Supplement

Redesignation Demonstration

and

Maintenance Plan

for

The Raleigh-Durham-Chapel Hill, North Carolina 8-Hour Ozone Maintenance Area

Prepared by

North Carolina Department of Environment and Natural Resources

Division of Air Quality

March 27, 2013

Preface: This document contains the technical support for North Carolina Division of Air Quality's request to remove summertime gasoline requirement of 7.8 pounds per square inch in the Raleigh-Durham-Chapel Hill 8-hour ozone maintenance area.

INTRODUCTION

This document supplements the Redesignation Demonstration and Maintenance Plan for the Raleigh-Durham-Chapel Hill (Triangle) 8-hour Ozone Maintenance Area that was submitted to the United States Environmental Protection Agency (USEPA) on June 7, 2007. More specifically, this supplement documents the revisions of the on-road mobile, off-road mobile, and area source emissions resulting from modifying the Reid Vapor Pressure (RVP) summertime gasoline requirement from 7.8 pounds per square inch (psi) to 9.0 psi for three Triangle counties (Wake, Durham, and Granville). The remaining counties in the Triangle area are already allowed to sell 9.0 psi gasoline. The RVP is a control measure used to lower emissions of volatile organic compounds (VOC).

The North Carolina Division of Air Quality (NCDAQ) 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 VOCs statewide. The overwhelming abundance of biogenic VOCs makes the majority of North Carolina a nitrogen oxides (NOx) limited environment for the formation of ozone. Since reductions in man-made VOC emissions do not reduce ozone levels, having a lower RVP during the summer months from June - September is not an effective control measure for ozone. In addition, it results in higher fuel costs, which places additional cost on businesses and consumers. Lastly, our analysis indicates that increasing the RVP from 7.8 psi to 9.0 psi in three Triangle counties does not negatively impact the redesignation demonstration. Therefore, the NCDAQ requests the USEPA remove the 7.8 psi RVP requirement and specify 9.0 psi as the applicable gasoline volatility standard for the entire Triangle area year round.

In addition to the revisions to the RVP, the on-road mobile motor vehicle emission budgets (MVEBs) have been updated. In December 2009, the USEPA released a new model to generate on-road mobile source emissions, the MOtor Vehicle Emissions Simulator (MOVES) mobile model. MOVES replaces the USEPA's previous emissions model for on-road mobile sources, MOBILE6.2. The purpose of updating the MVEBs is to replace the previous MVEBs that were generated by MOBILE6.2 with the updated on-road MOVES mobile model.

The last revision affects the off-road mobile source sector. In the original 2007 redesignation demonstration and maintenance plan, the model used to generate off-road emissions was the NONROAD2005c mobile model. Since 2007, USEPA has updated the nonroad mobile model to NONROAD2008a. NONROAD2008a is the latest USEPA approved nonroad mobile model. In

this supplement, the NONROAD2008a mobile model is used to generate nonroad mobile emissions for all inventory years – 2005, 2008, 2011, 2014, and 2017. Additionally, the non-road mobile emissions documentation includes the general conformity analysis for two new nuclear generating units at Duke-Progress Energy Company in Wake County.

REVISED SECTIONS

Attached are the revisions to the Redesignation Demonstration and Maintenance Plan for the Raleigh-Durham-Chapel Hill 8-hour Ozone Maintenance Area. The RVP revisions are only applicable to the area, off-road mobile, and on-road mobile sources emissions. In addition to the RVP revisions, the on-road mobile MVEBs and I/M program compliance rate have been updated and incorporated using the MOVES mobile model. For off-road mobile sector, emissions inventory data are updated using the newer NONROAD2008a mobile model and general conformity analysis for Shearon Harris nuclear facility in Wake County has been incorporated in the emissions analysis.

To appropriately revise the original package, replace the pages as outlined below:

Narrative Replacements
Replace pages i – vii with pages i – xii.
Replace pages 1-1 – 7-1 with pages 1-1 – 7-1.

Appendix C Replacements

In Appendix C.2-Area Source Emissions Inventory Documentation as follows:
replace pages 4-2 and 4-3 with the attached pages 4-2, 4-2a, and 4-3,
replace page 4-5 with the attached page 4-5,
replace page 4-6 with the attached page 4-6, and
replace page 4-85 with the attached page 4-85.

Replace Appendices C.3-Mobile Source Inventory Documentation with
Appendices C.3-On-road Mobile Source Emissions Inventory Documentation and
C.4-Off-road Mobile Emissions Inventory Documentation.

EXECUTIVE SUMMARY

Introduction

Ozone is formed by a complex set of chemical reactions involving volatile organic compounds, nitrogen oxides and to a lesser extent carbon monoxide. 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. Even the emissions from such sources as boat engines, lawn mowers and construction equipment 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 1997 8-hour ozone national ambient air quality standard (NAAQS) was 0.08 parts per million (ppm) which represents the annual fourth highest daily maximum 8-hour concentration, averaged over a 3 year period. An exceedance of the 8-hour ozone NAAQS occurs when a monitor measures ozone above 0.084 ppm on average for an eight-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 0.085 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 March 27, 2008, the EPA revised the 8-hour ozone NAAQS to 0.075 ppm (73 Federal Register 16436).

Raleigh-Durham-Chapel Hill Nonattainment and Maintenance Designation

The area surrounding Raleigh-Durham-Chapel Hill, North Carolina, called the Triangle area, was designated nonattainment for the 1997 8-hour ozone NAAQS on April 30, 2004 (69 Federal Register 23858). The Triangle nonattainment area included Durham, Franklin, Granville, Johnston, Orange, Person and Wake Counties and Baldwin, Center, New Hope and Williams Townships in Chatham County. The nonattainment designation was an action taken by the USEPA under Section 107(d) of the Clean Air Act (CAA). The CAA requires that some area be designated as nonattainment if a monitor is found to be in violation of a NAAQS. The USEPA took designation action in 2004 based on the ambient data from 2001-2003. At that time, the design value for the Triangle area was 0.094 ppm.

On June 7, 2007, NCDAQ submitted a Redesignation Demonstration and Maintenance Plan for the Triangle area in accordance with Section 175 A(b) of the Federal Clean Air Act amendments which contained analysis of air quality data demonstrating attainment with the 8-hour ozone standard, emissions inventory comparison showing that the standard can be maintained for 10

years beyond the approval of the plan, and defined contingency measures in the event of an air quality violation. Based on the information submitted, the USEPA redesignated the Triangle from nonattainment area to attainment/maintenance on December 26, 2007.

The Triangle area continues to be in compliance with the 1997 standard. As a result of continued improvement in air quality, on May 21, 2012, the USEPA designated the area attainment of the more stringent 2008 8-hour ozone NAAQS.

Current Air Quality

There are currently eight ozone monitors located throughout the Triangle maintenance area. Each monitor has been measuring declining levels in air quality since 2006. The latest design value for the area is 0.075 ppm based on 2010-2012 data. Therefore, the area continues to maintain the 1997 ozone standard and is in attainment of the 2008 ozone standard.

Maintenance Plan Requirements

The State of North Carolina has implemented permanent and enforceable reductions in ozone precursor emissions in the Triangle area. These actions include implementing the on-board diagnostic vehicle inspection and maintenance program that began on July 1, 2002, and an open burning ban during ozone action days. In addition, there have been several State rules that have resulted in reductions in emissions within and surrounding the maintenance area. These State actions include the NOx SIP Call, the Clean Smokestacks Act legislation, and heavy-duty engine stop-gap rule for model years 2005 and 2006. Finally, several actions at the Federal level by the USEPA have resulted in lower emissions throughout the eastern portion of the country. These 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, off-road engine standards.

This combination of State and Federal actions have resulted in cleaner air in the Triangle area, and the anticipated future benefits from these programs are expected to result in continued maintenance of the 8-hour ozone NAAQS in this region. A baseline year emissions inventory for NOx and VOC was developed for 2005, since the design value for the 2004-2006 period showed attainment of the 8-hour ozone NAAQS. Future year emissions inventories were also developed for the interim years 2008, 2011, 2014, and a final year emission inventory was developed for 2017. The future year emissions were lower than the 2005 emissions in all cases. This demonstrates that the Triangle area is expected to maintain the 8-hour ozone NAAQS through 2017, since in no future year are the emissions expected to be greater than they were in

the baseline year. The area is also in compliance with Section 110 and Part D requirements of the CAA.

Conclusion and Request for Redesignation

Emissions changes resulting from updating the older MOBILE6.2 model with the newer MOVES model are shown in the following table. Note, these model runs are based on the current RVP of 7.8 psi (Wake, Durham, and Granville Counties) and I/M compliance rate of 95%. The data shows that MOVES generated emissions are higher than previously reported MOBILE6.2 emissions. The MOVES data represent the new motor vehicle emissions budgets for the Triangle area, and serve as the basis for evaluating emissions impacts due to the relaxation of the RVP standard.

