Final

Supplement to the Revised Maintenance Plan for The Charlotte-Gastonia-Salisbury, North Carolina 2008 8-Hour Ozone Marginal Nonattainment Area

Prepared by

North Carolina Department of Environmental Quality

Division of Air Quality

Revised: July 25, 2018

Proposed Supplement: July 16, 2020

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Preface: In this supplement, North Carolina is proposing to revise the 2026 motor vehicle emission budgets (MVEBs) for oxides of nitrogen (NO_x) and volatile organic compound (VOC) emssions in the Charlotte-Gastonia-Salisbury area by increasing the allocations of safety margin emissions. The MVEB revisions are proposed to accommodate recent updates to the travel demand model used to calculate vehicle miles traveled in the affected area. The proposed revisions to the MVEBs for 2026 do not change the overall maintenance plan emissions upon which the safety margins are based. In addition, the revisions do not exceed 50 percent of the total available safety margin.

EXECUTIVE SUMMARY

Introduction

Ozone is formed by a complex set of chemical reactions involving volatile organic compounds (VOCs), nitrogen oxides (NOx) and to a lesser extent carbon monoxide (CO). These gases are generated by utilities, combustion processes, certain industrial processes and even by natural sources such as trees. Tailpipe emissions from mobile sources (vehicles) are also significant sources of these pollutants. Emissions from smaller sources such as boat engines, lawn mowers and construction equipment also contribute to the formation of ozone. Ozone formation is promoted by strong sunlight, warm temperatures and light winds and is hence a problem predominantly during the hot summer months.

The 2008 8-hour ozone National Ambient Air Quality Standard (NAAQS) is 0.075 parts per million (ppm). An exceedance of the 2008 8-hour ozone NAAQS occurs when a monitor measures ozone above 0.075 ppm on average for an 8-hour period. A violation of this NAAQS occurs when the average of the annual fourth highest daily maximum 8-hour ozone values over three consecutive years is greater than or equal to 0.076 ppm. This three-year average is termed the "design value" for the monitor. The design value for a nonattainment area is the highest monitor design value in the area.

On July 28, 2015, the U. S. Environmental Protection Agency (EPA) published its final rule (80 FR 44873) in which it (1) determined that the Charlotte-Gastonia-Salisbury, North Carolina 2008 8-Hour Ozone Marginal Nonattainment Area (hereinafter referred to as the "Charlotte area" or "maintenance area") was attaining the 2008 8-hour ozone NAAQS, (2) redesignated the North Carolina portion of the Charlotte area to attainment for the 2008 8-hour ozone NAAQS, (3) approved and incorporated North Carolina's maintenance plan for maintaining attainment of the 2008 8-hour ozone standard for the North Carolina portion of the Charlotte area into the State Implementation Plan (SIP), and (4) determined that the 2014 and 2026 sub-area NOx and VOC motor vehicle emissions budgets (MVEBs) for 2026 for the North Carolina portion of the Charlotte area were adequate for the purposes of transportation conformity. The final rule became effective August 27, 2015.

On the same day, EPA also published its final rule (80 FR 44868) approving of North Carolina's Clean Air Act (CAA) Section 110(l) noninterference demonstration for relaxing the Federal Reid vapor pressure (RVP) requirement from 7.8 pound per square inch (psi) to 9.0 psi applicable to gasoline introduced into commerce from June 1 to September 15 of each year in Mecklenburg and Gaston Counties. The EPA subsequently issued a direct final rule (80 FR 49164) on August 17,

2015, approving revisions to the rule (effective on October 16, 2015) to relax the summertime RVP requirement in the two counties.

In 2017, 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) which revised the state's emissions inspection and maintenance (I/M) program. Section 3.5.(b) of the Act amended *North Carolina General Statue (NCGS) §143-215.107A(c) §20-183.2(b)* by changing the vehicle model year coverage from 1996 and newer vehicles to the most recent 20 model years (excluding the three most recent model year vehicles with less than 70,000 miles on the odometer).

On July 25, 2018, the DAQ submitted a revision to the maintenance plan for the Charlotte area to update the emissions forecast and MVEBs for 2026 to account for the small increase in NOx and VOC emissions associated with the change in vehicle model year coverage as proposed by Section 3.5.(b) of the Act. The DAQ also submitted an accompanying I/M SIP revision, CAA Section 110(l) noninterference demonstration, and revisions to North Carolina's air quality rule 15A North Carolina Administrative Code (NCAC) 02D .1002 (Applicability). On September 11, 2019, EPA published a final rule (84 FR 47889) approving the revisions (effective on October 11, 2019).

In accordance with Section 3.5.(d) of the Act, on September 17, 2019, the Secretary of the Department of Environmental Quality submitted official certification to North Carolina's Revisor of Statutes that EPA published its final approval of the SIP revisions. The Section also required the changes to become effective on the first day of a month that is 60 days after the Secretary's official certification was submitted. As a result, the effective date for implementing the changes to the vehicle model year coverage was on December 1, 2019.

The DAQ prepared this supplement to revise the motor vehicle emission budgets (MVEBs) for the Charlotte-Gastonia-Salisbury area by increasing the safety margin emissions allocated to the MVEBs of each of the three budget regions in the area. Transportation conformity in the Charlotte-Gastonia-Salisbury, North Carolina 2008 8-Hour Marginal Nonattainment Area ensures that federal transportation actions do not interfere with maintaining compliance with the 2008 8-hour ozone National Ambient Air Quality Standards (NAAQS). As such, the level of emissions estimated for Transportation Improvement Programs and Metropolitan Transportation Plans must not exceed the MVEBs as defined in the area's maintenance plan. Historically, the North Carolina Division of Air Quality (DAQ) has limited the allocation of nitrogen oxides (NOx) and volatile organic compounds (VOC) safety margin emissions to MVEBs so that less than 50% of the safety margin of each pollutant is allocated. In this submittal, North Carolina is proposing to increase the amount of the total safety margin allocated to the 2026 MVEBs from 4.7% to 9.4%

for NOx and from 18.7% to 37.4% for VOC. The MVEB revisions are proposed to accommodate recent updates to the travel demand model used to calculate vehicle miles traveled for the Charlotte area.

The proposed revisions to the MVEBs were agreed upon at the March 27, 2020, interagency consultation meeting and do not change the overall maintenance plan emissions upon which the safety margins are based. In addition, the Charlotte-Gastonia-Salisbury area is currently attaining the 2008 and 2015 8-hour ozone NAAQS based on certified ambient monitoring data. Therefore, the DAQ concludes that the proposed revisions to the 2026 MVEBs will not interfere with any applicable requirement concerning the attainment and maintenance of the NAAQS.

Charlotte-Gastonia-Salisbury Nonattainment Designation

The area surrounding Charlotte-Gastonia-Salisbury, North Carolina, called the Charlotte area, was designated as marginal nonattainment for the 2008 8-hour ozone NAAQS on May 21, 2012 (77 Federal Register (FR) 30088). The nonattainment designation was an action taken by EPA under Section 107(d) of the CAA. The CAA requires that some area be designated as nonattainment if a monitor is found to be in violation of a NAAQS. For the 2008 8-hour ozone NAAQS, the EPA took designation action in 2012 based on 2009-2011 design values. At that time, the design value for the Charlotte area was 0.079 ppm.

The Charlotte area includes the entire county of Mecklenburg and parts of Cabarrus, Gaston, Iredell, Lincoln, Rowan and Union Counties (see Figure 1). The partial counties include the townships listed in Table 1. Note that the EPA also designated the portion of York County, South Carolina that is adjacent to the Charlotte area nonattainment for the 2008 8-hour ozone NAAQS. On April 17, 2015, the South Carolina Department of Health & Environmental Control (SCDHEC) submitted to EPA a SIP package request to redesignate the York County portion of the Charlotte nonattainment area to attainment. On December 11, 2015, EPA approved the SCDHEC's request and the redesignation to attainment became effective on January 11, 2016 (80 FR 76865).

Charlotte Nonattainment Area Boundary

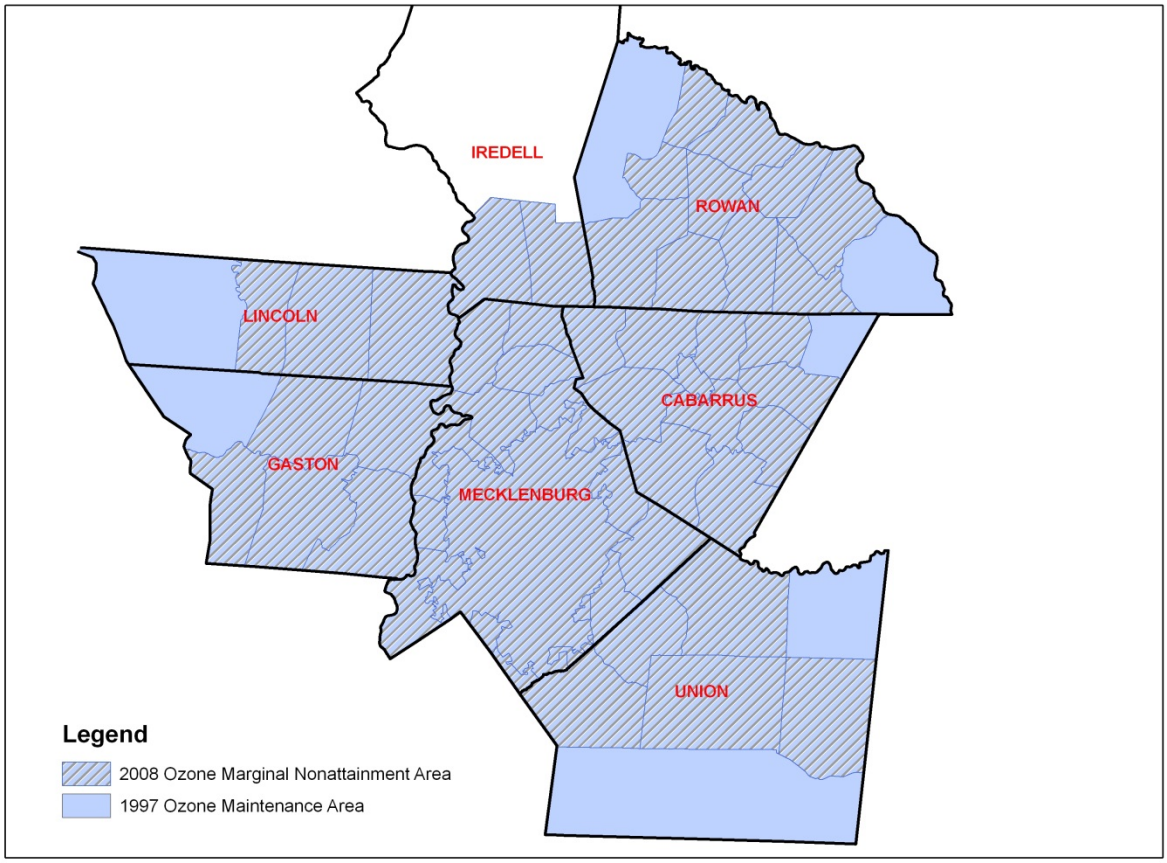

Table 1 Counties and Townships within the Charlotte Nonattainment Area

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 the EPA to add the missing townships in the state's 2008 marginal ozone nonattainment area definition.

Current Air Quality

There are currently six ozone monitors located throughout the Charlotte area and one monitor located in York County, South Carolina, just outside of the area. The design value for the nonattainment area is 0.073 ppm based on the data from 2012-2014. The 2014 8-hour ozone monitoring data for the Charlotte area was fully quality assured and officially submitted to the EPA for certification approval on December 12, 2014. The EPA concurred with the North Carolina Division of Air Quality (DAQ) and Mecklenburg County Air Quality (MCAQ) certification on December 15, 2014. A detailed discussion of air quality levels in the region is provided in Section 2.0.

Maintenance Plan Requirements

The state of North Carolina has implemented permanent and enforceable state and federal actions to reduce ozone precursor emissions in the North Carolina portion of the Charlotte area. In addition, MCAQ has implemented actions to reduce ozone precursor emissions. This combination of state, federal, and local actions has resulted in cleaner air in the Charlotte area, and the anticipated future benefits from these programs are expected to result in continued maintenance of the 2008 8-hour ozone NAAQS in this region. State actions include the Clean Smokestacks Act; the on-board diagnostic (OBDII) vehicle I/M program that began on July 1, 2002; and voluntary programs to reduce emissions from diesel engines. Local actions implemented by MCAQ include a prohibition on open burning and a very effective voluntary program called Grants to Replace Aging Diesel Engines (GRADE).[1] The GRADE program is designed to reduce NOx emissions by providing businesses and organizations funding incentives to replace or repower heavy-duty non-road equipment with newer, cleaner, less polluting engines.

Several federal actions have resulted in lower emissions throughout the eastern portion of the country. For on-road and nonroad vehicles, federal actions include the Tier 2 engine standards for light- and medium-duty vehicles, heavy-duty engine standards, the low-sulfur gasoline and diesel requirements, and off-road engine standards. For stationary sources, federal actions include the Mercury and Air Toxics (MATS) rule for electricity generating units (EGUs) and the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for industrial, commercial and institutional boilers and reciprocating internal combustion engines (RICE). In addition, there are several federal actions that will be implemented starting in 2015. These actions will provide for additional NOx emissions reductions in and near the Charlotte area. For EGUs, the future federal actions include compliance with the Cross State Air Pollution Rule (CSAPR) and the Tennessee Valley Authority (TVA) consent decree. For on-road vehicles, the future federal actions include

[1] http://charmeck.org/mecklenburg/county/LUESA/AirQuality/MobileSources/Pages/GRADE.aspx.

compliance with the Tier 3 vehicle emissions and fuel standards and corporate average fuel economy standards for on-road vehicles.

Emissions

A base year inventory for NOx and VOC emissions was developed for 2014 since the design value for the 2012-2014 period shows attainment of the 2008 8-hour ozone NAAQS. Future year emissions inventories were also developed for the interim years 2015, 2018, 2022, and a final year emission inventory was developed for 2026. For each future year, the total NOx and VOC emissions is lower than the 2014 base year emissions. Furthermore, emissions modeling and air quality modeling for 2018 and 2030 performed by the EPA for the new Tier 3 engine and fuel standards and modeling performed by the Southeastern states for 2018 indicate that the area will be in attainment of the 2008 ozone NAAQS.[2, 3] The emission inventory comparison demonstrates that the Charlotte area is expected to maintain the 2008 8-hour ozone NAAQS through 2026 since in no future year are the emissions expected to be greater than they were in the base year. The area is also in compliance with Section 110 and Part D requirements of the CAA.

Conclusion and Request for Approval of Revised Maintenance Plan

Based on the information provided in this supplement to the revised SIP and criteria established in Section 107(d)(3)(E) of the CAA, North Carolina is requesting that EPA approve this supplement to the revised maintenance plan for the Charlotte-Gastonia-Salisbury maintenance area. The proposed revisions entail only increases to MVEBs, and do not affect the projected emissions inventories for 2026. The current approved maintenance plan demonstrates that the projected emissions inventories for 2026, the final year of the maintenance plan and 10 years beyond the redesignation year, as well as the interim years, are all less than the base year emissions inventory. Therefore, continued maintenance of the 2008 8-hour ozone NAAQS will not be affected by the proposed revisions.

[2] US EPA, http://www.epa.gov/otaq/documents/tier3/454r14002.pdf.
[3] Southeastern States Air Resource Managers (SESARM); Southeastern Modeling, Analysis and Planning (SEMAP) study, http://semap.ce.gatech.edu/sites/default/files/files/projections/base2018b-O3-DVFs-DDVFs-for-4configs.xls.

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Acronym	Definition
AADVMT	Average annual daily vehicle miles traveled
AERR	Air Emission Reporting Rule
ARRA	American Recovery and Reinvestment Act
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CAMD	Clean Air Markets Division
CDOT	Charlotte Department of Transportation
CFR	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality Improvement
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CRMPO	Cabarrus Rowan Metropolitan Planning Organization
CRTPO	Charlotte Regional Transportation Planning Organization
CSAPR	Cross State Air Pollution Rule
DAQ	North Carolina Division of Air Quality
DERA	Diesel Emissions Reduction Act
DOC	Diesel Oxidation Catalyst
DPF	Diesel Particulate Filter
EF	Emission factor
EGU	Electricity Generating Units
EPA	United States Environmental Protection Agency
ºF	Degrees Fahrenheit
FHWA	Federal Highway Administration
FIP	Federal Implementation Plan
FR	Federal Register
GCLMPO	Gaston-Cleveland-Lincoln Metropolitan Planning Organization
GHG	Greenhouse Gas
GIS	Geographic Information System
GRADE	Grants to Replace Aging Diesel Engines
HAP	Hazardous Air Pollutant
HC	Hydrocarbons
HDDV	Heavy duty diesel vehicles
HDGV	Heavy duty gas vehicles
HPMS	Highway performance monitoring system
I/M	Inspection and Maintenance
ICI	Industrial and commercial/institutional

Acronym	Definition
KCLT	Charlotte Douglas International Airport
kg/day	Kilograms/Day
lbs	Pounds
LDDT1	Light duty diesel trucks 1
LDDT2	Light duty diesel trucks 2
LDDV	Light duty diesel vehicles
LDGT1	Light duty gas trucks 1
LDGT2	Light duty gas trucks 2
LDGV	Light duty gas vehicles
MATS	Mercury Air Toxics Standards
MC	Motorcycles
MCAQ	Mecklenburg County Air Quality
MOA	Memorandum of Agreement
MOVES	Motor Vehicle Emissions Simulator
mpg	miles per gallon
MPO	Metropolitan Planning Organization
MRM	Metrolina Regional Model
MTP	Metropolitan Transportation Plan
MVEB	Motor Vehicle Emission Budget
NAAQS	National Ambient Air Quality Standard
NCAA	North Carolina Air Awareness
NCAC	North Carolina Administrative Code
NCDOT	North Carolina Department of Transportation
NEI	National Emissions Inventory
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHTSA	National Highway Traffic Safety Administration
NMOG	Non-methane Organic Gases
NOx	Nitrogen Oxides
NSPS	New Source Performance Standard
OBD	Onboard Diagnostic
PM	Particulate Matter
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
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
RICE	Reciprocating Internal Combustion Engines

Acronym	Definition
RPO	Rural Planning Organization
RRRPO	Rock River Rural Planning Organization
RT	Road type
RVP	Reid Vapor Pressure
SCDHEC	South Carolina Department of Health and Environmental Control
SEMAP	Southeastern Modeling, Analysis and Planning
SESARM	Southeastern States Air Resource Managers
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SUV	Sport Utility Vehicle
TDM	Transportation Demand Model
TIP	Transportation Improvement Program
TVA	Tennessee Valley Authority
UI	Urban interstate
UF	Urban freeway
VHT	Vehicle Hours Traveled
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

1.0 INTRODUCTION

1.1 WHAT IS TROPOSPHERIC OZONE?

Ozone, a strong chemical oxidant, adversely impacts human health through effects on respiratory function and can also damage forests and crops. Ozone is not emitted directly by the electric utilities, industrial sources or motor vehicles but instead, is formed in the lower atmosphere, the troposphere, by a complex series of chemical reactions involving nitrogen oxides (NOx), resulting from the utilities, combustion processes and motor vehicles, and reactive volatile organic compounds (VOCs). VOCs include many industrial solvents, toluene, xylene and hexane as well as the various hydrocarbons (HC) that are evaporated from the gasoline used by motor vehicles or emitted through the tailpipe following combustion.