Comparison of On-Road Emissions Results Due to Model Changes

	2005	2008	2011	2014	2017
VOC Emissions (tons/day)					
MOVES	87.66	74.10	59.13	48.22	38.97
Mobile 6.2	47.47	39.71	35.13	30.24	27.18
Difference	40.19	34.39	24.00	17.98	11.79
NOx Emissions (tons/day)					
MOVES	175.18	152.05	117.46	91.84	72.88
Mobile 6.2	101.68	81.66	59.00	42.78	32.59
Difference	73.50	70.39	58.46	49.06	40.29

Relaxation of the RVP standard from 7.8 to 9.0 psi results in a slight increase in NOx and VOC emissions from the attainment inventory year through the end future year. By 2017, the effect of increasing the RVP on total man-made emissions is an increase of 0.30 tons per day in NOx emissions (0.20% increase). Total man-made VOC emissions increase is 3.88 tons per day or 2.44% increase. However, when biogenic emissions from natural sources (206.50 tons per day per USEPA Mercury Air Toxics rule modeling) are added to the man-made emissions, actual VOC emissions increase is only 1.06%. Despite these small increases, the Triangle maintenance area continues to demonstrate a downward trend in NOx and VOC emissions through all future years. A sufficient safety margin remains between 2005 and 2017 to ensure the area continues to attain the ozone NAAQS with the relaxation of the RVP standard. The safety margin for NOx and VOC are 102.34 tons per day and 35.37 tons per day, respectively.

Ambient air quality data for the most recent three year period (2010-2012) demonstrate that the Triangle maintenance area has continued to maintain the 1997 and the 2008 8-hour ozone standards. The area also continues to meet NAAQS for all other criteria air pollutants. This supplement to the maintenance demonstration also shows that even with the relaxation of summer time RVP standard, future emission inventories are expected to be lower than the attainment year inventory through the effective implementation of the various control measures listed earlier. With significant safety margin available to accommodate future changes to certain control options that provide minimal benefit, it is concluded that maintaining the existing 7.8 psi RVP requirement is not necessary to maintain the ozone NAAQS in the Triangle area. An analysis of the affect on other pollutants indicates that the RVP relaxation will not interfere with attainment of other NAAQS.

TABLE OF CONTENTS

INTRODUCTION ii

REVISED SECTIONS iv

EXECUTIVE SUMMARY v

1.0 INTRODUCTION 1-1

1.1 WHAT IS TROPOSPHERIC OZONE? 1-1

1.2 CLEAN AIR ACT OF 1990 1-1

1.3 RALEIGH-DURHAM-CHAPEL HILL AIR QUALITY HISTORY 1-2

1.4 CLEAN AIR ACT REDESIGNATION CRITERIA 1-3

2.0 AIR QUALITY 2-1

2.1 HISTORIC AIR QUALITY (2001 – 2012) 2-1

2.2 RECENT AIR QUALITY VALUES (2010 –2012) 2-4

2.3 PERMANENT AND ENFORCEABLE EMISSIONS REDUCTIONS 2-5

3.0 MAINTENANCE PLAN 3-1

3.1 CONCEPT OF NORTH CAROLINA'S MAINTENANCE PLAN 3-1

3.2 FOUNDATION CONTROL PROGRAM 3-1

3.2.1 Federal Control Measures 3-2

3.2.2 State Control Measures 3-3

3.2.3 Additional Programs Supporting Maintenance 3-6

3.3 EMISSIONS INVENTORIES AND MAINTENANCE DEMONSTRATION 3-7

3.3.1 Theory of Approach 3-7

3.3.2 Emission Inventories 3-8

3.3.3 Summary of Emissions 3-9

3.3.4 Maintenance Demonstration 3-15

3.3.5 Clean Air Act Section 110(l) Demonstration 3-16

3.4 CONTINGENCY PLAN 3-18

3.4.1 Overview 3-18

3.4.2 Primary and Secondary Triggers 3-18

3.4.3 Action Resulting From Trigger Activation 3-19

3.4.4 Tracking Program for Ongoing Maintenance 3-19

4.0 MOTOR VEHICLE EMISSIONS BUDGET FOR CONFORMITY 4-1

4.1 TRANSPORTATION CONFORMITY 4-1

4.2 ON-ROAD MOBILE SOURCE VOC INSIGNIFICANCE 4-1

4.3 SAFETY MARGIN 4-2

5.0 STATE IMPLEMENTATION PLAN APPROVAL 5-1

5.1 INTRODUCTION 5-1

5.2 EVIDENCE OF COMPLIANCE 5-1
6.0 STATE COMPLIANCE WITH CLEAN AIR ACT REQUIREMENTS 6-1
7.0 CONCLUSION 7-1

LIST OF APPENDICES

APPENDIX A: CORRESPONDENCE AND GUIDANCE DOCUMENTS
APPENDIX B: CORRESPONDENCE REGARDING MOTOR VEHICLE EMISSION BUDGETS GEOGRAPHICAL EXTENT
APPENDIX C.1: POINT SOURCE INVENTORY DOCUMENTATION
APPENDIX C.2: AREA SOURCE INVENTORY DOCUMENTATION
APPENDIX C.3: ON-ROAD MOBILE SOURCE INVENTORY DOCUMENTATION
APPENDIX C.4: OFF-ROAD MOBILE SOURCE INVENTORY DOCUMENTATION
APPENDIX D: HEARING REPORT, COMMENTS RECEIVED AND RESPONSES

LIST OF TABLES

Table 2-1 Triangle Area's Historic 4th Highest 8-hour Ozone Values (2001-2012) 2-2
Table 2-2 Triangle Area's Historic Design Values (2001 - 2012) 2-3
Table 2-3 Triangle Area's Current Air Quality Data (2010 -2012) 2-4
Table 2-4. NOx Emissions from NC Sources in USEPA Acid Rain Database 2-6
Table 2-5. April – September NOx Emissions for Utilities Effecting Triangle Area (tons/period) 2-7
Table 3-1 Point Source Emissions for the Triangle Maintenance Area 3-10
Table 3-2 Area Source Emissions for the Triangle Maintenance Area 3-11
Table 3-3 On-road Mobile Source Emissions for the Triangle Maintenance Area 3-12
Table 3-4 Off-road Mobile Source Emissions for the Triangle Maintenance Area 3-13
Table 3-5 Total Man-Made Emissions for the Triangle Maintenance Area 3-14
Table 3-6 Maintenance Demonstration for Raleigh-Durham-Chapel Hill 3-15
Table 3-7 Safety Margin for Raleigh-Durham-Chapel Hill 3-16
Table 4-1 Percent Increase To Mobile Vehicle Emissions Budget 4-3
Table 4-2 On-road Mobile Source NOx Emissions Triangle Maintenance Area 4-4
Table 4-3 Chatham County MVEB in kilograms per day 4-4
Table 4-4 Durham County MVEB in kilograms per day 4-5
Table 4-5 Franklin County MVEB in kilograms per day 4-5

Table 4-6 Granville County MVEB in kilograms per day 4-5
Table 4-7 Johnston County MVEB in kilograms per day 4-5
Table 4-8 Orange County MVEB in kilograms per day 4-6
Table 4-9 Person County MVEB in kilograms per day 4-6
Table 4-10 Wake County MVEB in kilograms per day 4-6
Table 4-11 New Safety Margins for the Triangle Area 4-7

LIST OF FIGURES

Figure 1. USEPA Designated 8-Hour Ozone Nonattainment Areas in North Carolina 1-2
Figure 2. Ozone Monitor Locations in the Triangle Maintenance Area 2-1
Figure 3. Relationship Between High Temperature Days and Number of Exceedance Days in the Triangle Area 2-8
Figure 4. Relationship Between High Temperature Days and Maximum 4th Highest Ozone Value in the Triangle Area 2-8
Figure 5. North Carolina's NOx Inspection & Maintenance (I/M) Phase-In Map 3-4

LIST OF ACRONYMS

Acronym	Definition
AERR	Air Emissions Reporting Rule
ºF	Degrees Fahrenheit
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
E-GAS 5.0	Economic Growth Analysis System version 5.0
FR	Federal Register
HC	Hydrocarbons
I/M	Inspection and Maintenance
MVEB	Motor Vehicle Emission Budget
MOVES	MOtor Vehicle Emissions Simulator
NAAQS	National Ambient Air Quality Standard
NCDAQ	North Carolina Division of Air Quality
NCDENR	North Carolina Department of Natural Resources
NCDOT	North Carolina Department of Transportation
NOx	Nitrogen Oxides
PM	Particulate Matter
ppm	Parts per million
psi	Pounds per square inch
QA	Quality Assure
RVP	Reid Vapor Pressure
SIP	State Implementation Plan
SUV	Sports Utility Vehicle
TIP	Transportation Improvement Program
USEPA	U.S. Environmental Protection Agency
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 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 (USEPA) mandates seasonal monitoring of ambient ozone concentrations in North Carolina only from April 1 through October 31 (40 CFR 58 App. D, 2.5).

In 1997, the USEPA revised the primary (health) and secondary (welfare) national ambient air quality standards (NAAQS) for ozone by establishing 8-hour standards. An exceedance of the 8-hour ozone NAAQS occurs when a monitor measures ozone above 0.084 ppm on average for an eight-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 0.085 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.

On March 27, 2008, the USEPA promulgated a new 8-hour ozone standard. The revised standard sets the annual fourth-highest daily maximum 8-hour ozone concentration (averaged over 3 years) to 75 ppm.

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 RALEIGH-DURHAM-CHAPEL HILL AIR QUALITY HISTORY

On April 15, 2004, the USEPA designated the Raleigh-Durham-Chapel Hill, North Carolina area (referred to as the Triangle area) as "basic" nonattainment for the 8-hour ozone standard (Figure 1) based on the ambient data from 2001-2003. At that time, the design value for the Triangle area was 0.094 ppm. The Triangle nonattainment area included Durham, Franklin, Granville, Johnston, Orange, Person and Wake Counties and Baldwin, Center, New Hope and Williams Townships in Chatham County. The official designation and classification was published in the Federal Register (FR) on April 30, 2004 (69 FR 23858). The designation became effective on June 15, 2004. Prior to the implementation of the new 8-hour ozone standard, this area had been maintenance for the 1-hour ozone standard.