Ozone formation is promoted by strong sunlight, warm temperatures, and light winds. High concentrations tend to be a problem in the eastern United States only during the hot summer months when these conditions frequently occur. Therefore, the U. S. Environmental Protection Agency (EPA) mandates seasonal monitoring of ambient ozone concentrations in North Carolina from April 1 through October 31 (40 CFR 58 App. D, 2.5).[4] The DAQ has examined both the man-made and natural sources of VOC emissions and their contribution to ozone formation in North Carolina. Because of the generally warm and moist climate of North Carolina, vegetation abounds in many forms, and forested lands naturally cover much of the state. As a result, the biogenic sector is the most abundant source of VOCs in North Carolina and accounts for approximately 90% of the total VOC emissions statewide. The overwhelming abundance of biogenic VOCs makes the majority of North Carolina a NOx limited environment for the formation of ozone. This is supported by a study published in the Journal of Environmental Management that concludes 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.[5] As a result, controlling anthropogenic VOC emissions in the Southeast is far less effective than controlling NOx emissions for purposes of reducing ozone levels.

On March 12, 2008, the EPA revised the primary (health) and secondary (welfare) National Ambient Air Quality Standards (NAAQS) for ozone to a level of 0.075 parts per million (ppm). An exceedance of the 2008 8-hour ozone NAAQS occurs when a monitor measures ozone above 0.075 ppm on average for an 8-hour period. A violation of this NAAQS occurs when the average of the annual fourth highest daily maximum 8-hour ozone values over three consecutive

[4] 40 CFR 58 App. D, 2.5.
[5] 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).

years is greater than or equal to 0.076 ppm. This three-year average is termed the "design value" for the monitor. The design value for a nonattainment area is the highest monitor's design value in the area.

1.2 CLEAN AIR ACT OF 1990

Since the 1977 amendments to the Clean Air Act (CAA), areas of the country that had not attained the ambient standard for a particular pollutant were formally designated as nonattainment for that pollutant. This formal designation concept was retained in the 1990 CAA Amendments.

1.3 AIR QUALITY HISTORY

The area surrounding Charlotte-Gastonia-Rock Hill, North Carolina-South Carolina, called the Metrolina area (see Figure 1.1), was designated nonattainment for the 1997 8-hour ozone NAAQS on April 30, 2004.[6] The 1997 8-hour ozone NAAQS was set at 0.085 ppm. The Metrolina nonattainment area includes the North Carolina counties of Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan and Union; Coddle Creek and Davidson Townships in Iredell County, North Carolina; and the Rock Hill Metropolitan Planning Organization boundary in York County, South Carolina. On December 2, 2013, the EPA approved North Carolina's redesignation demonstration and maintenance plan for the 1997 8-hour ozone NAAQS for the Charlotte-Gastonia-Rock Hill, North Carolina area.[7]

On July 20, 2012, the EPA designated the Charlotte-Gastonia-Salisbury, North Carolina nonattainment area (referred to as the Charlotte area) as "marginal" nonattainment for the 2008 8-hour ozone standard (Figure 1.1) based on the ambient data from 2009-2011. The nonattainment area includes all of Mecklenburg County and portions of Cabarrus, Gaston, Iredell, Lincoln, Rowan, and Union Counties. Table 1.1 identifies the townships in each county that are included in the Charlotte nonattainment area. At that time, the design value for the Charlotte area was 0.079 ppm. The official designation and classification was published in the Federal Register (FR) on May 21, 2012.[8] The designation became effective on July 20, 2012.

[6] 69 FR 23858.
[7] 78 FR 72036.
[8] 77 FR 30088.

Figure 1.1 Charlotte Nonattainment Area Boundary

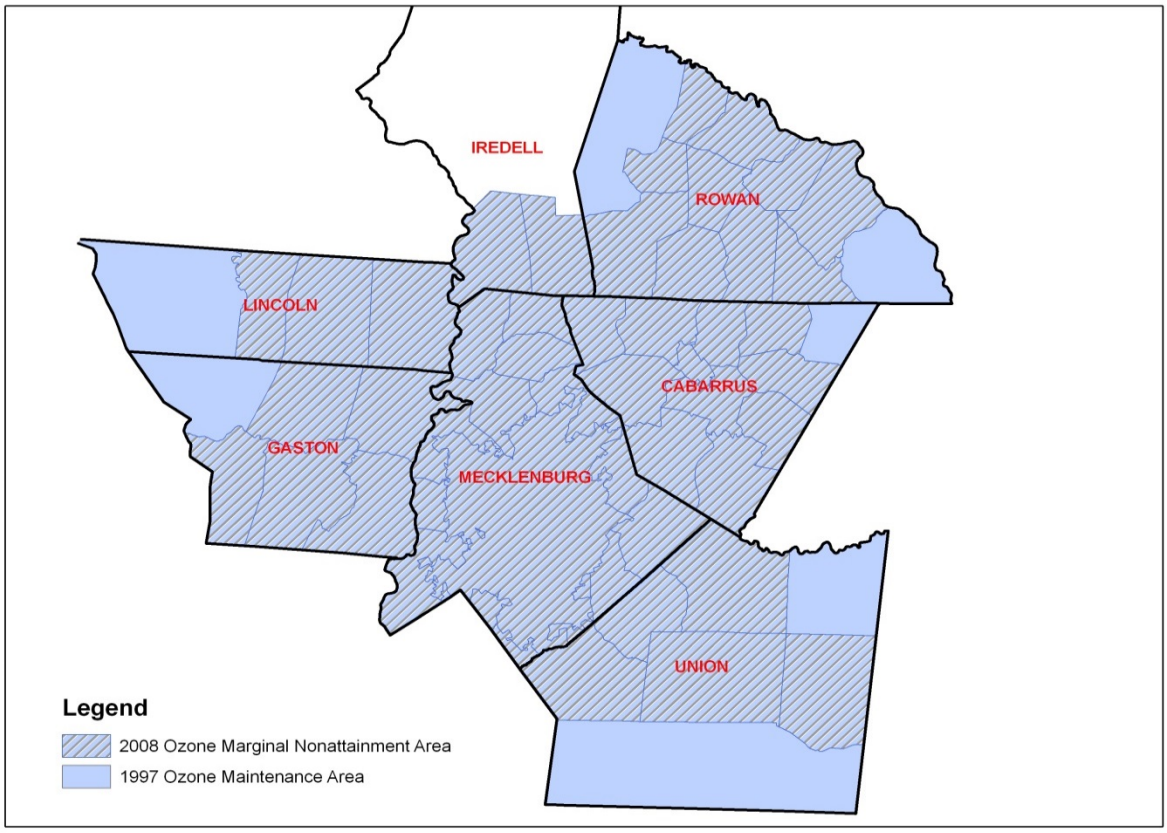


Table 1.1 Counties and Townships within the Charlotte Nonattainment Area

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 North Carolina Division of Air Quality (DAQ) requested EPA to add the missing townships in the state's 2008 marginal ozone nonattainment area definition.

There are currently six ozone monitors located throughout the Charlotte area and one monitor located in York County, South Carolina. The North Carolina Division of Air Quality (DAQ) operates three of the monitors in the Charlotte area, the Mecklenburg County Air Quality (MCAQ) operates three of the monitors in the Mecklenburg County, and South Carolina Department of Health and Environmental Control (SCDHEC) operates the York County monitor.

In 2013, all but two monitors, Garinger and County Line located in Mecklenburg County, came into attainment of the 2008 8-hour ozone NAAQS. With the completion of the 2014 ozone season, the Garinger and County Line monitors attained the standard as well. The 2012-2014 design value for Charlotte area is 0.073 ppm.

1.4 CLEAN AIR ACT REDESIGNATION CRITERIA

Section 107(d)(3)(E) of the CAA, as amended, states an area can be redesignated to attainment if the following conditions are met:

1. The EPA has determined that the NAAQS have been attained. For ozone, the areas must show that the average of the fourth highest 8-hour ozone values from three (3) complete, consecutive calendar years of quality-assured air quality monitoring data must be below 0.076 ppm.

2. The applicable implementation plan has been fully approved by the EPA under Section 110(k).

3. The EPA has determined that the improvement in air quality is due to permanent and enforceable reductions in emissions. To demonstrate this, the state should estimate the percent reduction (from the year used to determine the design value for designation and classification) achieved from federal, state, and local measures.

4. The state has met all applicable requirements for the area under Section 110 and Part D.

5. The EPA has fully approved a maintenance plan, including a contingency plan, for the areas under Section 175A.

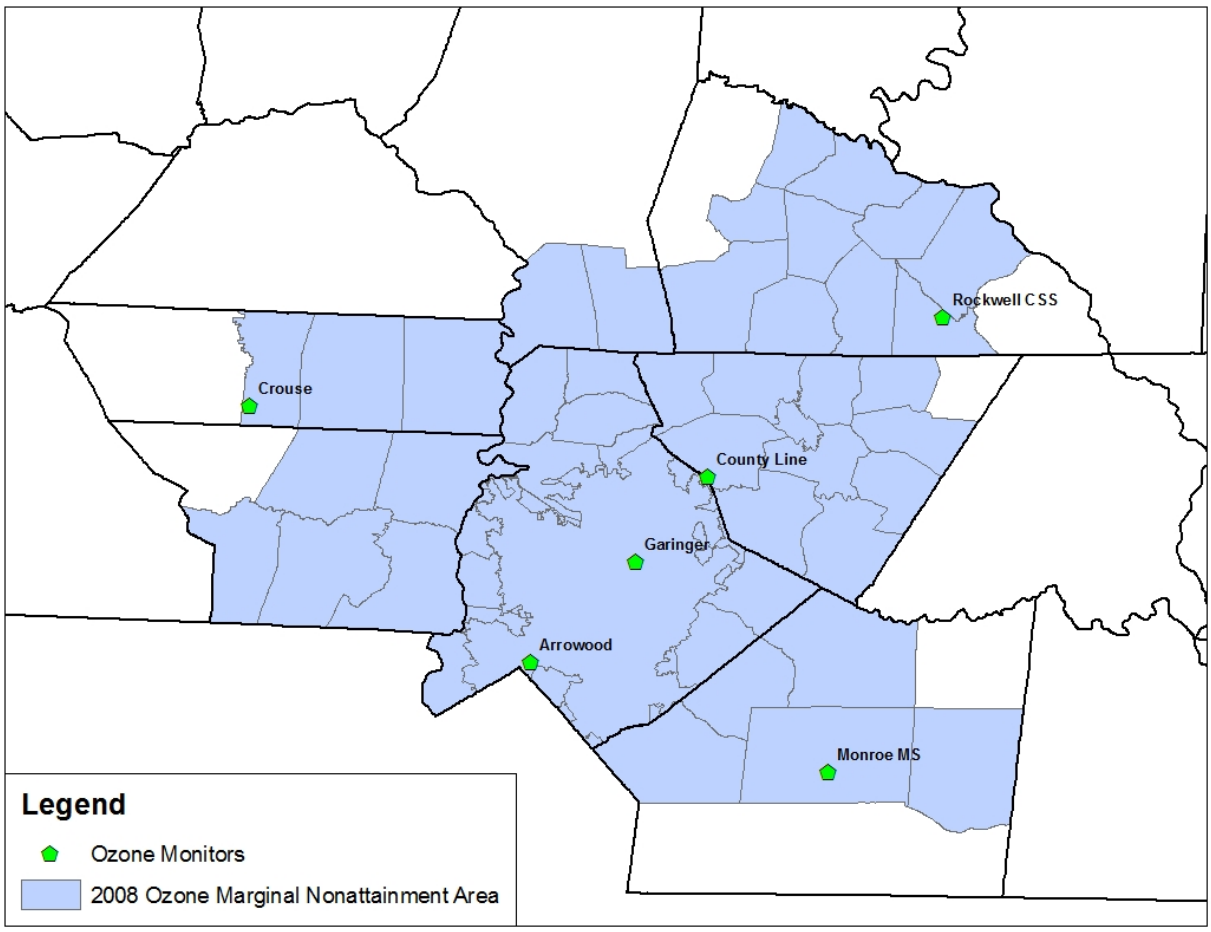
In the following sections, the DAQ provides the technical data necessary to show that the Charlotte-Gastonia-Salisbury nonattainment area has attained and is expected to maintain the 2008 8-hour ozone standard, and has met the requirements for redesignation set forth above.

2.0 AIR QUALITY

2.1 HISTORIC AIR QUALITY (2003 – 2011)

The DAQ and MCAQ have collected ambient monitoring data for the Charlotte area since the late seventies. Figure 2.1 shows the location of the six ozone monitors throughout the Charlotte nonattainment area. In addition, one additional ozone monitor is located in York County, South Carolina (not shown in Figure 2.1). These monitors were installed in accordance with the Code of Federal Regulations (CFR) 40 CFR 58.

Figure 2.1 Ozone Monitor Locations in the Charlotte Nonattainment Area



Tables 2.1 and 2.2 show the air quality data and corresponding design values for the monitors in the Charlotte region, respectively, from 2003 to 2014. As shown in Table 2.2, the design values for most of the monitors near and downwind of Charlotte have been declining rapidly in the past several years.

Table 2.1 Charlotte Area's Historic 4th Highest 8-hour Ozone Values (2003-2014)

Monitor	4th Highest 8-hour Ozone Values (ppm)											
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Crouse AIRS ID #37-109-0004 Lincoln County	0.089	0.074	0.082	0.082	0.085	0.079	0.065	0.072	0.077	0.076	0.064	0.064
Garinger AIRS ID #37-119-0041 Mecklenburg County	0.086	0.085	0.088	0.091	0.093	0.085	0.069	0.082	0.088	0.080	0.067	0.065
Arrowood AIRS ID #37-119-1005 Mecklenburg County	0.073	0.077	0.085	0.078	0.087	0.073	0.068	0.078	0.082	0.073	0.062	0.063
County Line AIRS ID #37-119-1009 Mecklenburg County	0.088	0.083	0.090	0.093	0.096	0.093	0.071	0.082	0.083	0.085	0.066	0.068
Rockwell AIRS ID #37-159-0021 Rowan County	0.098	0.080	0.086	0.085	0.096	0.084	0.071	0.077	0.077	0.080	0.062	0.064
Enochville[1] AIRS ID #37-159-0022 Rowan County	0.087	0.080	0.088	0.089	0.095	0.082	0.073	0.078	0.078	0.077	0.063	-----
Monroe AIRS ID #37-179-0003 Union County	0.083	0.074	0.082	0.080	0.082	0.080	0.067	0.071	0.073	0.075	0.062	0.067
York AIRS ID #45-091-0006 York County	0.076	0.071	0.079	0.078	0.080	0.075	0.062	0.065	0.065	0.065	0.061	0.056

[1] Monitoring data for 2014 are not available for this monitor because it was shut down in 2014.

Table 2.2 Charlotte Area's Historic Design Values (2003 - 2014)

Monitor	Design Value (ppm)									
	03-05	04-06	05-07	06-08	07-09	08-10	09-11	10-12	11-13	12-14
Crouse AIRS ID #37-109-0004 Lincoln County	0.081	0.079	0.083	0.082	0.076	0.072	0.071	0.075	0.072	0.068
Garinger AIRS ID #37-119-0041 Mecklenburg County	0.086	0.088	0.090	0.089	0.082	0.078	**0.079**	**0.083**	**0.078**	0.070
Arrowood AIRS ID #37-119-1005 Mecklenburg County	0.078	0.080	0.083	0.079	0.076	0.073	**0.076**	**0.077**	0.072	0.066
County Line AIRS ID #37-119-1009 Mecklenburg County	0.087	0.088	0.093	0.094	0.086	0.082	**0.078**	**0.083**	**0.078**	0.073
Rockwell AIRS ID #37-159-0021 Rowan County	0.088	0.083	0.089	0.088	0.083	0.077	0.075	**0.078**	0.073	0.068
Enochville[1] AIRS ID #37-159-0022 Rowan County	0.085	0.085	0.090	0.088	0.083	0.077	**0.076**	**0.077**	0.072	----
Monroe AIRS ID #37-179-0003 Union County	0.079	0.078	0.081	0.080	0.076	0.072	0.070	0.073	0.070	0.068
York AIRS ID #45-091-0006 York County	0.075	0.076	0.079	0.077	0.072	0.067	0.064	0.065	0.063	0.060

Note: Bolded values represent violations of the 2008 8-hour ozone standard.
[1] 2012-2014 design value for this monitor is not available because it was shut down in 2014.