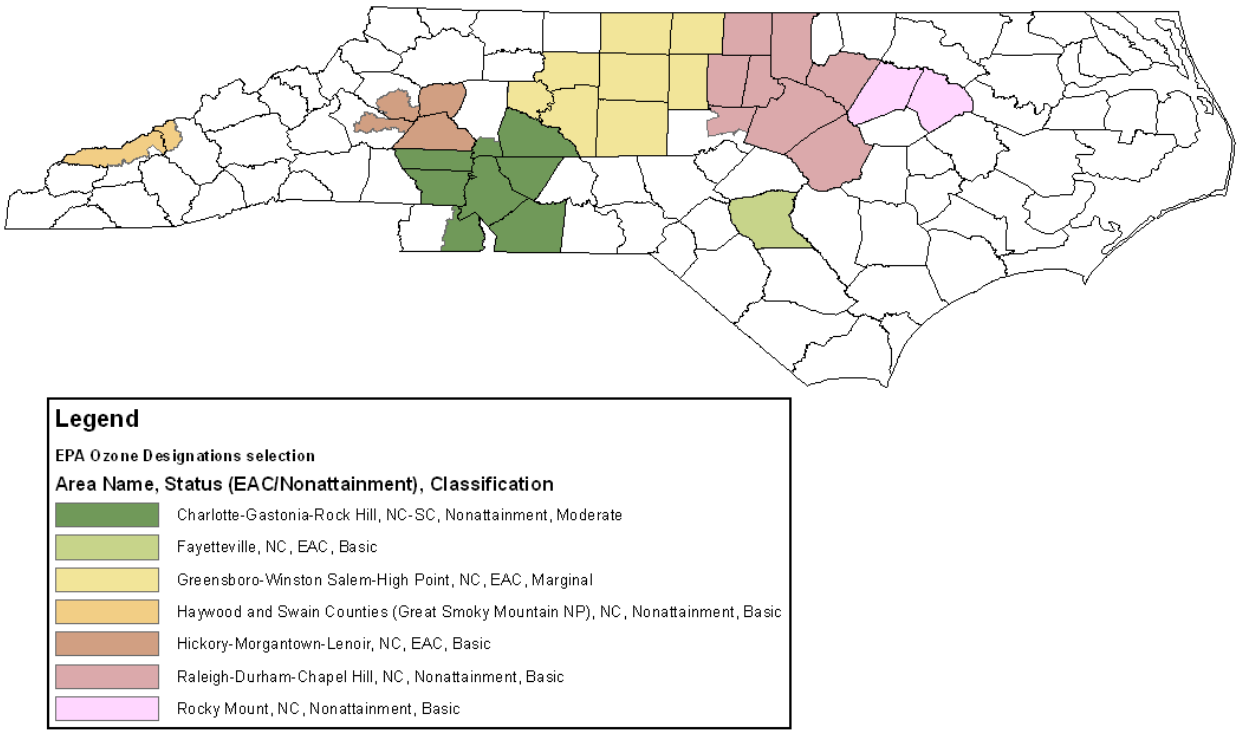

Figure 1. USEPA Designated 8-Hour Ozone Nonattainment Areas in North Carolina

There are currently eight ozone monitors in the Triangle maintenance area, located in seven counties. In 2005, all but one monitor, Butner located in Granville County, came into attainment of the 8-hour ozone NAAQS. With the completion of the 2006 ozone season, this monitor attained the standard as well. The 2004-2006 design value for Triangle area is 0.080 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 USEPA 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 0.085 ppm.

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

3. The USEPA 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 USEPA has fully approved a maintenance plan, including a contingency plan, for the areas under section 175A.

On June 7, 2007, North Carolina Department of Environment and Natural Resources, Division of Air Quality (NCDAQ) submitted a Redesignation Demonstration and Maintenance Plan for the Triangle area in accordance with Section 175 A(b) of the Federal Clean Air Act amendments. The Plan contained analysis of air quality data demonstrating attainment with the 8-hour ozone standard and emissions inventory comparison showing that the standard can be maintained for 10 years beyond the approval of the plan. The plan also defined contingency measures in the event of an air quality violation. Based on the information submitted, the USEPA redesignated the Triangle area from nonattainment to attainment/maintenance on December 26, 2007.

In the sections to follow, NCDAQ provides the technical data necessary to show that the Triangle maintenance area continues to attain the ozone NAAQS. The purpose of this supplement is to request the relaxation of summertime RVP standard of 7.8 psi for three Triangle counties (Wake, Durham, and Granville). USEPA's approval of this request would enable 9.0 psi gasoline to be distributed to all Triangle counties, resulting in significant economic relief to North Carolina consumers and businesses. The demonstration shows that the Federal RVP

requirement is not needed to attain the 8-hour ozone NAAQS. The demonstration also shows that relaxation of the RVP requirement does not interfere with the attainment of other NAAQS. A detailed discussion of Clean Air Act Section 110(l) requirements for all applicable pollutants is provided in Section 3.3.4.

2.0 AIR QUALITY

2.1 HISTORIC AIR QUALITY (2001 – 2012)

The NCDAQ has collected ambient monitoring data for the Triangle area since the late seventies. At the time of the 8-hour ozone designations, there were ten ozone monitors throughout the Triangle area (Figure 2). These monitors were installed in accordance with the Code of Federal Regulations (CFR) 40 CFR 58. Since then, two of the monitors have been shut down.

In 2004, the St. Augustine monitor, at St. Augustine College in Wake County, was shut down because the college planned to build on the land where the monitor was located. Since the Triangle area had more monitors than what was required, the Millbrook site in Wake County was located at a sufficiently close distance to rule out replacing the St. Augustine monitor. In 2005, the WRAL tower monitor was shut down due to painting of the tower, and was not re-established because of a significant increase in rental costs to use the tower, which the NCDAQ was fiscally unable to cover. There are eight remaining ozone monitors in the Triangle Nonattainment area, which provide adequate coverage of the entire area (see Figure 2).

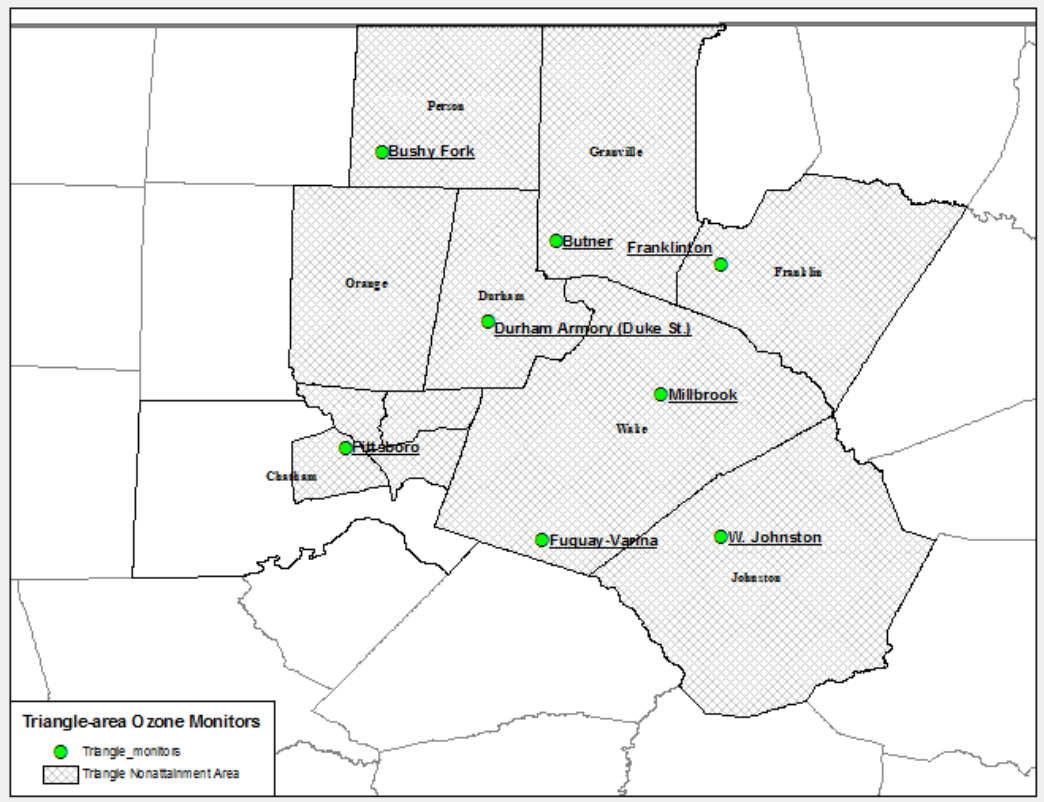

Figure 2. Ozone Monitor Locations in the Triangle Maintenance Area

Tables 2-1 and 2-2 below show the air quality data and corresponding design values for the monitors in the Triangle area, respectively, from 2001 to 2012.

Table 2-1 Triangle Area's Historic 4th Highest 8-hour Ozone Values (2001-2012)

Monitor	4th Highest 8-hour Ozone Values (ppm)											
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012*
Pittsboro AIRS ID #37-037-0004 Chatham County	0.077	0.094	0.075	0.068	0.079	0.070	0.075	0.071	0.063	0.070	0.067	0.060
Duke Street AIRS ID #37-063-0013 Durham County	0.084	0.100	0.084	0.074	0.076	0.078	0.080	0.076	0.066	0.074	0.070	0.074
Franklinton AIRS ID #37-069-0001 Franklin County	0.085	0.100	0.087	0.077	0.080	0.074	0.080	0.078	0.064	0.071	0.072	0.072
Butner AIRS ID #37-077-0001 Granville County	0.094	0.098	0.090	0.081	0.085	0.076	0.083	0.081	0.068	0.074	0.072	0.072
West Johnston AIRS ID #37-101-0002 Johnston County	0.078	0.097	0.080	0.074	0.083	0.072	0.078	0.076	0.066	0.074	0.074	0.075
Bushy Fork AIRS ID #37-145-0003 Person County	0.088	0.102	0.083	0.076	0.079	0.075	0.079	0.078	0.065	0.074	0.072	0.076
Millbrook AIRS ID #37-183-0014 Wake County	0.089	0.100	0.089	0.075	0.082	0.078	0.084	0.078	0.068	0.071	0.074	0.073
St. Augustine AIRS ID #37-183-0015 Wake County	0.088	0.107	0.079	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fuquay-Varina AIRS ID #37-183-0016 Wake County	0.082	0.095	0.089	0.077	0.085	0.073	0.080	0.078	0.069	0.073	0.078	0.074
WRAL Tower AIRS ID #37-183-0017 Wake County	0.077	0.096	0.084	0.079	-----	-----	-----	-----	-----	-----	-----	-----

* 2012 monitoring data has not been submitted to USEPA at this time.

Table 2-2 Triangle Area's Historic Design Values (2001 - 2012)

Monitor	Design Value (ppm)									
	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10	09-11	10-12*
Pittsboro AIRS ID #37-037-0004 Chatham County	**0.082**	**0.079**	0.074	0.072	0.074	0.072	0.069	0.068	0.066	0.065
Duke Street AIRS ID #37-063-0013 Durham County	**0.089**	**0.086**	**0.078**	**0.076**	**0.078**	**0.078**	0.074	0.072	0.070	0.072
Franklinton AIRS ID #37-069-0001 Franklin County	**0.090**	**0.088**	**0.081**	**0.077**	**0.078**	**0.077**	0.074	0.071	0.069	0.071
Butner AIRS ID #37-077-0001 Granville County	**0.094**	**0.089**	**0.085**	**0.080**	**0.081**	**0.080**	0.077	0.074	0.071	0.072
West Johnston AIRS ID #37-101-0002 Johnston County	**0.085**	**0.083**	**0.079**	**0.076**	**0.077**	0.075	0.073	0.072	0.071	0.074
Bushy Fork AIRS ID #37-145-0003 Person County	**0.091**	**0.087**	**0.079**	**0.076**	**0.077**	**0.077**	0.074	0.072	0.070	0.074
Millbrook AIRS ID #37-183-0014 Wake County	**0.092**	**0.088**	**0.082**	**0.078**	**0.081**	**0.080**	**0.076**	0.072	0.071	0.072
St. Augustine AIRS ID #37-183-0015 Wake County	**0.091**	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fuquay-Varina AIRS ID #37-183-0016 Wake County	**0.088**	**0.087**	**0.083**	**0.078**	**0.079**	**0.077**	0.075	0.073	0.073	0.075
WRAL Tower AIRS ID #37-183-0017 Wake County	**0.085**	**0.086**	-----	-----	-----	-----	-----	-----	-----	-----

Note: Bolded values represent violations of the 8-hour ozone standard.

* 2012 monitoring data has not been submitted to USEPA at this time.

In 2004, the USEPA took designation action for the Triangle area based on 2001-2003 ambient air quality data. At that time, the design value for the Triangle area was 0.094 ppm. On June 7,

2007, NCDAQ submitted a Redesignation Demonstration and Maintenance Plan for the Triangle area which showed that with State and Federal emission control requirements, the standard can be maintained for 10 years beyond the approval of the plan. Based on the information submitted, the USEPA redesignated the Triangle from nonattainment area to attainment/maintenance on December 26, 2007. Since then, ozone levels have continued to decline.

On March 27, 2008, the EPA revised 8-hour ozone standard from 0.80 ppm to 0.075 ppm (73 FR 16436). Due to continued decline in ozone values, on May 21, 2012, the USEPA designated the Triangle area in attainment of the more stringent 2008 ozone NAAQS.

2.2 RECENT AIR QUALITY VALUES (2010 –2012)

The most recent three years of ozone monitoring data (2010-2012) for the Raleigh-Durham-Chapel Hill, North Carolina maintenance area demonstrate compliance with the 8-hour ozone NAAQS. Table 2-3 is a summary of the fourth highest 8-hour average at the Triangle area monitors for 2010-2012 and the design value.

Table 2-3 Triangle Area's Current Air Quality Data (2010 -2012)

Monitor	Year	4th Highest 8-hour ozone values (ppm)	Design Value (ppm) 2010-2012
Pittsboro AIRS ID #37-037-0004 Chatham County	2010	0.070	0.065
	2011	0.067	
	2012*	0.060	
Duke Street AIRS ID #37-063-0013 Durham County	2010	0.074	0.072
	2011	0.070	
	2012*	0.074	
Franklinton AIRS ID #37-069-0001 Franklin County	2010	0.071	0.071
	2011	0.072	
	2012*	0.072	
Butner AIRS ID #37-077-0001 Granville County	2010	0.074	0.072
	2011	0.072	
	2012*	0.072	
West Johnston AIRS ID #37-101-0002 Johnston County	2010	0.074	0.074
	2011	0.074	
	2012*	0.075	
Bushy Fork AIRS ID #37-145-0003 Person County	2010	0.074	0.074
	2011	0.072	
	2012*	0.076	

Millbrook AIRS ID #37-183-0014 Wake County	2010	0.071	0.072
	2011	0.074	
	2012*	0.073	
Fuquay-Varina AIRS ID #37-183-0016 Wake County	2010	0.073	0.075
	2011	0.078	
	2012*	0.074	

The 2011 ozone monitoring data has been quality assured and was officially submitted to the USEPA on May 4, 2012. The 2012 8-hour ozone monitoring data is being quality-assured at this time, and will be submitted to the USEPA in the spring of 2013. The data in the table shows that the Triangle area continues to be in compliance with both the 1997 standard and the 2008 8-hour ozone NAAQS. Based on this continued decline in ozone levels and future year emission inventories with adequate safety margin (discussed later), NCDAQ believes that the current gasoline fuel standard of 7.8 psi is unnecessary to demonstrate maintenance.

2.3 PERMANENT AND ENFORCEABLE EMISSIONS REDUCTIONS

There are several State and Federal measures that have been enacted in recent years that are resulting in permanent and enforceable emissions reductions. A list of those measures that contributed to the permanent and enforceable emission reductions are listed below and are more fully described in Section 3.2.

The federal measures that have been implemented include:

- Tier 2 vehicle standards: Began implementation in 2004 and will require all passenger vehicles in the manufactures 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 will assist in lowering the NOx emissions.

- Heavy-duty gasoline and diesel on-road vehicle standards: Began to take effect in 2004 and is designed to reduce NOx and VOC emissions.

- Nonroad spark-ignition engines and recreational engines standards: Began to take effect in 2003 and will reduce NOx and HC emissions.

The state measures that have been implemented include:

- Clean Air Bill: Expanded the inspection and maintenance (I/M) program from 9 counties to 48. It was phased-in in the Triangle area from July 1, 2002 through July 1, 2004.

- Open burning ban: The rule prohibits open burning in areas that NCDAQ forecasts ozone and will reduce NOx and VOC emissions, as well as CO and fine particulate matter.

- Air toxics control program: The rule was effective in 1990 and reduce VOC emissions across the state.

- Heavy duty diesel engine gap filling rule: This rule requires engine manufacturers to perform the supplemental testing requirements for heavy duty diesel engines for model years 2005 and 2006 due to delays in the USEPA's rule. It was estimated to reduce the 2005 emissions in North Carolina by 5.3 tons per day and 10.9 tons per day in 2006.

- NOx State Implementation Plan (SIP) Call rule: This rule will result in a 68 percent reduction in NOx emissions from the State's large stationary combustion sources by 2006.

A recent review of the NOx emissions in the USEPA's acid rain database shows a reduction of over 96,000 tons NOx from the utilities subject to the NOx SIP call and the North Carolina Clean Smokestacks Act (CSA) between 2002 and 2011. Table 2-4 presents the annual emissions for the North Carolina sources in the USEPA acid rain database.

Table 2-4. NOx Emissions from NC Sources in USEPA Acid Rain 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

Table 2-5 displays the NOx emission reductions, as the result of the NOx SIP call rule and CSA, from power plants in the Triangle area, as well as the largest power plant just due west of the Triangle area that may be impacting the area. There are three facilities located within the Triangle area located in Person and Chatham Counties; however the Chatham County facility is not within the maintenance area. The facility west of the Triangle area is Belews Creek, located in Stokes County. This data is also from the USEPA acid rain database and represents the second and third quarters of the year (April through September), the period during which ozone levels are the highest. It is clearly demonstrated that the emissions from these facilities have significantly decreased during the ozone season since 2002, with almost 30,000 tons of NOx reduction in the 2012 ozone season compared to 2002. This is a 81% reduction in utility NOx emissions that are permanent and enforceable.