2.2 RECENT AIR QUALITY VALUES (2012 –2014)

Under the CAA, a marginal classification for the 2008 8-hour ozone NAAQS requires North Carolina to attain the standard within three years of designation, or July 20, 2015. However, in the 2008 Ozone Implementation Rule, the EPA extended the compliance date to December 31,

2015.[9] In a ruling by the U.S. Court of Appeals for the District of Columbia Circuit, the extension deadline was vacated, among other decisions.[10]

The most recent three years of ozone monitoring data (2012-2014) for the Charlotte nonattainment area demonstrate compliance with the 2008 8-hour ozone NAAQS. Table 2.3 is a summary of the fourth highest 8-hour average ozone concentration and the design value at each of the monitors in the Charlotte region for 2012-2014.

Table 2.3 Charlotte Area's Current Air Quality Data (2012 -2014)

Monitor	Year	4th Highest 8-hour ozone values (ppm)	Design Value (ppm) 2012-2014
Crouse AIRS ID #37-109-0004 Lincoln County	2012	0.076	0.068
	2013	0.064	
	2014	0.064	
Garinger AIRS ID #37-119-0041 Mecklenburg County	2012	0.080	0.070
	2013	0.067	
	2014	0.065	
Arrowood AIRS ID #37-119-1005 Mecklenburg County	2012	0.073	0.066
	2013	0.062	
	2014	0.063	
County Line AIRS ID #37-119-1009 Mecklenburg County	2012	0.085	0.073
	2013	0.066	
	2014	0.068	
Rockwell AIRS ID #37-159-0021 Rowan County	2012	0.080	0.068
	2013	0.062	
	2014	0.064	
Monroe AIRS ID #37-179-0003 Union County	2012	0.075	0.068
	2013	0.062	
	2014	0.067	
York AIRS ID #45-091-0006 York County	2012	0.065	0.060
	2013	0.061	
	2014	0.055	

[9] 78 FR 34178.
[10] http://www.cadc.uscourts.gov/internet/opinions.nsf/E97A64FFBFE4DC1D85257DB70054D5EE/$file/12-1321-1528834.pdf.

The 2014 8-hour ozone monitoring data for the Charlotte nonattainment area was fully quality assured and officially submitted to the EPA for certification approval on December 12, 2014. The EPA concurred with the DAQ and MCAQ certification on December 15, 2014. The Enochville site in Rowan County was shut down in 2014, but the most recent design value for that site was 0.072 ppm in 2011-2013 and it was not the highest value in Rowan County or the greater Charlotte area at the time of its shutdown.

The monitoring data shown above demonstrates that the Charlotte area is attaining the 2008 8-hour ozone standard, and is on schedule with the compliance date mandated in the CAA and upheld by the D.C. Circuit Court.

2.3 PERMANENT AND ENFORCEABLE EMISSIONS REDUCTIONS

There are several state and federal measures that have been enacted in recent years that have ensured permanent and enforceable emissions reductions. A list of those measures that contributed to the permanent and enforceable emission reductions are summarized here and are more fully described in Section 3.2.

The federal measures that have been implemented include:

- Tier 2 vehicle and fuel standards: Implementation began in 2004 and requires all passenger vehicles in each manufacture's fleet to meet an average standard of 0.07 grams of NOx per mile. Additionally, in January 2006 the sulfur content of gasoline was required to be on average 30 ppm which assists in lowering NOx emissions. Most gasoline sold in North Carolina prior to January 2006 had a sulfur content of about 300 ppm. These emission reductions are federally enforceable.

- Tier 3 vehicle and fuel standards: Implementation begins in 2017 with full compliance required by 2025. Tier 3 requires all passenger vehicles to meet an average standard of 0.03 gram/mile of NOx. Compared to Tier 2, the Tier 3 tailpipe standards for light-duty vehicles are expected to reduce NOx and VOC emissions by approximately 80%. Tier 3 vehicle standards also include evaporative standards using onboard diagnostics (OBD) that will result in a 50% reduction in VOC emissions over Tier 2. The rule reduces the sulfur content of gasoline to 10 ppm starting in January 2017. These emission reductions will be federally enforceable.

- National program for greenhouse gas (GHG) emissions and fuel economy standards: The federal GHG and fuel economy standards apply to light-duty cars and trucks in

model years 2012-2016 (phase 1) and 2017-2025 (phase 2). The final standards are projected to result in an average industry fleet-wide level of 163 grams/mile of carbon dioxide (CO_2) which is equivalent to 54.5 miles per gallon (mpg) if achieved exclusively through fuel economy improvements. The fuel economy standards will result in less fuel being consumed, and therefore less NOx emissions released. These emission reductions will be federally enforceable.

- Heavy-duty gasoline and diesel highway vehicle standards: Implementation of the program began in 2004 with full implementation in 2010. The program was estimated to reduce NOx emissions by 95% and required that the sulfur content of fuel be reduced to 15 ppm. These emission reductions are federally enforceable.

- Medium- and heavy-duty vehicle fuel consumption and GHG standards: Began implementation in 2014 and requires on-road vehicles to achieve from a 7% to 20% reduction in CO_2 emissions and fuel consumption by 2018. The decrease in fuel consumption will result in a 7% to 20% decrease in NOx emissions. These emission reductions will be federally enforceable.

- Large nonroad diesel engine standards: Phased in between 2008 through 2014, the combined engine and fuel requirements are expected to reduce NOx emissions by 90% and reduce the sulfur content in the nonroad diesel fuel to 15 ppm. These emission reductions are federally enforceable.

- Nonroad spark-ignition engine and recreational engine standards: Tier 1 of these standards was implemented in 2004 and Tier 2 started in 2007. These standards reduce NOx emissions by 80%. These emission reductions are federally enforceable.

- Clean Air Interstate Rule (CAIR) and Cross State Air Pollution Rule (CSAPR): In May 2005, the EPA promulgated CAIR to reduce NOx and sulfur dioxide (SO_2) emissions from electricity generating units (EGUs). After court challenges to CAIR, the EPA issued CSAPR in July 2011. CSAPR will take effect starting January 1, 2015 for SO_2 and annual NOx, and May 1, 2015 for ozone season NOx. Combined with other final state and EPA actions, the CSAPR will reduce power plant SO_2 emissions by 73% and NOx emissions by 54% from 2005 levels. The emission reductions will be federally enforceable.

- Tennessee Valley Authority (TVA) Consent Decree: In January 2009, a federal court required TVA coal-fired EGUs to install modern pollution controls for SO_2 and NOx

After an appeals court reversed the decision, North Carolina, TVA, and several other parties agreed to a settlement. The settlement caps NOx and SO_2 emissions at all of TVA's coal-fired facilities to permanent levels of 52,000 tons of NOx in 2018 and 110,000 tons of SO_2 in 2019. These emission reductions are federally enforceable.

- Boiler and Reciprocating Internal Combustion Engine (RICE) National Emissions Standards for Hazardous Air Pollutants (NESHAP): The NESHAPs for industrial, commercial and institutional boilers and RICE are expected to result in a small decrease in VOC emissions. Boilers must comply with the NESHAP by January 31, 2016 for all states except North Carolina which has a compliance date in May 2019 (see following discussion under state measures). RICE owners and operators had to comply with the NESHAP by May 3, 2013. These emission reductions are federally enforceable.

- Utility Mercury Air Toxics Standards (MATS) and New Source Performance Standards (NSPS): On February 16, 2012, the EPA published final rules for both the (1) MATS for new and existing coal- and oil-fired EGUs and (2) NSPS for fossil-fuel fired electric utility, industrial-commercial-institutional and small industrial-commercial-institutional steam generating units.[11] The MATS reduce emissions of toxic air pollutants from EGUs larger than 25 megawatts that burn coal or oil for the purpose of generating electricity for sale and distribution through the national electric grid to the public. For the NSPS, the EPA revised the standards that new coal- and oil-fired power plants must meet for NOx, SO_2, and particulate matter (PM). While MATS is still under court review, and portions of it may be overturned, the rule can be expected to result in the reduction of both NOx and SO_2 emissions in addition to the reduction in mercury and other air toxic emissions. The emission reductions associated with the MATS and revised NSPS are federally enforceable.

The state measures that have been implemented include:

- Vehicle Emissions Inspection and Maintenance (I/M) Program: In 1999, the North Carolina State Legislation passed the Clean Air Bill that expanded the on-road vehicle I/M program from 9 to 48 counties. It was phased-in in the Charlotte area from July 1, 2002 through January 1, 2004. This program reduces NOx, VOC and CO emissions. The rule for the I/M program was submitted to the EPA for adoption into the State Implementation Plan (SIP) in August 2002 and was federally approved

[11] 77 FR 9304.

in October 2002. Therefore, these emission reductions are both state and federally enforceable.

On February 5, 2015, the EPA approved a change to North Carolina's I/M rules triggered by a state law which exempted plug-in vehicles and the three newest model year vehicles with less than 70,000 miles on their odometers from emission inspection in all areas in North Carolina where I/M is required.[12] In North Carolina's Section 110(l) demonstration, the state showed that the change in the compliance rate from 95% to 96% more than compensates for the NOx and VOC emissions increase. The EPA-approved change to the I/M rules was effective March 9, 2015, and are state and federally enforceable. See Section 3.2.2 of this SIP for a more detailed discussion of this change.

- Clean Smokestacks Act: This state law requires coal-fired power plants to reduce annual NOx emissions by 77% by 2009, and to reduce annual SO_2 emissions by 49% by 2009 and 73% by 2013. This law set a NOx emissions cap of 56,000 tons/year for 2009 and SO_2 emissions caps of 250,000 tons/year and 130,000 tons/year for 2009 and 2013, respectively. The public utilities cannot meet these emission caps by purchasing emission credits. The EPA approved the statewide emissions caps as part of the Charlotte SIP on September 26, 2011. In 2013, the power plants subject to this law had combined NOx emissions of 38,857 tons/year, well below the 56,000 tons/year cap. The emissions cap has been met in all subsequent years as well. These emissions limits are enforceable at both the federal and state level.

- Boiler NESHAP: Because of delays associated with the EPA's promulgation of the boiler NESHAP, North Carolina adopted and implemented equivalent emission limitations by permit under Section 112(j) of the CAA.[13] These limitations apply to owners and operators of industrial, commercial and institutional boilers and process heaters burning natural gas, coal, oil or biomass beginning in 2013. These emissions limits are enforceable at both the federal and state level.

- Transportation Conformity Memorandum of Agreements (MOAs): The Conformity MOAs are signed by federal and state transportation agencies and local air quality organizations and the Metropolitan Planning Organization (MPOs) subject to transportation conformity requirements for applicable transportation-related NAAQs and satisfies the requirement in the CAA Section 176(c). The DAQ chose through

[12] Approval and Promulgation of Implementation Plans; North Carolina; Inspection and Maintenance Program Updates, 80 FR, 6455.
[13] 15A NCAC 02D .1109 - 112(j) Case-by-Case Maximum Achievable Control Technology.

rulemaking to develop Conformity MOAs to ensure that interagency consultation procedures for transportation conformity are followed in each of the nonattainment or maintenance areas in the state.

2.4 ADDITIONAL PROGRAMS SUPPORTING MAINTENANCE

This section provides a brief summary of state and local programs that have been implemented in the Charlotte area to maintain compliance with the NAAQS. Although these are important programs that help to ensure compliance with the NAAQS, they have not been relied upon as federally enforceable measures. These state and local programs are more fully described in Section 3.3.

State programs that have been implemented include:

- Air awareness program: The North Carolina Air Awareness Program is a public outreach and education program of the DAQ. The goal of the program is to reduce air pollution though voluntary actions by individuals and organizations. The program seeks to educate individuals about (1) the sources of air pollution; (2) the health effects of air pollution and how these effects can be mitigated by modification of outdoor activities on ozone action days; and (3) simple "action tips", such as carpooling, vehicle maintenance and energy conservation that reduce individual contributions to air pollution. One of the major program components is the daily air quality forecast. The DAQ produces the 8-hour ozone forecasts and corresponding air quality index for the Charlotte forecast area from April 1 through October 31 of each year.[14] Additionally, the DAQ produces daily PM forecasts for the Charlotte area.

- Grant Program: The DAQ has offered multiple forms of grant funding from state and federal funds to help cover the costs associated with emission reduction projects across the state. These projects include diesel engine replacements, diesel oxidation catalyst (DOC) retrofits, marine diesel repowers, replacing gasoline vehicles with electric vehicles, vehicle replacement and many more. Grant projects that have been awarded have helped to reduce PM, NO_x, CO and VOC emissions from mobile sources.

- Open burning rule: This rule prohibits open burning of man-made materials throughout the state. Additionally, the rule prohibits open burning of yard waste in areas that the DAQ forecasts air quality action days. The open burning regulation

[14] See N.C. DAQ http://www.ncair.org/airaware/.

reduces NOx, VOC, and CO emissions as well as PM with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}) and 2.5 micrometers ($PM_{2.5}$).

- Idle Reduction Regulation: The North Carolina Environmental Management Commission adopted the Heavy-Duty Vehicle Idling Restrictions rule to reduce unnecessary idling of heavy-duty trucks on July 9, 2009 and the rule became effective on July 10, 2010. This rule generally prevents any person who operates a heavy-duty vehicle to cause, let, permit, suffer or allow idling for a period of time in excess of 5 consecutive minutes in any 60 minute period. This rule is state enforceable.

Local program that have been implemented include:

- Open Burning Prohibition: Mecklenburg County prohibits open burning of any kind year round, except under extenuating circumstances with an approved burn permit. This prohibition is more stringent than the state's open burning rule and therefore enhances this control measure's overall benefit to the region. The open burning rule reduces NOx, VOC, CO, PM_{10} and $PM_{2.5}$. These emission reductions are enforceable at the local level.

- Grants to Replace Aging Diesel Engines (GRADE) Program: In 2007, MCAQ initiated an air pollution control program called GRADE designed to reduce NOx emissions in the Charlotte area. Funded by federal, state and local county grant money, GRADE provides businesses and organizations financial incentives to replace or repower heavy-duty non-road equipment with newer, cleaner, less polluting engines. GRADE has funded cost effective emission reduction projects operating in multiple segments of the economy including construction, landfills, timber logging operations, open pit mining, freight transportation, and commercial aviation. As of July 31, 2014, GRADE projects have reduced over 350 tons of NOx region-wide.

- Mobile Source Emissions Reduction Grants: This program reduces NOx, PM, and VOC emissions. MCAQ has also received Diesel Emissions Reduction Act (DERA) funding as well as American Recovery and Reinvestment Act (ARRA) and Congestion Mitigation and Air Quality Improvement (CMAQ) program funding. These funds have been used to repower or replace existing diesel engines from on-road vehicles and nonroad equipment. Even though these emission reductions are voluntary and not enforceable, they are still considered permanent reductions.

2.5 EFFECT OF NOX CONTROL PROGRAMS ON OZONE LEVELS

The foundation control program for stationary and mobile sources for the Charlotte area has significantly reduced NOx emissions enabling the area to demonstrate attainment with the 2008 ozone NAAQS. As an example, historically EGUs have been a significant source of NOx emissions contributing to ozone formation during the summer months in the Charlotte area as well as statewide. A recent review of the NOx emissions in the EPA's Air Markets Program Data database shows a reduction in over 96,641 tons of NOx from the reporting sources in North Carolina between 2002 and 2013. The trend in decreasing NOx emissions from these facilities are attributable to a combination of state (Clean Smoke Stacks Act) and federal (CAIR / CSAPR) measures and market forces (switching from coal to natural gas due to favorable natural gas prices). Table 2.4 presents the annual emissions for the North Carolina sources obtained from the EPA's Air Markets Program Data database.

Table 2.5 shows trends in NOx emissions from 2002 through 2013 from North Carolina power plants in the Charlotte area, as well as the power plants located directly north and west of the Charlotte region that may impact the area. There are four facilities located within Gaston, Lincoln and Rowan Counties. The facility west of the Charlotte area is Cliffside, located in Cleveland County and the facility north of the

Table 2.4 NOx Emissions from NC Sources in EPA's Air Markets Program Database

Year	Annual NOx Emissions from NC Sources (tons)
2002	145,706
2003	135,879
2004	124,079
2005	114,300
2006	108,584
2007	64,770
2008	61,669
2009	44,506
2010	57,305
2011	48,889
2012	51,057
2013	49,065

Charlotte area is Marshall located in Catawba County. These data are taken from the EPA Clean Air Markets Division's (CAMD) Air Markets Program Data and represent the second and third quarters of the year (April through September), the period during which ozone levels are the highest. The emissions from these facilities have significantly decreased during the ozone season since 2002, with over 12,000 tons of NOx reduction in the 2013 ozone season compared

to 2002. In addition, two coal-fired power plants (Buck and Riverbend) were retired in April 2013, which resulted in additional emissions reductions.