Table 2-5. April – September NOx Emissions for Utilities Effecting Triangle Area (tons/period)

Facility	**Belews Creek**	**Cape Fear**	**Mayo**	**Roxboro**	
County	**Stokes**	**Chatham**	**Person**	**Person**	**Total**
2002	20,632	1,089	4,703	10,045	36,469
2003	13,446	998	4,595	6,801	25,840
2004	7,042	1,052	1,630	7,245	16,969
2005	3,852	1,113	1,165	4,371	10,501
2006	3,769	1,159	1,223	5,607	11,758
2007	1,559	1,077	681	2,940	6,258
2008	1,483	954	818	3,306	6,561
2009	1,070	978	763	3,256	6,067
2010	1,600	1,,413	915	3,516	7,443
2011	1,897	877	791	3,222	6,787

A couple of measures to consider in determining how all of the emissions reductions have impacted air quality is whether the relationship of exceedance days or the maximum 4th highest ozone value with respect to high temperature days has changed over this time period. Temperature is one of the key meteorological factors 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 (^{o}F) or greater. Figure 3 shows the relationship of exceedance days to high temperature days from 1996 through 2012 for the Triangle monitors. The relationship between the maximum 4th highest ozone value to high temperature days from 1996 through 2012 is displayed in Figure 4.

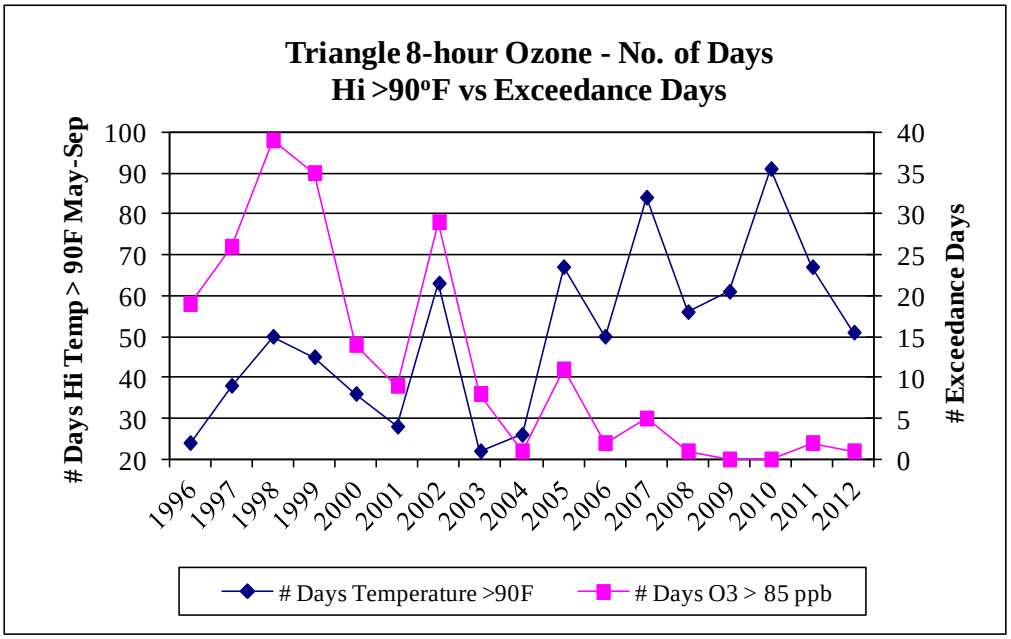

Figure 3. Relationship Between High Temperature Days and Number of Exceedance Days in the Triangle Area

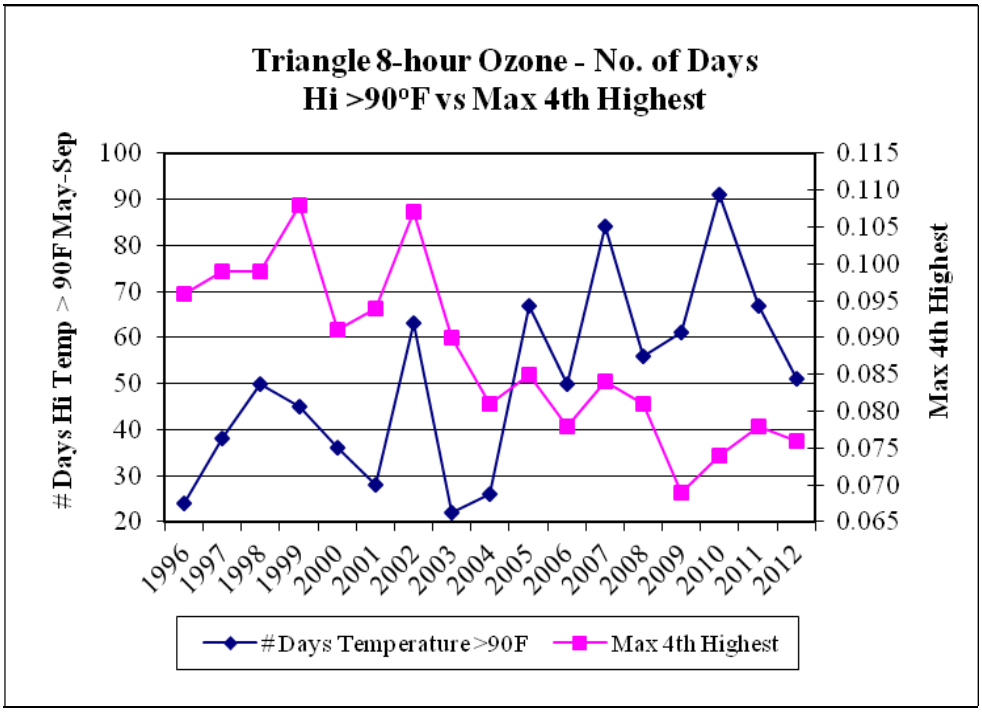

Figure 4. Relationship Between High Temperature Days and Maximum 4th Highest Ozone Value in the Triangle Area

It is important to see how the ozone levels have changed between 2002 and 2012 in response to lower NOx emissions in the State. In 2002, there were 67 days when the temperature was 90 ºF or greater, and the Triangle monitors observed 29 exceedance days of the 8-hour ozone NAAQS with the maximum 4th highest value being 0.107 ppm. In 2012, there were 51 hot days but only seven exceedance days occurred during the ozone season with the maximum 4th highest value being 0.076 ppm. North Carolina believes that this represents compelling evidence that the improvement in air quality is due to the real, permanent and enforceable reduction in NOx emissions in the State.

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 8-hour ozone in the Raleigh-Durham-Chapel Hill maintenance 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 Clean Air Interstate Rule, cleaner engine programs, and low sulfur gasoline and low sulfur diesel fuel programs.

The NCDAQ has implemented programs that will remain enforceable and are hereby submitted as the plan to ensure that maintenance of the 8-hour ozone standard will continue. Sources are prohibited from reducing emission controls (anti-backsliding) following the redesignation of the area unless such a change is first approved by the USEPA as a revision to the North Carolina SIP that is consistent with Section 110(l) of the Clean Air Act.

For the maintenance demonstration, the base year of 2005 was chosen since it is a year that falls within the attaining design value period of 2004-2006 and some emissions inventory data was already developed for this year. The interim years chosen were: 2008, 2011, and 2014 since the USEPA recommends three-year increments for interim years. The final year of the maintenance demonstration is 2017, since the CAA requires maintenance for at least ten years after redesignation. The maintenance demonstration consists of a comparison between the 2005 baseline emissions inventory and the projected emissions inventories (for 2008, 2011, 2014 and 2017), which consider economic and population growth. The comparison shows that the total emissions in each of the interim years and the final year will be lower than in the base year, which demonstrates maintenance of the 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 8-hour ozone. The secondary trigger will be a monitored air quality pattern that suggests an actual 8-hour ozone NAAQS violation may be imminent.

3.2 FOUNDATION CONTROL PROGRAM

The main element of the maintenance plan is the foundation control program. The foundation control program contains the controls 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 State's foundation control program is essential in demonstrating maintenance of the air quality standards.

The foundation control program consists of Federal and State measures. The Federal measures include the cleaner fuel programs and the federal on-road motor vehicle and off-road equipment control program. State measures include the I/M program, the air toxics program, the NOx SIP Call rule, the Clean Smokestacks Act, heavy duty diesel engine gap filling requirements and an open burning regulation. 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 Standards

Federal Tier 2 vehicle standards will require all passenger vehicles in a manufacturer's fleet, including light-duty trucks and Sports Utility Vehicles (SUVs), to meet an average standard of 0.07 grams of NOx per mile. Implementation began in 2004, and most vehicles will be phased in by 2007. Tier 2 standards will also cover passenger vehicles over 8,500 pounds gross vehicle weight rating (the larger pickup trucks and SUVs), which are not covered by current Tier 1 regulations. For these vehicles, the standards will be phased in beginning in 2008, with full compliance in 2009. The new standards require vehicles to be 77% to 95% cleaner than those on the road today. Tier 2 rule also reduces 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 but interferes with the operation of catalytic converters on vehicles resulting in higher NOx emissions. Lower-sulfur gasoline is necessary to achieve Tier 2 vehicle emission standards.

Heavy-Duty Gasoline and Diesel On-road Vehicles Standards

New USEPA standards designed to reduce NOx and VOC emissions from heavy-duty gasoline and diesel on-road vehicles began to take effect in 2004. A second phase of standards and testing procedures, beginning in 2007, will reduce particulate matter from heavy-duty on-road engines, and will also reduce on-road 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 particulate matter (PM) emissions and a 95% reduction in NOx emissions for these new engines using low sulfur diesel, compared to existing engines using higher-content sulfur diesel.

Large Nonroad Diesel Engines Rule

The USEPA promulgated in May 2004 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 reduce the allowable sulfur in nonroad diesel fuel by over 99%. Nonroad diesel fuel currently averages about 3,400 ppm sulfur. The proposed rules limit nonroad diesel sulfur content to 500 ppm in late 2006 and 15 ppm in 2010. The combined engine and fuel rules would reduce NOx and PM emissions from large nonroad diesel engines by over 90 %, compared to current nonroad engines using higher-content sulfur diesel.

Nonroad Spark-Ignition Engines and Recreational Engines Standard

The new standard, effective in July 2003, regulates NOx, HC and carbon monoxide (CO) for groups of previously unregulated nonroad engines. The new standard will apply to all new engines sold in the United States and imported after these standards begin and will apply to large spark-ignition engines (forklifts and airport ground service equipment), recreational vehicles (off-on-road 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 is scheduled to start in 2007. Like the large spark-ignition, recreational vehicles contribute to ozone formation and ambient CO and PM levels. They can also be a factor in regional haze and other visibility problems in both state and national parks. For the off-on-road motorcycles and all-terrain-vehicles, model year 2006, the new exhaust emissions standard will be phased-in by 50% and for model years 2007 and later at 100%. Recreational marine diesel 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 for will begin phase-in in 2006.

When all of the nonroad spark-ignition engines and recreational engines standards are fully implemented, an overall 72% reduction in HC, 80% reduction in NOx, and 56% reduction in CO emissions are expected by 2020. These controls will help reduce ambient concentrations of ozone, CO, and fine PM.

3.2.2 State Control Measures

North Carolina has adopted a number or regulations and legislation to address pollution issues across the State. These are summarized below.

Clean Air Bill

The 1999 Clean Air Bill expanded the vehicle emissions I/M program from 9 counties to 48, phased in between July 1, 2002 through January 1, 2006 (see Figure 5). Vehicles will be tested using the onboard diagnostic system, an improved method of testing, which will indicate NOx emissions, among other pollutants. The previously used tailpipe test did not measure NOx. The effective dates for the counties in the Triangle area are listed below.

County	Date
Chatham	January 1, 2004
Durham	July 1, 2002
Franklin	January 1, 2004
Granville	July 1, 2004

County	Date
Johnston	July 1, 2003
Orange	July 1, 2002
Wake	July 1, 2002

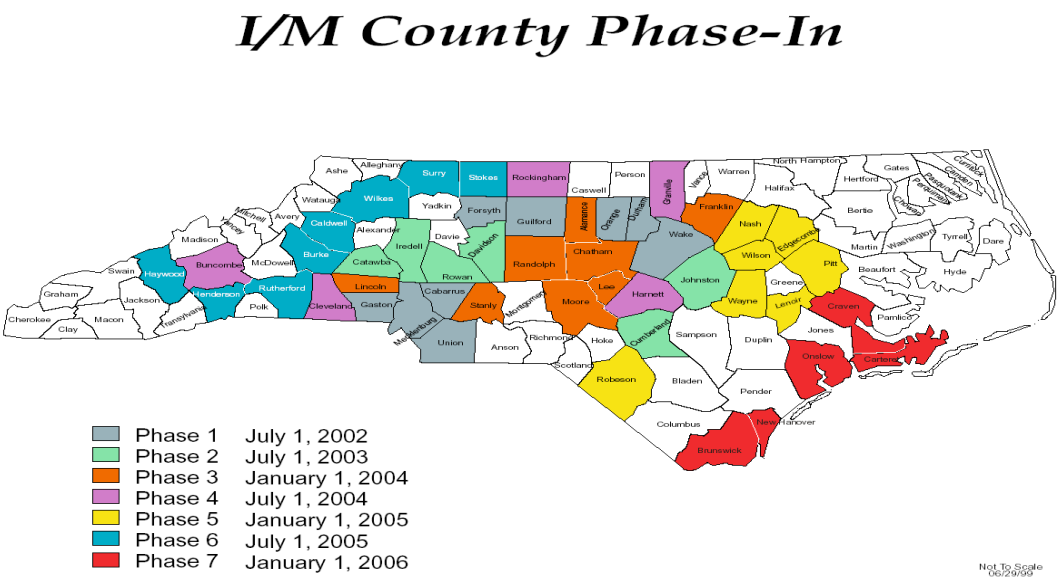

Figure 5. North Carolina's NOx Inspection & Maintenance (I/M) Phase-In Map

NOx SIP Call Rule

In response to the USEPA's NOx SIP call, North Carolina adopted rules to control the emissions of NOx from large stationary combustion sources. These rules cover (1) fossil fuel-fired stationary boilers, combustion turbines, and combined cycle systems serving a generator with a nameplate capacity greater than 25 megawatts electrical and selling any amount of electricity, (2) fossil fuel-fired stationary boilers, combustion turbines, and combined cycle systems having a maximum design heat input greater than 250 million British thermal units per hour, and (3) reciprocating stationary internal combustion engines rated at equal or greater than 2,400 brake horsepower (3,000 brake horsepower for diesel engines and 4,400 brake horsepower for dual fuel engines). As part of the NOx SIP call, the USEPA rules established a NOx budget for sources in

North Carolina and other states. North Carolina has a Phase II budget (i.e., emissions allowance) of 165,022 tons of NOx per ozone season.

Besides amending existing NOx rules and adopting new NOx rules specifically to address the USEPA NOx SIP call, the North Carolina rules also require new sources to control emissions of NOx. The objective of this requirement is (1) to aid in meeting the NOx budget for North Carolina for minor sources and (2) to aid in attaining and maintaining the ambient air quality standard for ozone in North Carolina.

North Carolina's NOx SIP Call rule was developed to reduce summertime NOx emissions from power plants and other industries by 68% by 2006. The North Carolina Environmental Management Commission adopted rules requiring the reductions in October 2000.

Clean Smokestacks Act

In June 2002, the North Carolina General Assembly enacted the Clean Smokestacks Act, requiring coal-fired power plants to reduce annual NOx emissions by 78% by 2009. These power plants must also reduce annual sulfur dioxide emissions by 49% by 2009 and by 74% by 2013. The Clean Smokestacks Act reduces NOx emissions beyond the requirements of the NOx SIP Call Rule. One of the first state laws of its kind in the nation, this legislation provides a model for other states in controlling multiple air pollutants from old coal-fired power plants.

Open Burning Bans

The Environmental Management Commission approved revisions to the open burning regulation banning open burning during the ozone season on forecasted code orange and code red ozone action days for those counties that the NCDAQ forecasts ozone. Since 1998, the NCDAQ has forecasted ozone in the Triangle area; therefore, the following counties in the Triangle area are subject to this rule: Chatham, Durham, Franklin, Granville, Johnston, Orange, Person, Vance, and Wake Counties.

Air Toxics Control Program

Although the purpose of North Carolina's air toxic program is to control toxic air pollutants rather than volatile organic compounds, it will also reduce emissions of volatile organic compounds because many toxic air pollutants are also volatile organic compounds. The air toxic program was effective May 1, 1990. All new facilities are required to comply with the air toxic rules before beginning operation. Existing facilities that are modified such that there are additional emissions of toxic air pollutants are required to comply with the air toxic rules.

Prevention of Significant Deterioration

All new major sources of volatile organic compounds and nitrogen dioxide will be evaluated under the prevention of significant deterioration program and are required to use best available control technology.

Heavy Duty Diesel Engine Gap Filling Requirements

In October of 2001, the Environmental Management Commission adopted a rule to fill a gap in federal requirements for improved heavy duty diesel engine emissions testing in order to prevent excess NOx emissions from occurring over the lengthy life of such vehicles. Without the rule, estimated excess NOx emissions of 5.3 tons per day would occur in 2005 and 10.91 tons per day in 2006 from heavy-duty diesels registered in North Carolina. The rule requires that all model year 2005 and 2006 heavy-duty diesel engines sold, leased, or registered in North Carolina to be of the type which have been certified by the California Air Resources Board as meeting supplemental test procedures that are more representative of actual on-road operating conditions than the federal test procedures for those model years. On January 1, 2002, the rule became effective.

3.2.3 Additional Programs Supporting Maintenance

Air Awareness Program

The North Carolina Air Awareness Program is a public outreach and education program of the NCDAQ. 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 ozone forecast. The NCDAQ produces the 8-hour ozone forecasts and corresponding air quality index for the Triangle forecast area from May 1 through September 30 of each year.

Transportation Conformity

The NCDAQ will continue to work closely with the North Carolina Department of Transportation (NCDOT) and local transportation agencies to assure that Transportation Improvement Programs (TIPs) in the maintenance area are consistent with and conform to the State's air quality program, including the SIP, and meet the Federal requirements on conformity. This conformity review shall be performed for all Federally funded and all other major projects contained in TIPs, regardless of source of funding. Technical analysis of transportation plans,

programs, and projects for conformity will be done cooperatively by the Statewide Planning Branch of the NCDOT and the NCDAQ. In the event that the NCDAQ disagrees with the NCDOT on a conformity determination or issue, the NCDAQ and the NCDOT will present the issue to the Governor for resolution. Additionally, the State will prepare NOx emissions analyses in the ozone conformity determinations.

The public and interested parties will be given an early and reasonable opportunity to comment on transportation plans, programs, projects and proposed conformity determinations in accordance with procedures adopted by metropolitan planning organizations pursuant to the requirements of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (and any updated transportation legislation) and the CAA as amended.