Table 2.5 April 1 through September 30 NOx Emissions for Electric Utilities Near Charlotte Area (tons/period)

Facility	County	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Allen*	Gaston	5,011	3,643	4,002	3,589	3,001	3,053	3,082	2,188	2,925	2,738	1,676	1,906
Riverbend*	Gaston	2,556	2,703	1,844	1,379	1,417	1,296	1,256	304	1,063	884	109	0
Lincoln*	Lincoln	44	20	50	20	52	81	33	6	40	46	10	22
Buck*	Rowan	1,084	1,468	1,089	1,286	1,262	870	832	197	783	477	196	61
Marshall	Catawba	9,283	9,101	8,243	7,558	6,370	7,253	7,151	4,481	4,861	5,443	5,128	4,777
Cliffside	Cleveland	1,944	2,149	1,738	1,782	1,540	1,311	1,173	561	357	469	267	673
Total	**-----**	**19,922**	**19,084**	**16,966**	**15,614**	**13,642**	**13,864**	**13,527**	**7,737**	**10,029**	**10,057**	**7,386**	**7,439**

*Facility is located within the Charlotte nonattainment area boundary.

Temperature is a key meteorological factor that determines the ozone production potential of a given day. In North Carolina, many exceedances occur when the maximum daily temperature is 90 degrees Fahrenheit (ºF) or greater. In recent years, however, foundation control program measures have reduced NOx emissions in the Charlotte area to the extent that recent trends are showing that ozone levels are lower than the NAAQS even when the daily temperature is 90 ºF or greater. Figure 2.2 shows the relationship of exceedance days to high temperature days from 2000 through 2014 for the Charlotte region monitors. The relationship between the maximum 4th highest ozone value to high temperature days from 2000 through 2014 is displayed in Figure 2.3.

It is important to see how the ozone levels have changed over the last decade in response to lower NOx emissions in the state. The worst summer in terms of the number of exceedance days and observed 4th highest ozone concentrations was 2002, with 61 exceedance days in the Charlotte region and a maximum 4th highest daily average 8-hour concentration of 0.108 ppm. That summer there were 49 days when the temperature was 90 ºF or greater in the Charlotte region. The next highest number of exceedance days occurred in 2007 with 56 days and 74 days with temperatures at or above 90 °F, yet the maximum 4th highest daily average 8-hour concentration was significantly lower than 2002 at 0.096 ppm. More recently, in the year 2010, the Charlotte area experienced the hottest summer of the 21st century with 86 days at or above 90 °F. However, the Charlotte area only observed 17 exceedance days and the maximum 4th highest daily average concentration was only 0.082 ppm. In subsequent years, the 4th-highest values have generally decreased as the number of very hot days over 90 degrees has moderated. In 2014, there were a total of 37 days with a high temperature over 90 degrees, but no exceedances of the 2008 8-hour ozone standard and a peak 4th highest daily average value of 0.068 ppm. The steady decrease of ozone values over the last 15 years regardless of summertime temperature regime illustrates the progress that North Carolina has made and the positive effects of the

control strategies put in place by North Carolina, Mecklenburg County and the EPA to regulate NOx emissions.

Figure 2.2 Relationship between high temperature days and number of exceedance days in the Charlotte area

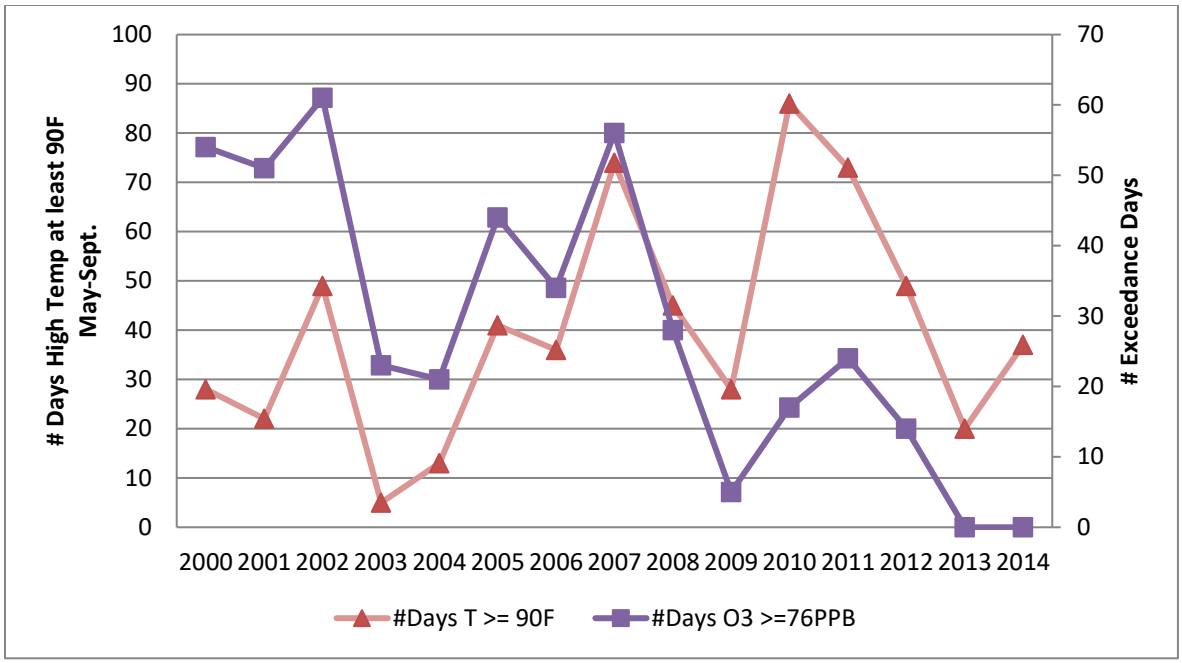
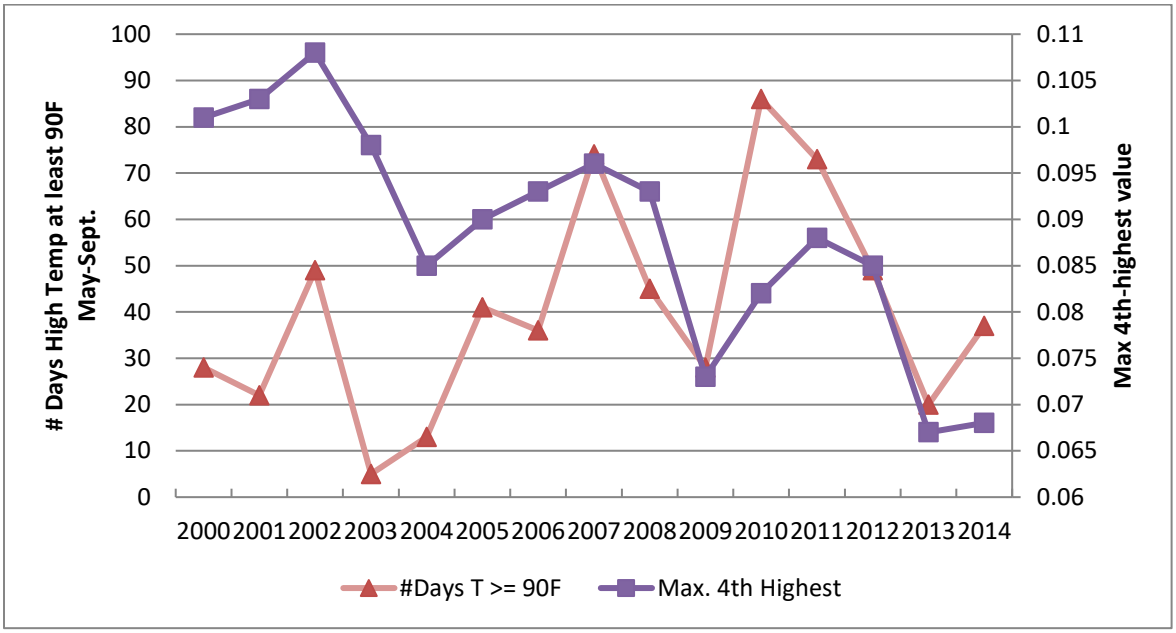


Figure 2.3 Relationship between high temperature days and maximum 4th highest ozone value in the Charlotte Area



3.0 MAINTENANCE PLAN

3.1 CONCEPT OF NORTH CAROLINA'S MAINTENANCE PLAN

The state's plan for maintaining compliance with the ambient air quality standard for the 2008 8-hour ozone in the Charlotte-Gastonia-Salisbury nonattainment area consists of three major parts: a foundation control program, a maintenance demonstration, and a contingency plan. The foundation control program consists of the current federal and state control measures already in effect, as well as the future benefits of the federal actions. For EGUs, the future federal actions include implementation of the MATS, CSAPR, and carbon rules and the TVA consent decree. Additionally, North Carolina will continue to implement and enforce the Clean Smokestacks Act. For on-road vehicles, the future federal actions include compliance with the Tier 3 vehicle emissions and fuel standards and corporate average fuel economy standards for on-road vehicles. Although North Carolina did not rely on the emission reductions from CSAPR or the TVA consent decree for maintenance of the 2008 8-hour ozone standard, these actions will result in additional reductions in NOx emissions regionally.

The foundation control program includes federally and state enforceable control programs that have been adopted and implemented by the DAQ. These programs will remain enforceable and ensure that maintenance of the 2008 8-hour ozone standard will continue. Sources are prohibited from reducing or removing emission controls (anti-backsliding) following the redesignation of the area unless such a change is first approved by the EPA as a revision to the North Carolina SIP that is consistent with Section 110(l) of the CAA.

For the maintenance demonstration, the base year of 2014 was chosen since it is a year that falls within the attaining design value period of 2012-2014. The interim years 2015, 2018 and 2022 were chosen based on consultation with the EPA. The final year of the maintenance demonstration is 2026, since the CAA requires maintenance for at least 10 years after the EPA approves the redesignation demonstration and maintenance plan. The maintenance demonstration consists of a comparison between the 2014 baseline emissions inventory and the projected emissions inventories (for 2015, 2018, 2022, and 2026), which consider economic and population growth. The comparison shows that the total emissions in each of the interim years and the final year is estimated to be lower than in the base year, which demonstrates maintenance of the 2008 8-hour ozone standard. The reductions in emissions are due to the foundation control programs outlined below.

The North Carolina contingency plan involves tracking and triggering mechanisms to determine when contingency measures are needed and a process of implementing appropriate control measures. The primary trigger of the contingency plan will be a violation of the ambient air

quality standard for 2008 8-hour ozone standard. The secondary trigger will be a monitored air quality pattern that suggests an actual 2008 8-hour ozone NAAQS violation may be imminent.

On April 17, 2015, the SCDHEC submitted to EPA a SIP package request to redesignate the York County portion of the Charlotte nonattainment area to attainment. On December 11, 2015, EPA approved the SCDHEC's request and the redesignation to attainment became effective on January 11, 2016 (80 FR 76865).

3.2 FOUNDATION CONTROL PROGRAM

The main element of the maintenance plan is the foundation control program. The foundation control program consists of a combination of federal and state control measures necessary to maintain the ambient air quality standards. The purpose of the foundation control program is to prevent the ambient air quality standards from being violated and thereby eliminate the need for more costly controls being imposed on industry and the general public. Each component of the foundation control program is essential in demonstrating maintenance of the air quality standards. The following provides a summary of each federal and state control measure included in the foundation control program for the Charlotte nonattainment area. All of these programs have already been implemented or are in the process of being implemented.

3.2.1 Federal Control Measures

Tier 2 Vehicle and Fuel Standards

Federal Tier 2 vehicle standards require all passenger vehicles in a manufacturer's fleet, including light-duty trucks and sport utility vehicles (SUVs), to meet an average standard of 0.07 gram/per mile of NOx. Implementation began in 2004, with full compliance required by 2007. The Tier 2 standards also cover passenger vehicles over 8,500 pounds gross vehicle weight rating (the larger pickup trucks and SUVs), which are not covered by the Tier 1 regulations. For these vehicles, the standards were phased in beginning in 2008, with full compliance required by 2009. The Tier 2 standards require vehicles to be 77% to 95% cleaner. The Tier 2 rule also reduced the sulfur content of gasoline to 30 ppm starting in January of 2006. Most gasoline sold in North Carolina prior to January 2006 had a sulfur content of about 300 ppm. Sulfur occurs naturally in gasoline and interferes with the operation of catalytic converters on vehicles, which results in higher NOx emissions. Lower-sulfur gasoline is necessary to achieve the Tier 2 vehicle emission standards.[15] These emission reductions are federally enforceable.

[15] Fact Sheet, Office of Mobile Sources, EPA-420-F-99-051, December 1999.

Tier 3 Vehicle and Fuel Standards

Federal Tier 3 vehicle standards require all passenger vehicles in a manufacturer's fleet, including light-duty trucks and SUVs, to meet an average standard of 0.03 gram/per mile of NOx. Heavy-duty passenger vehicles must meet average standards of 0.178 to 0.247 gram/per mile of NOx depending on vehicle classification. Implementation begins in 2017, with full compliance required by 2025. Compared to current standards in 2014, the Tier 3 tailpipe standards for light-duty vehicles are expected to reduce non-methane organic gases (NMOG) and NOx by approximately 80%. The Tier 3 program is expected to reduce per-vehicle PM standards by approximately 70%. The heavy-duty tailpipe standards represent about a 60% reduction in both fleet average NMOG+NOx and per vehicle PM standards. Tier 3 vehicle standards also require evaporative standards including OBD that will result in a 50% reduction in VOC emissions from Tier 2 for all 2017 and later light-duty and on-road gasoline-powered heavy-duty vehicles. The Tier 3 rule also reduced the sulfur content of gasoline to 10 ppm starting in January 2017. Tier 2 standards had limited the sulfur content to 30 ppm. Sulfur occurs naturally in gasoline and interferes with the operation of catalytic converters on vehicles, which results in higher NOx emissions.[16] These emission reductions are federally enforceable.[17]

National Program for GHG Emissions and Fuel Economy Standards

The EPA and the National Highway Traffic Safety Administration (NHTSA) jointly developed the federal GHG and fuel economy standards for light-duty cars and trucks in model years 2012-2016 (phase 1) and 2017-2025 (phase 2). The EPA also aligned implementation of the Tier 3 program with the second phase of the EPA and NHTSA federal GHG and fuel economy standards program. Together, phases 1 and 2 of the final standards are projected to result in an average industry fleet-wide level of 163 grams/mile of CO_2 in model year 2025, which is equivalent to 54.5 mpg if achieved exclusively through fuel economy improvements.[18] The fuel economy standards will result in less fuel being consumed, and therefore less NOx emissions released. These emission reductions will be federally enforceable.

Heavy-Duty Gasoline and Diesel Highway Vehicles Standards

The EPA standards designed to reduce NOx and VOC emissions from heavy-duty gasoline and diesel highway vehicles began to take effect in 2004. A second phase of standards and testing procedures that began in 2007 reduced PM from heavy-duty highway engines and also reduced highway diesel fuel sulfur content to 15 ppm since the sulfur damages emission control devices. The total program is expected to achieve a 90% reduction in PM emissions and a 95% reduction

[16] Fact Sheets, Office of Transportation and Air Quality, EPA-420-F-14-008 and EPA-420-F-14-009, March 2014.
[17] See U.S. EPA, http://www.epa.gov/otaq/tier3.htm.
[18] See U.S. EPA, http://www.epa.gov/otaq/climate/regs-light-duty.htm.

in NOx emissions for these new engines using low-sulfur diesel, compared to engines using higher-content sulfur diesel. These emission reductions are federally enforceable.

Large Nonroad Diesel Engines Rule

In May 2004, the EPA promulgated new rules for large nonroad diesel engines, such as those used in construction, agricultural and industrial equipment, to be phased in between 2008 and 2014. The nonroad diesel rules also reduced the allowable sulfur in nonroad diesel fuel to 15 ppm. Prior to the fuel standard change, nonroad diesel fuel averaged about 3,400 ppm sulfur. The combined engine and fuel rules are expected to reduce NOx and PM emissions from large nonroad diesel engines by over 90%.[19] These emission reductions are federally enforceable.

Medium- and Heavy-Duty Vehicle Fuel Consumption and GHG Standards

In September 2011, the EPA and the NHTSA promulgated joint rules to reduce GHG emissions and improve fuel efficiency of combination tractor trucks, heavy-duty pickups and vans, and vocational trucks beginning with model year 2014 and applying to all model years by 2018. Depending on truck type, the on-road vehicles must achieve from a 7% to 20% reduction in CO_2 emissions and fuel consumption from the 2010 base year. The decrease in fuel consumption will result in a 7% to 20% decrease in NOx emissions.[20] These emission reductions are federally enforceable.

Nonroad Spark-Ignition Engines and Recreational Engines Standard

The nonroad spark-ignition and recreational engine standards, effective in July 2003, regulates NOx, hydrocarbons and CO for groups of previously unregulated nonroad engines. These engine standards apply to all new engines sold in the United States and imported after these standards began and applies to large spark-ignition engines (forklifts and airport ground service equipment), recreational vehicles (off-highway motorcycles and all-terrain-vehicles), and recreational marine diesel engines. The regulation varies based upon the type of engine or vehicle.