3.3 EMISSIONS INVENTORIES AND MAINTENANCE DEMONSTRATION

3.3.1 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 dispersion modeling. The approach used by the NCDAQ is the comparison of emissions inventories for the years 2005 and 2017.

For the maintenance demonstration, the base year of 2005 was chosen since it is a year that falls within the attaining design value period of 2004-2006 and some emissions inventory data was already developed for this year. The maintenance demonstration is made by comparing the 2005 baseline emissions inventory to the 2017 projected emissions inventory. The baseline emissions inventory represents an emission level for a period when the ambient air quality standard was not violated, 2004-2006. 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 2005 baseline to demonstrate that these years are also expected to show continued maintenance of the 8-hour ozone standard.

The emissions inventories are comprised of four major types of sources: point, area, on-road mobile and off-road mobile. The projected emissions 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.

3.3.2 Emission Inventories

There are four different man-made emission inventory source classifications: (1) stationary point, (2) area, (3) on-road mobile and (4) off-road mobile sources.

Point sources are those stationary sources that emit more than 10 tons per year VOC or 100 tons per year of NOx 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 USEPA's AP-42. There are usually several emission sources for each facility. Emission data is collected for each point source at a facility and the data is entered into an in-house database system. For the projected year's inventory, point sources are adjusted by growth factors based on Standard Industrial Classification codes. The growth factors are generated using the USEPA's Economic Growth Analysis System version 5.0 (E-GAS 5.0) program. No changes to the point source emissions inventory are made in this supplement.

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.). For area sources, 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 the projected year's inventory, area source emissions are changed by population growth, projected production growth, or when applicable, by E-GAS 5.0 growth factors. Where applicable, future year area source emissions inventory is generated using 9.0 psi RVP (see Appendix C.2).

On-road mobile sources are those vehicles that travel on the roadways. For on-road mobile sources, the USEPA's MOBILE6.2 model is replaced with the Motor Vehicle Emission Simulator (MOVES) mobile model to generate emissions estimates. The MOVES model data represent the new motor vehicle emission budgets for the Triangle area. The MOVES model uses the road class vehicle miles traveled (VMT) and other operating conditions as input parameters to generate an output file that contains estimated emissions. For the projected years' inventories, the on-road mobile sources emissions are calculated by running the MOVES mobile model for the future year with the projected VMT to generate emissions that take into consideration expected Federal tailpipe standards, fleet turnover and new fuel standards.

The current I/M SIP (submitted to EPA on May 21, 2010) commits North Carolina to ensure a compliance rate of no less than 92% among subject vehicles by 2011. This SIP has not yet been approved by the EPA. The most recent approved version of the I/M SIP requires a compliance rate of at least 95%. In recent years, North Carolina instituted an electronic authorization program which replaced paper stickers with electronic authorizations. This process synchronized

vehicle registration renewal date with the vehicle inspection renewal date, essentially requiring a passing safety only or safety/On-Board-Diognostics inspection prior to the vehicle's registration renewal. As a result of tying the inspections requirements to vehicle registration, the actual compliance rate has improved and varies between 96 and 99 percent. In 2011, the North Carolina Division of Motor Vehicles reported a program-wide compliance rate of 98.48% to EPA based on electronic records. The reported compliance rate for 2010 was 99.34%.

For this supplement, NCDAQ applied the currently approved compliance rate of 95% for Triangle counties with the I/M program. The MOVES modeling was performed under two scenarios: (1) current 7.8 psi RVP standard and (2) future 9.0 psi RVP. Appendix C.3 documents the analysis approach for on-road mobile source related emissions.

Off-road mobile sources are equipment that can move but do not use the roadways (i.e., lawn mowers, construction equipment, railroad locomotives, aircraft). With the exception of the railroad locomotives and aircraft engines, the emissions from this category are calculated using the USEPA's NONROAD2008a nonroad mobile model. In the original plan, NONROAD2005c Model was run by assigning all counties with 7.8 psi RVP. This modeling was conducted in error for Chatham, Franklin, Johnston, Orange, and Person, as these counties are not subject to the Federal gasoline standard. The model should have been run with RVP of 9.0 psi. Also in the original plan, the oxygen weight content was defined to be 0 percent. In this supplement, both input parameters are corrected by using the correct RVP standard and actual oxygen content (as reported by the Petroleum and Convenience Marketers) in the NONROAD2008a model. The railroad locomotive and aircraft engine emissions are estimated by taking an activity and multiply by an emission factor. All emissions are also estimated at the county level. Total off-road mobile source emissions represent the sum of emissions generated by the NONROAD 2008a model and emissions calculated for aircraft and railroad locomotives. Adjusted total emissions adds general conformity emission budget for the Shearon Harris project to the total emissions. The relaxation of the RVP standard in Wake, Durham, and Granville Counties only impacts future year emissions calculated by the NONROAD 2008a model. A complete description of how off-road inventories were developed is discussed in detail in Appendix C.4.

3.3.3 Summary of Emissions

The tables below contain the estimated emissions from all of the emission source sectors, i.e., point, area, on-road mobile and off-road mobile.

Table 3-1 Point Source Emissions for the Triangle Maintenance Area

County	2005	2008	2011	2014	2017
VOC Emissions (tons/day)					
Chatham*	0.00	0.00	0.00	0.00	0.00
Durham	1.18	1.29	1.47	1.53	1.65
Franklin	1.59	1.74	1.86	2.02	2.20
Granville	1.93	2.15	2.35	2.55	2.78
Johnston	2.36	2.58	2.84	3.10	3.37
Orange	0.28	0.31	0.35	0.38	0.42
Person	0.95	1.03	1.08	1.18	1.25
Wake	3.99	4.14	4.50	4.85	5.27
Total	12.28	13.24	14.45	15.61	16.94
NOx Emissions (tons/day)					
Chatham*	0.02	0.02	0.02	0.03	0.03
Durham	1.86	2.05	2.17	2.34	2.49
Franklin	0.16	0.18	0.18	0.20	0.23
Granville	0.28	0.32	0.33	0.34	0.37
Johnston	0.62	0.67	0.71	0.81	0.89
Orange	1.55	1.63	1.64	1.65	1.65
Person	32.43	27.12	27.79	28.26	27.41
Wake	1.45	1.56	1.66	1.80	1.97
Total	38.37	33.55	34.50	35.43	35.04

* Includes only those sources within the maintenance area of Chatham County.

Table 3-2 Area Source Emissions for the Triangle Maintenance Area

County	2005	2008	2011	2014	2017
VOC Emissions (tons/day)					
Chatham*	2.47	2.96	3.10	3.24	3.38
Durham	7.46	7.82	8.20	8.57	8.96
Franklin	5.29	5.73	6.11	6.47	6.82
Granville	5.43	5.81	6.19	6.53	6.86
Johnston	12.52	13.60	14.72	15.70	16.69
Orange	5.23	5.49	5.71	5.95	6.21
Person	4.12	4.41	4.67	4.88	5.10
Wake	27.34	29.74	31.91	34.24	36.53
Total	69.86	75.56	80.61	85.58	90.55
NOx Emissions (tons/day)					
Chatham*	0.37	0.39	0.41	0.42	0.45
Durham	2.04	2.13	2.22	2.30	2.38
Franklin	0.55	0.57	0.62	0.67	0.69
Granville	0.47	0.49	0.50	0.51	0.55
Johnston	1.35	1.43	1.50	1.59	1.73
Orange	1.15	1.21	1.24	1.29	1.34
Person	0.34	0.36	0.38	0.39	0.39
Wake	6.75	7.07	7.37	7.70	8.02
Total	13.02	13.65	14.24	14.87	15.55

*Chatham County emissions adjusted for maintenance area only.

Table 3-3 On-road Mobile Source Emissions for the Triangle Maintenance Area

County	Current 7.8 psi RVP[1]					9.0 psi RVP	
	2005	2008	2011	2014	2017	2014	2017
VOC Emissions (tons/day)							
Chatham*	2.49	2.14	1.73	1.44	1.19	1.44	1.19
Durham	13.00	10.62	8.28	6.66	5.29	6.89	5.46
Franklin	4.18	3.47	2.73	2.23	1.83	2.23	1.83
Granville	4.48	3.65	2.83	2.26	1.80	2.26	1.80
Johnston	13.17	11.09	8.87	7.37	6.10	7.37	6.10
Orange	6.96	5.79	4.54	3.63	2.86	3.63	2.86
Person	3.17	2.60	2.05	1.65	1.35	1.65	1.35
Wake	40.21	34.74	28.10	22.98	18.55	23.79	19.18
Total	87.66	74.10	59.13	48.22	38.97	49.26	39.77
Net Change in Total Future Year Emissions Due to RVP Change						1.04	0.80
% Change in Total Future Year Emissions Due to RVP Change						2.16%	2.05%
NOx Emissions (tons/day)							
Chatham*	3.84	3.34	2.76	2.25	1.86	2.25	1.86
Durham	28.50	24.73	18.77	14.59	11.51	14.69	11.58
Franklin	6.08	5.00	3.89	3.05	2.43	3.05	2.43
Granville	8.55	6.73	4.96	3.74	2.89	3.74	2.89
Johnston	27.37	22.40	16.99	13.46	10.87	13.46	10.87
Orange	17.90	15.23	11.35	8.67	6.76	8.67	6.76
Person	3.88	3.16	2.38	1.85	1.48	1.85	1.48
Wake	79.06	71.46	56.36	44.23	35.08	44.56	35.31
Total	175.18	152.05	117.46	91.84	72.88	92.27	73.18
Net Change in Total Future Year Emissions Due to RVP Change						0.43	0.30
% Change in Total Future Year Emissions Due to RVP Change						0.47%	0.41%

*Chatham County emissions adjusted for maintenance area only.