The large spark-ignition engines contribute to ozone formation and ambient CO and PM levels in urban areas. Tier 1 of this standard was implemented in 2004 and Tier 2 started in 2007. Like the large spark-ignition, recreational vehicles contribute to ozone formation and ambient CO and PM levels. For the off-highway motorcycles and all-terrain-vehicles, the exhaust emissions standard was phased-in. Fifty percent of model year 2006 engines had to meet the standard and for model years 2007 and later, all engines must meet the standard. Recreational marine diesel

[19] See U.S. EPA http://transportpolicy.net/index.php?title=US:_Heavy-duty:_Fuel_Consumption_and_GHG
[20] Fact Sheet, Office of Transport and Air Quality, EOA-420-F-11-031, August 2011.

engines over 37 kilowatts are used in yachts, cruisers, and other types of pleasure craft. Recreational marine engines contribute to ozone formation and PM levels, especially in marinas. Depending on the size of the engine, the standard began phasing-in in 2006.

When the nonroad spark-ignition and recreational engine standards are fully implemented in 2020, an overall 72% reduction in hydrocarbons, 80% reduction in NOx, and 56% reduction in CO emissions are expected. These controls will help reduce ambient concentrations of ozone, CO, and fine PM.[21] These emission reductions are federally enforceable.

CAIR and CSAPR

On May 12, 2005, the EPA promulgated the CAIR which required reductions in emissions of NOx and SO_2 from large fossil fuel fired EGUs. CAIR also allowed non-EGU industrial boilers to participate in the program to meet their NOx SIP Call requirements.[22] The U.S. Court of Appeals for the D.C. Circuit ruled on petitions for review of CAIR and CAIR Federal Implementation Plans (FIPs), including their provisions establishing the CAIR NOx annual and ozone season and SO_2 trading programs. On July 11, 2008, the Court issued an opinion vacating and remanding these rules. However, parties to the litigation requested rehearing of aspects of the Court's decision, including the vacatur of the rules. On December 23, 2008, the Court remanded the rules to the EPA without vacating them. The December 23, 2008 ruling left CAIR in place until the EPA issued a new rule to replace CAIR in accordance with the July 11, 2008 decision.

The EPA issued CSAPR in July 2011 to address CAA requirements concerning interstate transport of air pollution and to replace the previous CAIR which the D.C. Circuit remanded to the EPA for replacement. Following the original rulemaking, CSAPR was amended by three further rules known as the Supplemental Rule, the First Revisions Rule, and the Second Revisions Rule. As amended, CSAPR requires 28 states to limit their state-wide emissions of SO_2 and/or NOx in order to reduce or eliminate the states' contributions to fine PM and/or ground-level ozone pollution in other states. The emissions limitations are defined in terms of maximum state-wide "budgets" for emissions of annual SO_2, annual NOx, and/or ozone-season NOx by each state's large EGUs.

As the mechanism for achieving compliance with the emissions limitations, CSAPR establishes FIPs that require large EGUs in each affected state to participate in one or more new emissions trading programs that supersede the existing CAIR emissions trading programs. Non-EGU

[21] Final Rule: Control of Emissions from Nonroad Large Spark-Ignition Engines, and Recreational Engines (Marine and Land-Based), 67 FR 68242.
[22] In 2009, the NOx SIP Call program was replaced by CAIR.

boilers are not able to participate in CSAPR, resulting in a group of "orphaned" industrial units that are still subject to the NOx SIP Call. Interstate trading of CSAPR's emission allowances is permitted, but the rule includes "assurance provisions" designed to ensure that individual states' emissions do not exceed the states' respective emissions budgets. CSAPR allows states to elect to revise their SIPs to modify or replace the FIPs while continuing to rely on the rule's trading programs for compliance with the emissions limitations, and establishes certain requirements and deadlines related to those optional SIP revisions. The rule also contains provisions that sunset CAIR compliance requirements on a schedule coordinated with the implementation of CSAPR compliance requirements.

Certain industry and state and local government petitioners challenged CSAPR in the D.C. Circuit and filed motions seeking a stay of the rule pending judicial review. On December 30, 2011, the Court granted a stay of the rule, ordering the EPA to continue administering CAIR on an interim basis. In a subsequent decision on the merits, the Court vacated CSAPR based on a subset of petitioners' claims, but on April 29, 2014, the U.S. Supreme Court reversed that decision and remanded the case to the D.C. Circuit for further proceedings. Throughout the initial round of D.C. Circuit proceedings and the ensuing Supreme Court proceedings, the stay remained in place and the EPA has continued to implement CAIR. Following the Supreme Court decision, in order to allow CSAPR to replace CAIR in an equitable and orderly manner while further D.C. Circuit proceedings are held to resolve petitioners' remaining claims, the EPA filed a motion asking the D.C. Circuit to lift the stay and to toll by three years all CSAPR compliance deadlines that had not passed as of the date of the stay order. On October 23, 2014, the Court granted the EPA's motion.

CSAPR will take effect starting January 1, 2015 for SO_2 and annual NOx, and May 1, 2015 for ozone season NOx. Combined with other final state and EPA actions, the CSAPR will reduce power plant SO_2 emissions by 73% and NOx emissions by 54% from 2005 levels in the CSAPR region.[23] The emission reductions will be federally enforceable.

TVA Consent Decree

In January 2009 a federal court found that four TVA coal-fired generating stations were creating a public nuisance in North Carolina. The judge ordered that each unit of each facility install modern pollution controls for SO_2 and NOx and meet emission limits that are consistent with the continuous operation of such controls. The court ordered that TVA meet these limits on a staggered schedule ending in 2013. In July 2010 an appeals court reversed the decision.

[23] Interim Final Rule: Rulemaking to Amend Dates in Federal Implementation Plans Addressing Interstate Transport of Ozone and Fine Particulate Matter, 79 FR 71663.

In April 2011 North Carolina, TVA, and several other parties agreed to a comprehensive settlement of a variety of air pollution allegations. The detailed settlement would (1) subject SO_2 and NOx emissions at all of TVA's coal-fired facilities to system-wide caps that decline on an annual basis to permanent levels of 110,000 tons of SO_2 in 2019 and 52,000 tons of NOx in 2018; (2) require TVA to install modern pollution controls on or shutdown the majority of its coal-fired units; and (3) require TVA to pay North Carolina $11.2 million to fund mitigation projects in North Carolina. The settlement is being successfully implemented, including the provision of funds directly to North Carolina for approved projects.[24] These emission reductions are federally enforceable.

Boiler NESHAP

The NESHAP for the industrial, commercial and institutional boiler source category is applicable to boilers and process heaters burning natural gas, coal, oil or biomass. Boilers must comply with the NESHAP by January 31, 2016 for all states except North Carolina (see state control measure Section 3.2.2 below for further discussion) and by May 2019 for boilers in North Carolina. The NESHAP contains work practice standards such as annual boiler tune ups for most boilers. There are also emissions standards for the largest emitting boilers (<1% of all boilers) including a CO standard that is a surrogate for gas-phase hazardous air pollutants (HAPs) and VOC. There is estimated to be a small reduction in VOC emissions due to the NESHAP.[25] These new emission reductions are federally enforceable.

RICE NESHAP

The RICE NESHAP applies to stationary engines burning natural gas and diesel fuels that generate electricity and power equipment at industrial, agricultural, oil and gas production, power generation and other facilities. RICE owners and operators had to comply with the NESHAP by May 3, 2013. The NESHAP contains work practice standards such as engine maintenance, requires ultralow-sulfur diesel fuel for some engines, and requires the use of catalytic converters on larger engines. There is estimated to be a slight reduction in VOC emissions due to the NESHAP.[26] These emission reductions are federally enforceable.

Utility MATS and NSPS Rules

On February 16, 2012, the EPA published final rules for both the (1) MATS for new and existing coal- and oil-fired EGUs and (2) NSPS for fossil-fuel fired electric utility, industrial-

[24] http://www.ncdoj.gov/getdoc/bdf66401-8137-4be2-bd20-57e89b570c1a/TVA-signed-consent-decree.aspx.
[25] See U.S. EPA http://www.epa.gov/ttn/atw/boiler/boilerpg.html.
[26] See U.S. EPA http://www.epa.gov/ttn/atw/icengines/.

commercial-institutional and small industrial-commercial-institutional steam generating units.[27] The MATS reduce emissions of toxic air pollutants from EGUs larger than 25 megawatts that burn coal or oil for the purpose of generating electricity for sale and distribution through the national electric grid to the public. For the NSPS, the EPA revised the standards that new coal- and oil-fired power plants must meet for NOx, SO_2, and PM.

Following promulgation of the final rules, the EPA received petitions for reconsideration of various provisions of both rules, including requests to reconsider the work practice standards applicable during startup periods and shutdown periods that were included in the final rule. The EPA granted reconsideration of the startup and shutdown provisions because the public was not provided an opportunity to comment on the work practice requirements contained in the final rule. On November 30, 2012, the EPA published a proposed rule reconsidering certain new source standards issued in MATS and the startup and shutdown provisions in MATS and the Utility NSPS.[28] The EPA proposed certain minor changes to the startup and shutdown provisions contained in the 2012 final rule based on information obtained in the petitions for reconsideration. On April 24, 2013, the EPA took final action on the new source standards that were reconsidered and also the technical corrections contained in the November 30, 2012, proposed action.[29] The EPA did not take final action on the startup and shutdown provisions, and, on June 25, 2013, the EPA added new information and analysis to the docket and reopened the public comment period for the proposed revisions to the startup and shutdown provisions in MATS and the startup and shutdown provisions related to the PM standard in the Utility NSPS.[30] The EPA took final action on the remaining topics of the reconsideration on November 19, 2014.[31] The compliance date for existing sources is April 16, 2015, while the compliance date for new sources is April 16, 2012.

On November 25, 2014, The U.S. Supreme Court accepted several challenges to the rules brought by the utility industry and a coalition of nearly two dozen states. The court will hear arguments in the case in the spring and is likely to rule in June 2015.[32] While MATS is still under court review, and portions of it may be overturned, the rule can be expected to result in the reduction of both NOx and SO_2 emissions in addition to the reduction in mercury and other air toxic emissions. The emission reductions are federally enforceable.

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[27] 77 FR 9304.
[28] 77 FR 71323.
[29] 78 FR 24073.
[30] 78 FR 38001.
[31] 79 FR 68777.
[32] Wall Street Journal, Nov. 25, 2014, Supreme Court to Review EPA Rule on Power Plant Emissions, http://www.wsj.com/articles/supreme-court-to-review-epa-rule-on-power-plant-emissions-1416942022?mod=WSJ_newsreel_6.

3.2.2 State Control Measures

North Carolina has adopted a number of regulations, legislation and voluntary programs to address pollution issues across the state. These are summarized below.

Vehicle Emissions Inspection and Maintenance (I/M) Program

The 1999 Clean Air Bill expanded the vehicle emissions I/M program in North Carolina from 9 counties to 48 counties from July 1, 2002 through January 1, 2006. Vehicles are tested using the OBDII, an improved method of testing, which ensures proper emission system operation for vehicles and light trucks during their lifetime by monitoring emission-related components and systems for malfunction and/or deterioration. An important aspect of OBDII is its ability to notify the driver of malfunction and/or deterioration by illuminating the "check engine light". If the vehicle is taken to a repair shop in a timely fashion, it can be properly repaired before any significant and prolonged emission increase occurs. The previously used tailpipe test (i.e., idle test) did not measure NOx emissions; it only tested for VOC and CO emissions. By utilizing the OBDII test method, the NOx emissions as well as other pollutants from motor vehicles are reduced. The effective dates for the counties in the North Carolina portion of the Charlotte nonattainment area are July 1, 2002 for Cabarrus, Gaston, Mecklenburg and Union Counties; July 1, 2003 for Iredell and Rowan Counties; and January 1, 2004 for Lincoln County.

The I/M program rule was submitted to the EPA for adoption into the SIP in August 2002 and was federally approved in October 2002. Therefore, these emission reductions are both state and federally enforceable.

On February 5, 2015, the EPA approved a change to North Carolina's I/M rules triggered by a state law which exempted plug-in vehicles and the three newest model year vehicles with less than 70,000 miles on their odometers from emission inspection in all areas in North Carolina where I/M is required.[33] In North Carolina's Section 110(l) demonstration, the state showed that the change in the compliance rate from 95% to 96% more than compensates for the NOx and VOC emissions increase from exempting the newest model year vehicles with less than 70,000 miles. Based on recent modeling the DAQ completed using the EPA's Motor Vehicle Emission Simulator (MOVES2014) model, North Carolina's current I/M program with the three newest model year vehicle exemption is expected to yield annual I/M emission reduction benefits ranging from 5% to 8% for NOx and 6% to 8.5% for VOC. The EPA-approved change to the

[33] Approval and Promulgation of Implementation Plans; North Carolina; Inspection and Maintenance Program Updates, 80 FR, 6455.

I/M rules was effective March 9, 2015. The emissions reductions are state and federally enforceable.

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 Statue (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, Section 3.5.(b) of 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. All seven counties in the Charlotte maintenance area will continue to operate the I/M program.

- 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 of these changes to North Carolina's I/M program are contingent upon EPA's approval of the changes. In addition, for the counties covered by this maintenance plan for the Charlotte area, EPA must also approve the revisions to the emissions inventory forecast, safety margins, and motor vehicle emissions budgets (MVEBs) for the three local planning organizations before implementing the changes to the vehicle model year coverage of the I/M program for the area.

Clean Smokestacks Act

In June 2002, the North Carolina General Assembly enacted the North Carolina Clean Smokestacks Act, which required coal-fired power plants in North Carolina to reduce annual

NOx emissions by 77% by 2009.[34] These power plants were also required to reduce annual SO_2 emissions by 49% by 2009 and 74% by 2013. The utilities have reduced NOx emissions by 83% and SO_2 emissions by 89% relative to 1998 emissions levels.

With the requirement to meet annual emissions caps and disallowing the purchase of NOx credits to meet the caps, the Clean Smokestacks Act reduces NOx emissions beyond the requirements of the NOx SIP Call Rule. The CSA emissions caps were submitted to the EPA for adoption into the SIP in August 2009 and were approved in September 2011. These regulations are both state and federally enforceable.

Boiler NESHAP

Because of delays associated with the EPA's promulgation of the boiler NESHAP, North Carolina adopted and implemented equivalent emission limitations by permit under Section 112(j) of the CAA.[35] These limitations apply to owners and operators of industrial, commercial and institutional boiler boilers and process heaters burning natural gas, coal, oil or biomass beginning in 2013. This rule reduced uncertainty for owners and operators of affected emission units while the EPA resolved legal challenges to the federal rule, reduced emissions from affected units three years earlier than the federal rule, and provided the time needed for owners and operators to transition to the federal rule requirements beginning in May 2019.[36] Although the rule establishes limits for reducing HAPs form boilers and process heaters, VOC emissions will also be controlled. In the Charlotte area, natural gas fired boilers are the only types of emission units affected by this rule. For natural gas fired boilers, VOC emissions are estimated to be reduced by 4%. The emission limits associated with this rule are state and federally enforceable.

Transportation Conformity MOAs

Transportation conformity MOAs establish criteria and procedures related to interagency consultation, conflict resolution, public participation and enforceability of certain transportation related control measures and mitigation measures in the State of North Carolina and its SIP.

Transportation conformity is required under section 176(c) of the CAA for nonattainment and maintenance areas to ensure that federally supported highway projects, transit projects, and other activities are consistent with (conform to) the purpose of the SIP, which is to eliminate or reduce the severity and number of violations of the NAAQS and to achieve expeditiously the attainment

[34] Air Quality/Electric Utilities Bill (SB 1078), http://daq.state.nc.us/news/leg/.
[35] 15A NCAC 02D .1109 - 112(j) Case-by-Case Maximum Achievable Control Technology.
[36] See U.S. EPA http://www.epa.gov/ttn/atw/boiler/boilerpg.html.

of such standards. In compliance with Section 176(c) of the CAA, the DAQ chose, through rulemaking as referenced in 15A North Carolina Administrative Code (NCAC) 02D.2005, to develop Conformity MOAs to ensure that interagency consultation procedures for transportation conformity are followed.[37] The Conformity MOAs were submitted to the EPA on July 12, 2013. The USEPA, through direct final rule action, approved a revision to the North Carolina SIP with the effective date of February 24, 2014.[38]

3.3 ADDITIONAL PROGRAMS SUPPORTING MAINTENANCE

This section provides a summary of state and local programs that have been implemented in the Charlotte area to maintain compliance with the NAAQS. Although these are important programs that help to ensure compliance with the NAAQS, they have not been relied upon as federally enforceable measures.

3.3.1 State Programs Supporting Maintenance

Air Awareness Program

The DAQ has found that the most effective outreach programs are performed by locally-based personnel who can work closely with members of the local community. The DAQ has contracted with MCAQ to manage the Charlotte area North Carolina Air Awareness (NCAA) program since its inception in 1997. Charlotte area NCAA has conducted educational outreach with the general public, built strong working relationships with regional interest groups, and developed communication resources for business coalition members. Coalition activities are designed to communicate air quality information, including the forecast, and promote voluntary emissions reduction programs. The business coalition includes partnerships with private businesses and civic organizations. These efforts are important for maintaining compliance with the NAAQS. Under MCAQ's management, Charlotte area NCAA has established itself as a leader in advocating for voluntary pollution reduction efforts throughout the state's only ozone nonattainment region.

Grant Program

Since 1995, the DAQ has offered multiple forms of grant funding to help cover the costs associated with emission reduction projects. These projects include diesel engine replacements, DOC retrofits, marine diesel repowers, replacing gasoline vehicles with electric vehicles and many more. One source of funding is the North Carolina Mobile Source Emissions Reduction Grants funded by gasoline tax receipts. The Mobile Source Emissions Reduction Grant program

[37] http://www.ncair.org/rules/rules/D2005.pdf.
[38] 78 FR 73266-78272.

has awarded grants to a number of businesses, cities, counties and school districts that have ranged from the installation of DOCs or Diesel Particulate Filters (DPFs) on their diesel equipment to non-diesel emission reduction projects like purchase of electric vehicles. The DAQ has also received federal funds from the DERA and the American Recovery and Reinvestment Act (ARRA) to fund diesel emission reducing projects. The DERA and ARRA funds that the DAQ has received have been used to retrofit, repower or replace existing diesel engines from on-road and nonroad mobile source vehicles/equipment. Even though these emission reductions are voluntary and not enforceable, they are still considered permanent reductions.

Open Burning Rule

The North Carolina open burning rule prohibits the burning of man-made materials statewide. The rule also prohibits open burning of yard waste and land clearing debris on forecasted code orange or higher "air quality action days" for those counties for which the DAQ or local air programs forecast ozone or fine PM.[39] The open burning rule reduces PM, SO_2, CO, NOx, and VOC emissions. This rule is state enforceable.

Idle Reduction Regulation

The North Carolina Environmental Management Commission adopted the Heavy-Duty Vehicle Idling Restrictions rule to reduce unnecessary idling of heavy-duty trucks on July 9, 2009 and the rule became effective on July 10, 2010. This rule generally prevents any person who operates a heavy-duty vehicle to cause, let, permit, suffer or allow idling for a period of time in excess of 5 consecutive minutes in any 60 minute period. This rule is state enforceable.

3.3.2 Local Programs Supporting Maintenance

Mobile Source Emissions Reduction Grants

In the Charlotte area, between 2011 and 2013, with funding from a settlement, a nonroad equipment repower was funded. This project resulted in significant fuel savings and reductions in NOx and $PM_{2.5}$ emissions.

GRADE Program

In 2007, MCAQ initiated an air pollution control program called GRADE designed to reduce NOx emissions in the Charlotte nonattainment area. Funded by federal, state and local county grant money, GRADE provides businesses and organizations financial incentives to replace or repower heavy-duty non-road equipment with newer, cleaner, less polluting engines.
GRADE has funded cost effective emission reduction projects operating in multiple segments of

[39] 15A NCAC 02Q.1900 – Open Burning.

the economy including construction, landfills, timber logging operations, open pit mining, freight transportation, and commercial aviation. As of July 31, 2014, GRADE projects have reduced over 350 tons of NOx region-wide.

Open Burning Prohibitions

Mecklenburg County prohibits open burning of any kind year round except under extenuating circumstances with an approved burn permit. This prohibition is more stringent than the state's open burning rule and therefore enhances this control measure's overall benefit to the region. The open burning rule reduces emissions of NOx, VOC, CO, PM_{10} and $PM_{2.5}$. These emission reductions are enforced at the local level.

3.4 EMISSIONS INVENTORIES AND MAINTENANCE DEMONSTRATION

3.4.1 Theory of Approach

There are two basic approaches used to demonstrate continued maintenance. The first is the comparison of a projected emissions inventory with a baseline emissions inventory. The second approach involves complex analysis using gridded photochemical modeling. The approach used by the DAQ is the comparison of emissions inventories for the years 2014 and 2026.

For the maintenance demonstration, the base year of 2014 was chosen since it is a year that falls within the attaining design value period of 2012-2014. The maintenance demonstration is made by comparing the 2014 baseline summer day emissions inventory to the 2026 projected summer day emissions inventory. The baseline summer day emissions inventory represents an emission level for a period when the ambient air quality standard was not violated, 2012-2014. If the projected emissions remain at or below the baseline emissions, continued maintenance is demonstrated and it then follows, if the projected emissions remain at or below the baseline emissions, then the ambient air quality standard should not be violated in the future. In addition to comparing the final year of the plan, all of the interim years are compared to the 2014 baseline to demonstrate that these years are also expected to show continued maintenance of the 2008 8-hour ozone standard.

The emissions inventories are comprised of four major types of sources: point, area, on-road mobile and nonroad mobile. The projected summer day emission inventories have been estimated using projected rates of growth in population, traffic, economic activity and other parameters. Naturally occurring, or biogenic, emissions are not included in the emissions inventory comparison, as these emissions are outside the state's span of control.

On April 17, 2015, the SCDHEC submitted to EPA a SIP package request to redesignate the York County portion of the Charlotte nonattainment area to attainment. On December 11, 2015, EPA approved the SCDHEC's request and the redesignation to attainment became effective on January 11, 2016 (80 FR 76865).

3.4.2 Emission Inventories

The base year and future year emissions include the emissions associated with all emission sources in Mecklenburg County and the portion of the other six counties that is included in the maintenance area. For point sources, the location coordinates for each facility were mapped using Geographic Information System (GIS) software to identify the facilities located within the maintenance area of each county. For the on-road mobile sector, emissions were modeled based on vehicle activity within the maintenance area of each county. For the nonroad mobile and area source sectors, total county emissions were multiplied by the population percentages for the townships within the maintenance area to calculate the emissions for the maintenance area for each county. Table 3.1 shows the population percentages that were used to determine emissions contributions for the maintenance area of each partial county (except for Mecklenburg County). The population percentages were obtained from transportation demand modeling (TDM) that the Charlotte Department of Transportation completed to develop vehicle miles traveled (VMT) and vehicle speed data used as inputs to the on-road model for the base year and each of the future year inventories.

Table 3.1 Population Percentages Used to Allocate Partial County Emissions

County	Population Percentage				
	2014	2015	2018	2022	2026
Cabarrus	99.4	99.4	99.5	99.5	99.5
Gaston	92.2	92.4	92.5	92.7	92.9
Iredell	44.2	44.5	45.3	46.1	46.6
Lincoln	83.3	83.3	83.6	83.8	84.1
Rowan	93.9	93.9	93.9	94.0	94.0
Union	87.6	87.5	87.5	87.6	87.6

In this SIP revision, the 2014 base year and 2015 emissions presented in the original April 16, 2015, maintenance plan for the Charlotte area were not changed.[40] However, the 2018, 2022, and 2026 emissions forecast for all sectors was revised to (1) account for anticipated future increases in on-road mobile source NOx and VOC emissions associated with changing the

[40] Redesignation Demonstration And Maintenance Plan and Clean Air Act Section 110(l) Non-Interference Demonstration to Support the Gasoline Reid Vapor Pressure (RVP) Standard Relaxation in Gaston and Mecklenburg Counties for The Charlotte-Gastonia-Salisbury, North Carolina 2008 8-Hour Ozone Marginal Nonattainment Area, Appendix B Emission Inventory Documentation, Prepared by North Carolina DEQ/DAQ, April 16, 2015.

vehicle model year coverage of North Carolina's I/M program in accordance with Section 3.5.(b) of Session Law 2017-10; and (2) incorporate the most recent emissions forecast data available for the nonroad, point, and area source sectors.

The DAQ prepared a 2018-year inventory for all sectors for the CAA Section 110(l) noninterference demonstration based on more recent data than were available when the original maintenance SIP was prepared for the Charlotte area.[41] Therefore, the DAQ revised 2018-year emissions in this revised maintenance SIP to be consistent with the emissions presented in the CAA Section 110(l) noninterference demonstration. The DAQ also revised the emissions for 2022 and 2026 in this maintenance SIP. Table 3.2 identifies the references/data sources for the 2014 base year emissions inventory and revised 2015, 2018, 2022, and 2026 emissions forecast prepared for each sector.

Table 3.2 References/Data Sources for the Base Year Emissions Inventory and Revised Emissions Forecast

Sector	Inventory Year	References / Data Sources
All Sectors	2014, 2015	Original Maintenance Plan.[40]
On-road	2018, 2022, 2026	MOVES2014 modeling – See Appendix A of this Revised Maintenance Plan.
Point EGU	2018, 2022, 2026	Emissions forecast provided by Duke Energy dated April 2017
Point non-EGU (including aircraft and rail yards), EGU NOx, nonroad, and area	2018	CAA Section 110(l) Noninterference Demonstration for Changing Vehicle Model Year Coverage of I/M program.[41]
Point non-EGU (including aircraft and rail yards), EGU VOC, nonroad, and area	2022, 2026	Applied 2022/2018 and 2026/2018 county-level ratio of emissions in the Original Maintenance Plan to the revised 2018 emissions in the CAA Section 110(l) Noninterference Demonstration to update the 2022 and 2026 emissions in this Revised Maintenance Plan. $2022\ revised = 2018\ revised\ x \frac{2022\ original}{2018\ original}$ $2026\ revised = 2018\ revised\ x \frac{2026\ original}{2018\ original}$

[41] CAA Section 110(l) Noninterference Demonstration for Changing the Vehicle Model Year Coverage for 22 Counties Subject to North Carolina's Motor Vehicle Emissions Inspection and Maintenance (I&M) Program, prepared by North Carolina DEQ/DAQ, Appendix B (Nonroad Sources), Appendix C (Point Sources), and Appendix D (Area Sources), Fall 2017.

The following provides a brief discussion on the four different man-made emission inventory source classifications: (1) stationary point, (2) stationary area, (3) on-road mobile and (4) nonroad mobile.

Point Sources

Point sources are those stationary sources that require an air permit to operate. In general, these sources have a potential-to-emit more than five tons per year of a criteria air pollutant or its precursors from a single facility. The source emissions are tabulated from data collected by direct on-site measurements of emissions or mass balance calculations utilizing emission factors from the EPA's AP-42 or stack test results. There are usually several emission sources for each facility. Emission data are collected for each point source at a facility and reported to the DAQ through its on-line system.

Airports and rail yards are not required to have air quality permits for construction and operation (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, for purposes of the EPA's National Emissions Inventory (NEI), they are included in the point source inventory even though they are traditionally considered nonroad sources.

Point EGU Sources

For EGUs, 2014 base year NOx emissions for July were obtained from the EPA's CAMD database for the G.G. Allen Steam Station in Gaston County, Lincoln County Combustion Turbine Station in Lincoln County, and Buck Steam Station in Rowan County. Total emissions for the month of July for each unit were divided by the number of days the unit operated in July to calculate average July day emissions. Base year 2014 July day VOC emissions were calculated for each unit using emissions for the month of July that Duke Energy Carolinas reported to the DAQ. A forecast that Duke Energy Carolinas provided to the DAQ was used to estimate NOx emissions for 2015.[42] For each unit, the 2014 to 2015 projection factor for NOx emissions was applied to VOC emissions for 2014 to estimate VOC emissions for 2015.

In April 2017, Duke Energy Carolinas provided the DAQ with a revised unit-level NOx emissions forecast for the month of July for 2018, 2022, and 2026.[43] The forecast did not include an estimate of the number of days each unit would operate in July; therefore, for each emission unit, July emissions for each year were divided by the number of days the unit operated

[42] Duke Energy Carolinas, NOx emissions forecast provided to NC DAQ, December 2, 2014.
[43] Duke Energy Carolinas, NOx emissions forecast provided to NC DAQ, April 17, 2017.

in July 2014 to estimate the average summer July day emissions for each year. The forecast reflects compliance with the North Carolina Clean Smokestacks Act, the MATS rule, and Phase I of CSAPR. Energy companies are not required to report VOC emissions to CAMD; therefore, the DAQ used 2018 emissions from the noninterference demonstration and then applied the growth rate for NOx emissions to estimate VOC emissions for 2022 and 2026.[44]

Point Non-EGU Sources

For non-EGU point sources, the latest data available were the 2013 emissions data that permitted sources submitted to the DAQ, and, for these sources, 2013 emissions were used to represent 2014 base year emission. The Charlotte maintenance area includes some small sources that report emissions to the DAQ once every five years and, for these sources, the most recently reported data were used and assumed to be equivalent to 2014 since the emissions from these small sources do not vary much from year to year.[45] The DAQ reviewed recent historical emissions data (i.e., 2010 - 2013) for non-EGU Title V sources and emissions sources subject to the emissions statements requirements. Based on this review, the DAQ decided that 2013 emissions should be used to represent 2014 emissions due to the uncertainty associated with applying regional growth factors to forecast emissions for one year.

For non-EGU point sources, aircraft, and rail yards, the 2018 inventory is based on the Mid-Atlantic Regional Air Management Association (MARAMA) Beta 2 air quality modeling platform for the year 2017.[46] 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).[47] The EPA's 2011v6.2eh modeling platform was developed from the 2011 NEI v2.[48] 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 2018 inventory was prepared.

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[44] At the time the EGU inventory was prepared for the noninterference demonstration, the DAQ used 2015 actual NOx and VOC emissions data to represent 2018 emissions. Note that although NOx emissions for 2016 were available from EPA at the time, 2016 VOC emissions that Duke Energy reported to the DAQ would not available until November 2017. Therefore, 2015 was selected to be representative of 2018 emissions because this is the most recent year for which both actual NOx and VOC emissions were available.

[45] North Carolina permit renewal intervals for small sources changed from every five years to every eight years, effective 2014.

[46] The previous version of the 2017 modeling platform was actually prepared for the year 2018. For most sources, 2018 emissions were assumed to represent 2017 emissions in the 2017 modeling platform.

[47] *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.

[48] *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.

The inventory includes 20 natural gas fired boilers that, beginning in 2014, are subject to equivalent emission limitations by permit that North Carolina established per Section 112(j) of the CAA. Although the Section 112(j) standards only apply to hazardous air pollutants, compliance with the standards also reduces VOC and NOx emissions. Therefore, VOC and NOx control factors were applied to the natural gas boilers to estimate emissions for 2018.

Non-EGU point, aircraft, and rail yard emissions for 2022 and 2026 were estimated by applying the 2022/2018 and 2026/2018 county-level ratio of emissions in the original maintenance plan to the revised 2018-year emissions. This approach provides consistency with the projection methods previously applied to estimate emissions for 2022 and 2026. Table 3.3 and Table 3.4 present a summary of the point source NOx and VOC emissions, respectively, on a ton per summer day basis.

Table 3.3 Point Source NOx Emissions (tons/summer day)

County	2014	2015	2018	2022	2026
Cabarrus*	1.72	1.80	0.85	0.91	0.96
Gaston*¥	16.50	17.25	5.27	1.44	4.09
Iredell*	2.02	2.03	2.46	2.46	2.46
Lincoln*	0.18	0.84	3.85	2.41	0.98
Mecklenburg	8.56	8.77	9.25	10.18	11.75
Rowan*	2.80	3.16	2.86	2.95	3.11
Union*	0.59	0.62	0.30	0.32	0.33
Total	**32.37**	**34.47**	**24.83**	**20.67**	**23.67**

* Emissions for portion of county included in maintenance area**.** Totals include emissions associated with stationary point sources, aircraft, and rail yards.

¥ For Gaston County, the fluctuation in NOx emissions from 2014 through 2026 are primarily associated with the emissions forecast that Duke Energy Carolinas provided for the G.G. Allen power plant.

Table 3.4 Point Source VOC Emissions (tons/summer day)

County	2014	2015	2018	2022	2026
Cabarrus*	0.99	1.03	0.74	0.75	0.80
Gaston*	1.82	1.90	1.35	1.33	1.49
Iredell*	0.68	0.68	0.80	0.80	0.80
Lincoln*	1.50	1.54	1.02	1.08	1.15
Mecklenburg	3.36	3.45	1.83	1.98	2.14
Rowan*	2.30	2.40	5.15	5.45	5.97
Union*	1.38	1.42	0.90	0.94	1.00
Total	**12.03**	**12.42**	**11.78**	**12.33**	**13.34**

* Emissions for portion of county included in maintenance area. Totals include emissions associated with stationary point sources, aircraft, and rail yards.

Area Sources

Area sources are those stationary sources whose emissions are relatively small but due to the large number of these sources, the collective emissions could be significant (i.e., dry cleaners, service stations, etc.). In general, area source emissions are estimated by multiplying an emission factor by some known indicator of collective activity such as production, number of employees, or population. These types of emissions are estimated on the county level. For 2014 and 2015, the emissions estimation methodology varied depending on the latest available data for each source category. The reader is referred to the area source documentation for the original maintenance plan for details.

For 2018, the area source emissions inventory is based on the MARAMA Beta 2 air quality modeling platform for the year 2017 as previously described for non-EGU point sources. Emissions for 2022 and 2026 were estimated by applying the 2022/2018 and 2026/2018 county-level ratio of emissions in the original maintenance plan to the revised 2018-year emissions. Table 3.5 and Table 3.6 present a summary of the area source NOx and VOC emissions, respectively, on a ton per summer day basis.

Table 3.5 Area Source NOx Emissions (tons/summer day)

County	2014	2015	2018	2022	2026
Cabarrus*	0.97	0.96	0.45	0.45	0.45
Gaston*	1.30	1.28	0.58	0.59	0.59
Iredell*	0.54	0.53	0.26	0.27	0.27
Lincoln*	0.40	0.40	0.15	0.15	0.15
Mecklenburg	6.07	6.01	5.37	5.37	5.37
Rowan*	0.87	0.86	0.40	0.40	0.40
Union*	1.25	1.24	0.50	0.50	0.50
Total	**11.40**	**11.28**	**7.71**	**7.73**	**7.73**

* Emissions for portion of county included in maintenance area.

Table 3.6 Area Source VOC Emissions (tons/summer day)

County	2014	2015	2018	2022	2026
Cabarrus*	5.09	5.13	4.56	4.70	4.83
Gaston*	5.24	5.30	5.86	6.04	6.21
Iredell*	3.08	3.13	2.56	2.69	2.82
Lincoln*	2.56	2.57	1.91	1.99	2.04
Mecklenburg	20.59	20.77	22.69	23.37	23.82
Rowan*	5.23	5.28	3.67	3.78	3.89
Union*	6.09	6.12	5.56	5.73	5.84
Total	**47.88**	**48.30**	**46.81**	**48.30**	**49.45**

* Emissions for portion of county included in maintenance area.

On-road Mobile Sources

For on-road mobile sources, EPA's MOVES2014 model was run to generate emissions for each year. The MOVES2014 model includes the road class VMT as an input file and can directly output the estimated emissions. For the projected years' inventories, the highway mobile source emissions are calculated by running the MOVES2014 model for the future year with the projected VMT to generate emissions that take into consideration expected federal tailpipe standards, fleet turnover and new fuels. Emissions for 2018, 2022, and 2026 were revised to account for increases in NOx and VOC emissions associated with changing the vehicle model year coverage of North Carolina's I/M program in accordance with Section 3.5.(b) of Session Law 2017-10. This was accomplished by modeling on-road mobile source emissions for 2018, 2022, and 2026 using new I/M model input parameters which characterize the revised I/M program. All other model inputs were unchanged from the original SIP. The emissions for 2014 and 2015 were not revised because they would not be affected by the I/M program change. For a detailed discussion on how the on-road mobile source emission inventory was developed, see Appendix A. Table 3.7 and Table 3.8 present a summary of the on-road mobile source NOx and VOC emissions, respectively, on a ton per summer day basis.

Table 3.7 On-road Mobile Source NOx Emissions (tons/summer day)

County	2014	2015	2018	2022	2026
Cabarrus*	6.60	5.93	4.01	2.89	2.00
Gaston*	8.11	7.26	4.70	3.15	2.12
Iredell*	3.36	3.05	2.08	1.46	1.00
Lincoln*	3.00	2.75	1.87	1.28	0.83
Mecklenburg	26.99	24.20	14.62	9.93	7.17
Rowan*	6.42	5.76	3.81	2.66	1.73
Union*	5.67	5.14	3.47	2.36	1.62
Total	**60.15**	**54.09**	**34.56**	**23.73**	**16.47**

* Emissions for portion of county included in maintenance area.

Table 3.8 On-road Mobile Source VOC Emissions (tons/summer day)

County	2014	2015	2018	2022	2026
Cabarrus*	4.15	3.89	3.08	2.63	2.19
Gaston*	4.61	4.29	3.15	2.42	1.86
Iredell*	1.95	1.82	1.43	1.15	0.88
Lincoln*	1.91	1.81	1.40	1.13	0.86
Mecklenburg	14.40	13.41	10.27	8.49	6.98
Rowan*	3.76	3.48	2.62	2.02	1.53
Union*	3.54	3.30	2.59	2.13	1.68
Total	**34.32**	**32.00**	**24.54**	**19.97**	**15.98**

* Emissions for portion of county included in maintenance area.

Nonroad Mobile Sources

Nonroad mobile sources, also referred to as off-road mobile sources, are equipment that can move but do not use the roadways (i.e., lawn mowers, construction equipment, railroad locomotives, etc.). The 2014 and 2015 emissions from this category were calculated using EPA's NONROAD2008a model, with the exception of the railroad locomotives. Emissions for 2018 were calculated using EPA's MOVES2014a model.[49] Railroad locomotive emissions for 2014 and 2015 were estimated by applying growth and control factors to the 2008 NEI. Emissions for 2018 are based on the MARAMA Beta 2 air quality modeling platform for the year 2017 as previously described for non-EGU point and area sources. Nonroad model and railroad locomotive emissions for 2022 and 2026 were estimated by applying the 2022/2018 and 2026/2018 county-level ratio of emissions in the original maintenance plan to the revised 2018-year emissions.

Table 3.9 and Table 3.10 present summary of the nonroad mobile source NOx and VOC emissions, respectively, on a ton per summer day basis. The significant decrease in NOx (and to a lesser extent VOC) emissions from 2015 to 2018 is most likely associated with differences between the NONROAD2008a and MOVES2014a models.

Table 3.9 Nonroad Mobile Source NOx Emissions (tons/summer day)

County	2014	2015	2018	2022	2026
Cabarrus*	2.20	2.04	1.47	1.19	1.03
Gaston*	1.98	1.83	1.48	1.23	1.07
Iredell*	0.94	0.88	0.61	0.49	0.43
Lincoln*	0.78	0.72	0.54	0.45	0.38
Mecklenburg	15.09	13.99	9.92	8.04	7.04
Rowan*	1.65	1.53	1.21	1.00	0.86
Union*	3.62	3.36	2.36	1.91	1.60
Total	**26.26**	**24.35**	**17.59**	**14.31**	**12.41**

***** Emissions for portion of county included in maintenance area.

[49] 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.

Table 3.10 Nonroad Mobile Source VOC Emissions (tons/summer day)

County	2014	2015	2018	2022	2026
Cabarrus*	1.27	1.22	1.13	1.15	1.20
Gaston*	1.29	1.25	1.17	1.15	1.18
Iredell*	0.62	0.59	0.50	0.47	0.47
Lincoln*	0.58	0.55	0.48	0.46	0.46
Mecklenburg	11.75	11.53	10.52	10.63	11.05
Rowan*	1.30	1.22	1.03	0.94	0.93
Union*	2.08	2.01	1.86	1.88	1.93
Total	**18.89**	**18.37**	**16.69**	**16.68**	**17.22**

* Emissions for portion of county included in maintenance area.

3.4.3 Summary of Emissions

The sum totals of the man-made emissions for the North Carolina portion of the Charlotte maintenance area are tabulated in Table 3.11 and Table 3.12.

Table 3.11 Total Man-Made NOx Emissions for the North Carolina Portion of the Charlotte Maintenance Area (tons/summer day)

County	2014	2015	2018	2022	2026
Cabarrus*	11.49	10.73	6.78	5.44	4.44
Gaston*	27.89	27.62	12.03	6.41	7.87
Iredell*	6.86	6.49	5.41	4.68	4.16
Lincoln*	4.36	4.71	6.41	4.29	2.34
Mecklenburg	56.71	52.97	39.16	33.52	31.33
Rowan*	11.74	11.31	8.28	7.01	6.10
Union*	11.13	10.36	6.63	5.09	4.05
Total	**130.18**	**124.19**	**84.69**	**66.44**	**60.28**

* Emissions for portion of county included in maintenance area.

Table 3.12 Total Man-Made VOC Emissions for the North Carolina Portion of the Charlotte Maintenance Area (tons/summer day)

County	2014	2015	2018	2022	2026
Cabarrus*	11.50	11.27	9.51	9.23	9.02
Gaston*	12.96	12.74	11.53	10.94	10.74
Iredell*	6.33	6.22	5.29	5.11	4.97
Lincoln*	6.55	6.47	4.81	4.66	4.51
Mecklenburg	50.10	49.16	45.31	44.47	43.99
Rowan*	12.59	12.38	12.47	12.19	12.32
Union*	13.09	12.85	10.91	10.68	10.45
Total	**113.12**	**111.09**	**99.82**	**97.28**	**95.99**

* Emissions for portion of county included in maintenance area.

3.4.4 Maintenance Demonstration

As discussed above, maintenance is demonstrated when the future year's total man-made emissions are less than the 2014 baseline emissions. Table 3.13 summarizes the NOx and VOC emissions for the North Carolina portion of the Charlotte maintenance area. The difference between the base year and the final year illustrates that the continued maintenance of the 2008 8-hour ozone NAAQS is expected. This is further supported by two modeling studies summarized in the following section.

Table 3.13 Maintenance Demonstration for North Carolina Portion of the Charlotte Maintenance Area

Year	NOx (tons/summer day)	VOC (tons/summer day)
2014	130.18	113.12
2015	124.19	111.09
2018	84.69	99.82
2022	66.44	97.28
2026	60.28	95.99
Difference from 2014 to 2026	**69.90**	**17.13**

The difference between the attainment level of emissions (2014) from all man-made sources and the projected level of emissions (2015, 2018, 2022, and 2026) from all man-made sources in the maintenance area is considered the "safety margin". The safety margin for the North Carolina portion of the maintenance area for each period is summarized in Table 3.14.

Table 3.14 Safety Margins for North Carolina Portion of the Charlotte Maintenance Area

Year	NOx (tons/summer day)	VOC (tons/summer day)
2014	N/A	N/A
2015	-5.99	-2.03
2018	-45.49	-13.30
2022	-63.74	-15.84
2026	-69.90	-17.13

3.4.5 National and Regional Air Quality Assessments in Future Years

The Southeastern States Air Resource Managers (SESARM) conducted a Southeastern Modeling, Analysis and Planning (SEMAP) project to produce technical analyses to assist member states in developing SIPs for ozone and $PM_{2.5}$, and in the demonstration of reasonable progress for the regional haze rule. Photochemical modeling predicts that ozone in the Charlotte maintenance area will be well below 0.075 ppm in 2018. Base and future design values are shown in Table 3.15. It should be noted that the benefits of Tier 3 engine and fuel standards were not included in these results.

Table 3.15 Eight-hour Design Values from SEMAP Photochemical Modeling

Monitor	County	2007 Base Design Value, ppm	2018 Future Design Value, ppm	Relative Reduction Factor[1]
371090004	Lincoln	0.080	0.064	0.7977
371190041	Mecklenburg	0.087	0.070	0.8149
371191005	Mecklenburg	0.079	0.065	0.8224
371191009	Mecklenburg	0.091	0.072	0.7927
371590021	Rowan	0.086	0.067	0.781
371590022	Rowan	0.087	0.068	0.7888
371790003	Union	0.079	0.062	0.7869

Source: Southeastern States Air Resource Managers (SESARM); Southeastern Modeling, Analysis and Planning (SEMAP) study, http://semap.ce.gatech.edu/sites/default/files/files/projections/base2018b-O3-DVFs-DDVFs-for-4configs.xls.

[1] The Relative Reduction Factor is the ratio of the future modeled ozone concentration divided by the base modeled ozone concentration. The future design value is computed by multiplying the Relative Reduction Factor and the base design value.

The EPA used photochemical modeling to assess the impacts of the federal Tier 3 rule. Ozone design values in 2018 within the Charlotte maintenance area are predicted to be below 0.075 ppm in the reference case, and even lower when Tier 3 controls are included. The downward trend in ozone continues out to 2030. Table 3.16 shows EPA's Tier 3 ozone modeling results.

Table 3.16 Eight-hour Design Values Scenarios from EPA Tier 3 Photochemical Modeling

County	2007 Baseline Design Value, ppm	2018 Reference Design Value, ppm	2018 Tier 3 Control Design Value, ppm	2030 Reference Design Value, ppm	2030 Tier 3 Control Design Value, ppm
Lincoln	0.080	0.064	0.063	0.060	0.058
Mecklenburg	0.091	0.073	0.072	0.069	0.067
Rowan	0.087	0.069	0.068	0.065	0.063
Union	0.079	0.062	0.061	0.058	0.056

Source: US EPA http://www.epa.gov/otaq/documents/tier3/454r14002.pdf.

3.5 CONTINGENCY PLAN

3.5.1 Overview

The two main elements of the North Carolina contingency plan are tracking and triggering mechanisms to determine when contingency control measures are needed and a process of developing and adopting appropriate control measures. There will be three potential triggers for the contingency plan. The primary trigger of the contingency plan will be a violation of the 2008 8-hour ozone NAAQS at any of the Charlotte area monitors. The secondary trigger will be a monitored air quality pattern that suggests an actual 2008 8-hour ozone NAAQS violation may be imminent. The tertiary trigger will be a monitored fourth highest exceedance of the NAAQS. Upon either the primary or secondary triggers being activated, the DAQ, working in consultation with the SCDHEC and the MCAQ local program, will commence analyses to determine what additional measures, if any, will be necessary to attain or maintain the 2008 8-hour ozone standard. If activation of either the primary or secondary triggers occurs, this plan provides a regulatory adoption process for revising emission control strategies. Activation of the tertiary trigger will result in an analysis to understand the cause of the exceedance and to identify voluntary measures if needed.

In addition, there will be a tracking mechanism that requires a comparison of the actual emissions inventory submitted under the Air Emission Reporting Rule (AERR) to the projected inventory, and to the attainment year inventory contained in this maintenance plan. The AERR reporting years coincide with the base year (2014) and final year (2026) for this maintenance demonstration. In addition, the AERR reporting years will occur at 3-year intervals, thus enabling the comparison of actual emissions developed for the AERR to the projected emissions for the interim years presented in this maintenance demonstration.

3.5.2 Contingency Plan Triggers

The primary trigger of the contingency plan will be a violation of the 2008 8-hour ozone standard, or when the three-year average of the 4th highest values is equal to or greater than 0.076 ppm at a monitor in the Charlotte nonattainment area. The trigger date will be 60 days from the date that the state observes a 4th highest value that, when averaged with the two previous ozone seasons' fourth highest values, would result in a three-year average equal to or greater than 0.076 ppm.

The secondary trigger will apply where no actual violation of the 2008 8-hour ozone standard has occurred, but where the state finds monitored ozone levels indicating that an actual ozone NAAQS violation may be imminent. A pattern will be deemed to exist when there are two consecutive ozone seasons in which the 4th highest values are 0.076 ppm or greater at a single

monitor within the Charlotte nonattainment area. The trigger date will be 60 days from the date that the state observes a 4th highest value of 0.076 ppm or greater at a monitor for which the previous season had a 4th highest value of 0.076 ppm or greater.

Similarly, the tertiary trigger will not be an actual violation of the 2008 8-hour ozone standard. This trigger will be a first alert as to a potential air quality problem on the horizon. The trigger will be activated when a monitor in the Charlotte nonattainment area has a 4th highest value of 0.076 ppm or greater, starting the first year after the maintenance plan has been approved. The trigger date will be 60 days from the date that the state observes a 4th highest value of 0.076 ppm or greater at any monitor.

3.5.3 Action Resulting From Trigger Activation

Once the primary or secondary trigger is activated, the Planning Section of the DAQ, in consultation with the SCDHEC and MCAQ, shall commence analyses including trajectory analyses of high ozone days, and emissions inventory assessment to determine those emission control measures that will be required for attaining or maintaining the 2008 8-hour ozone standard. By May 1 of the year following the ozone season in which the primary or secondary trigger has been activated, North Carolina will complete sufficient analyses to begin adoption of necessary rules for ensuring attainment and maintenance of the 2008 8-hour ozone NAAQS. The rules would become state effective by the following January 1, unless legislative review is required.

The measures that will be considered for adoption upon a trigger of the contingency plan include: NOx Reasonably Available Control Technology on stationary sources with a potential to emit less than 100 tons per year in the North Carolina portion of the Charlotte nonattainment area, diesel I/M program, implementation of diesel retrofit programs, including incentives for performing retrofits, and additional controls in upwind areas.

The DAQ commits to implement within 24 months of a primary or secondary trigger, or as expeditiously as practicable, at least one of the control measures listed above or other contingency measures that may be determined to be more appropriate based on the analyses performed.

Once the tertiary trigger is activated, the Planning Section of the DAQ, in consultation with the SCDHEC and MCAQ, shall commence analyses including meteorological evaluation, trajectory analyses of high ozone days, and emissions inventory assessment to understand why a 4th highest exceedance of the standard has occurred. Once the analyses are completed, the DAQ will work with SCDHEC, MCAQ and the local air awareness program to develop an outreach plan

identifying any additional voluntary measures that can be implemented. If the 4th highest exceedance occurs early in the season, the DAQ will work with entities identified in the outreach plan to determine if the measures can be implemented during the current season, otherwise, DAQ will work with SCDHEC, MCAQ and the local air awareness coordinator to implement the plan for the following ozone season.

3.5.4 Tracking Program for Ongoing Maintenance

In addition to the measures listed above, emissions inventory comparisons will be carried out. The large stationary sources are required to submit an emissions inventory annually to the DAQ or MCAQ. The DAQ will commit to review these emissions inventories to determine if an unexpected growth in NOx emissions in the Charlotte area may endanger the maintenance of the 2008 8-hour ozone standard. Additionally, as new VMT data are provided by the North Carolina Department of Transportation (NCDOT), the DAQ commits to review these data and determine if any unexpected growth in VMT may endanger the maintenance of the 2008 8-hour ozone standard.

Additionally, under the AERR the DAQ is required to develop a comprehensive, annual, statewide emissions inventory every three years and is due 12 to 18 months after the completion of the inventory year. The AERR inventory years match the base year and final year of the inventory for the maintenance plan, and are within one or two years of the interim inventory years of the maintenance plan. Therefore, the DAQ commits to compare the AERR inventories as they are developed with the maintenance plan to determine if additional steps are necessary for continued maintenance of the 2008 8-hour ozone standard in this area.

4.0 MOTOR VEHICLE EMISSIONS BUDGET FOR CONFORMITY

4.1 TRANSPORTATION CONFORMITY

For the Charlotte-Gastonia-Salisbury, North Carolina 2008 8-Hour Ozone Marginal Nonattainment Area, the purpose of transportation conformity is to ensure that federal transportation actions occurring in the area do not interfere with the area maintaining compliance with the 2008 8-hour ozone standard. This means that the level of emissions estimated by the NCDOT or the MPOs for the Transportation Improvement Program (TIP) and Metropolitan Transportation Plan (MTP) must not exceed the MVEBs as defined in this maintenance plan.

The DAQ held three conference calls with the Charlotte Regional Transportation Planning Organization (CRTPO) - Rocky River Rural Planning Organization (RRRPO), Gaston-Cleveland-Lincoln Metropolitan Planning Organization (GCLMPO), and Cabarrus-Rowan Metropolitan Planning Organization (CRMPO) to determine what years to set MVEBs for the Charlotte maintenance plan. According to Section 93.118 of the transportation conformity rule, a maintenance plan must establish MVEBs for the last year of the maintenance plan (in this case, 2026). The consensus formed during the interagency consultation process was that another MVEB should be set for the Charlotte maintenance plan base year of 2014.

4.2 SAFETY MARGIN

As stated in Section 3.3.4, a safety margin is the difference between the attainment level of emissions from all source categories (i.e., point, area, on-road and nonroad) and the projected level of emissions from all source categories. The safety margins for the North Carolina portion of the Charlotte area are listed in Table 3.14. The state may choose to allocate some of the safety margin to the MVEB, for transportation conformity purposes, so long as the total level of emissions from all source categories remains below the attainment level of emissions.

The DAQ has decided to allocate a portion of the safety margin for 2026 to the MVEB to allow for unanticipated growth in VMT, changes and uncertainty in vehicle mix assumptions, and uncertainty associated with mobile modeling that will influence the future year emission estimations. The DAQ has developed and implemented a five-step approach for determining a factor to use to calculate the amount of safety margin to apply to the MVEB for 2026 (see the following Section 4.3 and Appendix A). The resulting percent increase to the MVEBs for the North Carolina counties in the Charlotte area are listed in the Table 4.1. Note that because the initial MVEB year of 2014 is also the base year for the maintenance plan inventory, there is no safety margin and, therefore, no adjustments were made to the MVEB for 2014.

Table 4.1 Percent Increase to Mobile Vehicle Emissions Budget

County	2026
Cabarrus	45%
Gaston	40%
Iredell	42%
Lincoln	42%
Mecklenburg	37%
Rowan	45%
Union	40%

4.3 MOTOR VEHICLE EMISSION BUDGETS

Although the emissions up to this point have been expressed in terms of tons/summer day, for conformity purposes the MVEBs are expressed in kilograms/day (kg/summer day). Note that, for this reason, kg/summer day was selected as the specified unit for all MOVES2014 model outputs. MOVES2014 output emissions values were rounded to the nearest kg/summer day, and were divided by 907.1847 to convert them to units of tons/summer day. The resulting values in tons/summer day were rounded to two decimal places.

Table 4.2 shows the counties with their highway mobile NOx and VOC emissions, respectively, expressed in tons/summer day and the corresponding kg/summer day values for 2014 and 2026.

Table 4.2 Highway Mobile Source NOx and VOC Summer Day Emissions in 2014 and 2026 for North Carolina Portion of the Charlotte Maintenance Area

County	2014 NOx		2014 VOC		2026 NOx		2026 VOC	
	tons/day	kg/day	tons/day	kg/day	tons/day	kg/day	tons/day	kg/day
Cabarrus*	6.60	5,989	4.15	3,765	2.00	1,810	2.19	1,982
Gaston*†	8.11	7,357	4.61	4,179	2.12	1,924	1.86	1,689
Iredell*	3.36	3,045	1.95	1,768	1.00	903	0.88	801
Lincoln*	3.00	2,723	1.91	1,737	0.83	757	0.86	779
Mecklenburg†	26.99	24,488	14.40	13,060	7.17	6,501	6.98	6,334
Rowan*	6.42	5,825	3.76	3,408	1.73	1,571	1.53	1,389
Union*	5.67	5,146	3.54	3,210	1.62	1,466	1.68	1,520
Total	**60.15**	**54,572**	**34.32**	**31,127**	**16.47**	**14,932**	**15.98**	**14,494**

* Emissions for portion of county included in maintenance area.

† The 2014 base year NOx and VOC emissions for Gaston and Mecklenburg counties have been revised slightly to correct a transcription error in recording the values in this table in the original maintenance plan.

As part of the consultation process on developing MVEBs, the DAQ coordinated three interagency conference calls with local and state transportation partners and the EPA's Region

IV staff to establish the framework and process for developing MVEBs. Based on these conference calls, the participants in the consultation process unanimously agreed to the following:

Emissions Inventory and Forecast

- Use 2014 as the base year for the emissions inventory and include emissions estimates for 2018, 2022, and 2026 (4-year increments) from the base year.
- The Charlotte DOT runs the local transportation demand model based on inputs from the local transportation planning organizations to generate inputs (VMT, and speeds for daily travel periods, and human population to forecast VMT) needed to run MOVES2014 to estimate emissions for each year.

Geographic Extent of MVEBs

- Prepare separate MVEBs based on the latest MPO jurisdictional boundaries such that MVEBs are established for the CRMPO (Cabarrus and Rowan Counties), for the CRTPO-RRRPO (Iredell, Mecklenburg and Union Counties), and for the GCLMPO (Gaston and Lincoln Counties). Although Cleveland County is included in the GCLMPO, it is not included in the Charlotte ozone maintenance area.

MVEB Years

- In addition to developing a MVEB for 2026 (required by EPA guidance), the group agreed to develop a MVEB for the base year 2014.

Adjustment to MVEBs

- Allocate a portion of the safety margin to increase the MVEBs for each county grouping following the process used to develop the MVEBs for the previous "Redesignation Demonstration and Maintenance Plan for the Charlotte-Gastonia-Rock Hill, NC-SC 1997 8-Hour Ozone Nonattainment Area." This process, which includes the following five steps, was used to adjust the MVEBs for 2026. Because 2014 is the base year for the emissions inventory there is no safety margin; consequently, the MVEB for 2014 was not adjusted.

  Step 1 - Percentage below the standard

  - All counties get 2% of their emissions allocated to the NOx and VOC MVEBs in 2026

  Step 2 - Account for unanticipated model input data changes

- The amount of safety margin allocated to the MVEBs in 2026 was increased from 5% to 25% in 2026 for each county

Step 3 - Provide flexibility and account for rapid growth for counties that are determined to be medium to small contributors to the on-road mobile NOx emissions inventory

- Counties with <8% of total on-road mobile source NOx emissions received an additional 5% of their emissions allocated to the MVEBs in 2026 (Iredell and Lincoln)
- Counties with 8% to 25% of total on-road mobile source NOx emissions received an additional 3% of their emissions allocated to the MVEBs in 2026 (Cabarrus, Gaston, Rowan and Union)

Step 4 - Account for input uncertainty in final year of the maintenance plan:

- All counties get 10% additional of their emissions allocated to the MVEBs in 2026 to account for potential changes in VMT, vehicle mix and vehicle age distribution
- Cabarrus and Rowan Counties each get an additional safety margin allocation equal to 5% of their emissions to account for projected high growth rates in the CRMPO jurisdiction.

Step 5 - Ensure the sum of the safety margins applied to the MVEBs does not exceed 50% of the total safety margin available. For 2026, Steps 1-4 accounted for:

- 9.4% of the total NOx safety margin
- 37.4% of the total VOC safety margin

Tables 4.3 through 4.5 provide the NOx and VOC MVEBs in kg/summer day, for transportation conformity purposes, for 2014 and 2026. Upon the EPA's final approval for these sub-area MVEBs, they will become the applicable MVEBs for transportation conformity.

Table 4.3 Cabarrus-Rowan Metropolitan Planning Organization (CRMPO) MVEB in 2014 and 2026 (kg/summer day)*

	2014		2026	
	NOx	**VOC**	**NOx**	**VOC**
Base Emissions	11,814	7,173	3,381	3,371
Safety Margin Allocated to MVEB	-	-	1,522	1,517
Conformity MVEB	**11,814**	**7,173**	**4,903**	**4,888**

* Includes the portion of Cabarrus and Rowan Counties in the maintenance area.

Table 4.4 Gaston-Cleveland-Lincoln Metropolitan Planning Organization (GCLMPO) MVEB in 2014 and 2026 (kg/summer day)*

	2014		2026	
	NOx	**VOC**	**NOx**	**VOC**
Base Emissions	10,079	5,916	2,681	2,468
Safety Margin Allocated to MVEB	-	-	1,087	1,004
Conformity MVEB	**10,079**	**5,916**	**3,768**	**3,472**

* Includes the portion of Gaston and Lincoln Counties in the maintenance area. Although Cleveland County is included in the MPO it is not included in the Charlotte ozone maintenance area.

Table 4.5 Charlotte Regional Transportation Planning Organization (CRTPO) - Rocky River Rural Planning Organization (RRRPO) MVEB in 2014 and 2026 (kg/summer day)*

	2014		2026	
	NOx	**VOC**	**NOx**	**VOC**
Base Emissions	32,679	18,038	8,870	8,655
Safety Margin Allocated to MVEB	-	-	3,371	3,288
Conformity MVEB	**32,679**	**18,038**	**12,241**	**11,943**

* Includes all of Mecklenburg County and the portion of Iredell and Union Counties in the maintenance area.

New Safety Margins

With this revision, an additional 2,987 kg/summer day (3.29 tons/summer day) of NOx emissions and 2,899 kg/summer day (3.19 tons/summer day) of VOC emissions was allocated from available safety margin emissions to the Charlotte area 2026 MVEBs. This results in total safety margin emissions allocations to the 2026 MVEBs of 5,980 kg/summer day (6.59 tons/summer day) of NOx and 5,809 kg/summer day (6.40 tons/summer day) of VOC. The updated safety margins for each projected year are listed in Table 4.6.

Table 4.6 New Safety Margins for the North Carolina Portion of the Charlotte Maintenance Area (tons/summer day)

Year	NOx	VOC
2014	N/A*	N/A
2015	-5.99	-2.03
2018	-45.49	-13.30
2022	-63.74	-15.84
2026	-63.31	-10.73

* N/A = not applicable.

5.0 STATE IMPLEMENTATION PLAN APPROVAL

5.1 INTRODUCTION

For an area to be redesignated and have an approved maintenance plan, the SIP must include evidence of compliance with the rules relied on to show maintenance of the standard. This section provides the evidence of compliance with such rules for the Charlotte-Gastonia-Salisbury 2008 8-hour ozone nonattainment area.

5.2 EVIDENCE OF COMPLIANCE

Two counties in the Charlotte area (Gaston and Mecklenburg Counties) were designated as moderate nonattainment for 1-hour ozone effective January 1992. Since a redesignation demonstration and maintenance plan was submitted for this area prior to November 15, 1992, the CAA requirements for moderate areas were not required with the exception of the I/M program. An I/M program was established in the Charlotte area as prescribed by the 1990 CAA. Therefore, North Carolina has a fully approved SIP for this area.

For the 1997 8-hour ozone standard, the DAQ submitted to the EPA for approval the Metrolina Attainment Demonstration SIP on June 15, 2007, and a Supplement to the Attainment Demonstration SIP on April 5, 2010. The North Carolina portion of the Metrolina nonattainment area includes the counties of Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan and Union and Coddle Creek and Davidson Townships in Iredell County. The Reasonable Further Progress SIP was submitted to the EPA for approval on June 15, 2007 and a Revised Reasonable Further Progress SIP was submitted on November 30, 2009. The EPA approved the Revised Reasonable Further Progress SIP on October 12, 2012.[50] On November 2, 2011 the DAQ submitted to the EPA a Redesignation Demonstration and Maintenance Plan for 1997 8-hour Ozone standard; and submitted a supplement to this SIP on March 28, 2013. The EPA approved the redesignation request and maintenance plan on December 2, 2013.[51]

For the 2008 8-hour ozone standard for the Charlotte nonattainment area, the DAQ submitted to the EPA for approval the Base Year (2011) Emissions Inventory and Emissions Statements SIP on July 7, 2014, to fulfill the requirements of Sections 182(a)(1) and 182(a)(3)(B) of the CAA.[52]

[50] 77 FR 62159-62166.
[51] 78 FR 72036-72040.
[52] http://ncair.org/planning/metrolina/metrolina_area_sip_plans.shtml.

Additionally, the following rules regulating emissions of VOCs and/or NOx in the Charlotte nonattainment area counties have been approved, or have been submitted with a request to be approved, as part of the SIP:

15A NCAC 2D .0958, Work Practices For Sources of Volatile Organic Compounds,
15A NCAC 2D .0530, Prevention of Significant Deterioration,
15A NCAC 2D .0925, Petroleum Liquid Storage in Fixed Roof Tanks,
15A NCAC 2D .0926, Bulk Gasoline Plants,
15A NCAC 2D .0927, Bulk Gasoline Terminals,
15A NCAC 2D .0928, Gasoline Service Stations Stage I,
15A NCAC 2D .0932, Gasoline Truck Tanks and Vapor Collection Systems,
15A NCAC 2D .0933 Petroleum Liquid Storage in External Floating Roof Tanks
15A NCAC 2D .1000, Motor Vehicle Emission Control Standards.
15A NCAC 2D .1200, Control and Emissions from Incinerators
15A NCAC 2D .1409(b), Stationary Internal Combustion Engines
15A NCAC 2D .1416 - .1423, NOx SIP rules
15A NCAC 2D .1600, General Conformity
15A NCAC 2D .1700, Municipal Solid Waste Landfills, and
15A NCAC 2D .1900, Open Burning
15A NCAC 2D .2000, Transportation Conformity
15A NCAC 2D .2400 Clean Air Interstate Rules

Rules 15A NCAC 2D .0925, .0926, .0927, .0928, .0932, .0933, .0948, .0949, and .0958 have been approved as part of the SIP and are applicable across the state regardless of the size of the source.

Section 15A NCAC 2D .1000 also regulates emissions from motor vehicles in the North Carolina counties in and around the Charlotte nonattainment area and requires the use of the OBDII system, which provides an indication of NOx emissions as well as other pollutants.

Section 15A NCAC 2D .1200 regulates the controls and emissions from incinerators. Part of this rule has been submitted as part of the SIP, while .1205, .1206 and .1210 are part of the CAA Section 111(d) plans.

Two rules are conformity related, 15A NCAC 2D .1600 and .2000. General conformity related projects are covered under Section .1600, while transportation conformity related projects are covered under Section .2000. Although neither of these rules requires reduction in emissions, they do ensure that federal actions do not hinder attainment or maintenance of the NAAQS.

North Carolina has adopted an open burning rule, 15A NCAC 2D .1900 that prohibits open burning of vegetative material during Air Quality Action Days of Code Orange or higher in

forecasted areas of the state. Ozone forecasts are issued for the Charlotte area from May 1st through September 30th, therefore this area is covered by this rule.

Section 15A NCAC 2D .2400 regulates nitrogen oxide emissions from electric generating units with a nameplate capacity of 25 megawatts or more producing electricity for sale. Section 15A NCAC 2D .2400 also covers industrial boilers that are covered under the NOx SIP rules. This Section replaces the NOx SIP rules beginning January 1, 2009. Although North Carolina did not rely on the emission reductions from CAIR for maintenance of the 2008 8-hour ozone standard, these regulations will result in additional reductions in NOx emissions regionally.

Another important set of rules that control volatile organic compound emissions in these counties is Section 15A NCAC 2D .1100, Control of Toxic Air Pollutants. These rules, however, have not been submitted to the EPA to be approved as part of the SIP.

There are two other rules that control emissions of volatile organic compounds in these areas. They are 15A NCAC 2D .0524, New Source Performance Standards, and 2D.1110, National Emission Standards for Hazardous Air Pollutants. Also, rule 2D.1111, Maximum Achievable Control Technology applies to control of emissions of volatile organic compounds. They are not part of the SIP, but the EPA has delegated the state enforcement authority for standards that have been adopted by the state. (The standards adopted by the state are state-enforceable regardless of the EPA delegation.)

6.0 STATE COMPLIANCE WITH CLEAN AIR ACT REQUIREMENTS

Section 107(d)(3)(E)(v) of the CAA requires that the provisions of Section 110 (State Implementation Plans for the Primary and Secondary NAAQS) and Part D (Plan Requirements for Nonattainment Areas) of the CAA be met within the area to be redesignated. This means that North Carolina must meet all requirements, if any, that had come due as of the date of the redesignation request.

The EPA, in its latest guidance on redesignation requirements (as contained in a memorandum from John Calcagni, Director, Air Quality Management Division, Office of Air Quality Planning and Standards to the EPA Regional Offices dated September 4, 1992), states that "For the purposes of redesignation, a state must meet all requirements of Section 110 and Part D that were applicable prior to submittal of the complete redesignation request. When evaluating a redesignation request, Regions should not consider whether the state has met requirements that come due under the Act after submittal of a complete redesignation request."

Monitoring is one of the requirements of Section 110. The DAQ commits to continue operating the current ozone monitors in the North Carolina portion of the Charlotte 2008 8-hour ozone nonattainment area, providing sufficient funding is available for continued operation. Any monitor shutdowns or relocations will only be made with the approval of EPA. No plans are underway to discontinue operation, relocation or otherwise affect the integrity of the ambient monitoring network in place. The current monitors are operated consistent with 40 CFR Part 58 and any changes will only be made if they are consistent with 40 CFR Part 58.

For the 2008 8-hour ozone standard for the Charlotte marginal nonattainment area, the DAQ submitted to the EPA for approval the Base Year (2011) Emissions Inventory and Emissions Statements SIP on July 7, 2014, to fulfill the requirements of Part D, Sections 182(a)(1) and 182(a)(3)(B) of the CAA.[53] The DAQ believes that North Carolina has met all of the requirements of Section 110 and Part D.

[53] http://ncair.org/planning/metrolina/metrolina_area_sip_plans.shtml.

7.0 SUMMARY AND CONCLUSION RELATED TO THIS REVISION TO THE MAINTENANCE PLAN

This revised maintenance plan demonstrates that the projected emissions inventories for 2026, the final year of the maintenance plan and 10 years beyond the redesignation year, as well as the interim years, are all less than the base year emissions inventory. In addition, the CAA Section 110(l) non-interference demonstration analysis indicates that changing the vehicle model year coverage would not negatively impact air quality in the Charlotte maintenance area. Therefore, maintenance of the 2008 8-hour ozone NAAQS has been demonstrated.

This maintenance plan has been prepared to meet the requirements of the 1990 CAA Amendments.