[1] 7.8 psi for Wake, Durham and Granville Counties and 9.0 psi for the remaining counties.

Table 3-4 Off-road Mobile Source Emissions for the Triangle Maintenance Area

	Current 7.8 psi RVP[1]					9.0 psi RVP	
County	2005	2008	2011	2014	2017	2014	2017
VOC Emissions							
Chatham*	0.56	0.47	0.40	0.32	0.28	0.32	0.28
Durham	4.30	3.54	2.98	2.43	2.16	2.48	2.24
Franklin	0.75	0.61	0.50	0.42	0.38	0.42	0.38
Granville	0.94	0.77	0.61	0.50	0.45	0.51	0.46
Johnston	2.53	2.16	1.88	1.56	1.41	1.56	1.41
Orange	2.95	2.76	2.50	2.17	1.86	2.17	1.86
Person	0.76	0.61	0.52	0.41	0.37	0.41	0.37
Wake	15.91	12.72	11.10	9.18	8.63	9.45	8.87
Adjusted Total[2]	**28.70**	**23.64**	**20.49**	**16.99**	**15.54**	**17.32**	**15.87**
NOx Emissions							
Chatham*	0.78	0.69	0.60	0.47	0.39	0.47	0.39
Durham	7.08	6.25	5.29	4.20	3.28	4.19	3.28
Franklin	0.89	0.80	0.68	0.57	0.47	0.57	0.47
Granville	1.64	1.44	1.22	0.97	0.76	0.97	0.76
Johnston	4.88	4.44	3.99	3.46	2.98	3.46	2.98
Orange	2.77	2.57	2.30	1.91	1.56	1.91	1.56
Person	0.83	0.74	0.65	0.52	0.44	0.52	0.44
Wake	19.26	18.03	18.43	15.91	13.76	15.91	13.76
Adjusted Total[2]	**38.13**	**34.96**	**33.16**	**28.01**	**23.64**	**28.00**	**23.64**

*Chatham County emissions for nonattainment area only.

[1] 7.8 psi is for Wake, Durham and Granville Counties and 9.0 psi is for the remaining counties.

[2] Adjusted Total represents total emissions plus the General Conformity emissions budget for the Shearon Harris Project in Wake County.

Table 3-5 summarizes the total man-made emissions for the Triangle area. The relaxation of the summertime RVP from 7.8 to 9.0 psi results in a slight increase in NOx and VOC emissions from the attainment inventory year through the end future year. By 2017, total man-made emissions increase in NOx is 0.30 tons per day (0.20% increase). Total man-made VOC emissions increase is 3.88 tons per day or 2.44% increase. When biogenic emissions from natural sources (206.50 tons per day per USEPA Mercury Air Toxics rule modeling) are added to the man-made emissions, actual VOC emissions increase is only 1.03%. Despite these small increases, the Triangle maintenance area continues to demonstrate a downward trend in NOx and VOC emissions through all future years. A large safety margin remains between 2005 and 2017 to ensure the area continues to attain the ozone NAAQS with the relaxation of the RVP standard (discussed below).

Table 3-5 Total Man-Made Emissions for the Triangle Maintenance Area

	Current 7.8 psi RVP[1]			9.0 psi RVP	
County	2005	2008	2011	2014	2017
VOC Emissions (tons/day)					
Chatham*	5.52	5.57	5.23	5.00	4.85
Durham	25.94	23.27	20.93	19.47	18.31
Franklin	11.81	11.55	11.20	11.14	11.23
Granville	12.78	12.38	11.98	11.85	11.90
Johnston	30.58	29.43	28.31	27.73	27.57
Orange	15.42	14.35	13.10	12.13	11.35
Person	9.00	8.65	8.32	8.12	8.07
Wake	87.45	81.34	75.61	72.33	69.85
Total	**198.50**	**186.54**	**174.68**	**167.77**	**163.13**
NOx Emissions (tons/day)					
Chatham*	5.01	4.44	3.79	3.17	2.73
Durham	39.48	35.16	28.45	23.52	19.73
Franklin	7.68	6.55	5.37	4.49	3.82
Granville	10.94	8.98	7.01	5.56	4.57
Johnston	34.22	28.94	23.19	19.32	16.47
Orange	23.37	20.64	16.53	13.52	11.31
Person	37.48	31.38	31.20	31.02	29.72
Wake	106.52	98.12	83.82	69.97	59.06
Total	**264.70**	**234.21**	**199.36**	**170.57**	**147.41**

* Chatham County emissions for maintenance area only.

[1] 7.8 psi for Wake, Durham and Granville Counties and 9.0 psi for the remaining counties.

3.3.4 Maintenance Demonstration

Maintenance is demonstrated when the future years total man-made emissions are less than the 2005 baseline emissions. The following table summarized the VOC and NOx emissions for the entire Triangle maintenance area. The difference between the base year and the final year of the plan illustrates that the continued maintenance of the 8-hour ozone NAAQS is expected.

Although there is a slight increase in VOC emissions between 2014 and 2017, the NCDAQ does not believe this is inconsistent with the maintenance demonstration. First, the 2017 emissions are still below the baseline emissions for 2005. Secondly, the Triangle area is considered a NOx limited area with respect to ozone formation. This means that there are significantly more VOC emissions in the atmosphere and that reductions in man-made VOC emissions will not result in reductions of ozone. Approximately 90% of the VOC emissions come from biogenic, or natural, sources, which cannot be controlled; therefore, a slight increase in man-made VOC emissions in 2017 will not result in an increase in ozone formation.

Table 3-6 Maintenance Demonstration for Raleigh-Durham-Chapel Hill

Year	VOC TPD	NOx TPD
2005	198.50	264.70
2008	186.54	234.21
2011	174.68	199.36
2014	167.77	170.57
2017	163.13	147.41
Difference from 2005 to 2017	-35.37	-117.29

The difference between the attainment level of emissions (2005) from all man-made sources and the projected level of emissions from all man-made sources in the area is considered the "safety margin". The safety margin for each projected year is listed below in Table 3-7. The data illustrate that significant reductions in emissions are expected in future years and adequate safety margin remains between the base year and all future years.

Table 3-7 Safety Margin for Raleigh-Durham-Chapel Hill

Year	VOC TPD	NOx TPD
2005	N/A	N/A
2008	-11.96	-30.49
2011	-23.82	-65.34
2014	-30.73	-94.13
2017	-35.37	-117.29

3.3.5 Clean Air Act Section 110(l) Demonstration

Relaxation of the Federal gasoline standard requires a demonstration that associated emissions increases will not interfere with the attainment of other NAAQS. The following discussion shows that the RVP relaxation will not impact compliance with other NAAQS.

Currently, all eight ozone monitors in the Triangle area are attaining the more stringent 2008 8-hour ozone standards. Due to the large safety margin present in NOx and VOC emissions (discussed earlier), it is expected that the area will continue to attain the ozone NAAQS.

The current ambient air quality levels for carbon monoxide (CO) is about 25% of the CO standard. Although on-road mobile sources are a large contributor to CO ambient air concentrations, CO emissions increase from relaxation of the RVP standard is not expected to affect the attainment status of the area. Off-road and area sources are not a large contributor to CO emissions.

One of the two current NAAQS established by USEPA for carbon monoxide (CO) is an 8-hour standard of 9 ppm, measured using the annual second-highest maximum 8-hour concentration for two consecutive years as the design value. The other standard is a 1-hour average of 35 ppm, using the second-highest 1-hour average within a given year. Ambient monitoring data for the Triangle area in the years 2010 and 2011 show an 8-hour design value of 1.4 ppm, or about 16% of the CO NAAQS (see the "Carbon Monoxide Limited Maintenance Plan" submitted to USEPA on 2 August 2012, Table 2-2.1, p. 6). Additionally, years 2010 and 2011 ambient monitoring data show 1-hour values of 1.8 and 2.4 ppm, respectively, within the Triangle. Both of these values are well inside of the 35 ppm standard set forth in the CO NAAQS. On-road mobile emissions are known to be a large component of overall CO emissions. A CO emissions inventory for year 2010, submitted as a requirement of the CO Limited Maintenance Plan (Table 3-1.1, p. 9), showed that on-road mobile sources (as estimated using the MOVES2010a model) comprised 829 tons of the overall 927 tons of CO emitted from the Triangle region per day. Non-road mobile and area sources contributed far less (e.g., approximately 90 and 6 tons,

respectively). It is estimated that Triangle-area on-road CO emissions will increase approximately 6.3 tons per day in 2014 and 2017 due to relaxation of the RVP standard. This projected increase in CO emissions is comparatively minimal, and it is expected that the effect to ambient concentrations of CO will be correspondingly minimal as well. Therefore, there is no expectation or concern that this change in CO emissions due to the relaxation of the RVP standard will affect the attainment status of the Triangle area CO NAAQS.

The revised nitrogen dioxide (NO_2) standard was published in the federal register on February 9, 2010. The monitoring requirements are focused on near-road monitoring; therefore, one focus of this standard is on-road mobile sources. To date, none of the near-road NO_2 monitors have been established in North Carolina. Since there is no data to determine if North Carolina is violating or close to exceeding this standard, it is difficult to assess whether increasing the RVP will result in a violation of the NO_2 standard. However, on-road mobile sources are a large contributor of NOx emissions and NO_2 is a component of NOx. Based upon the MOVES model emission estimations, the RVP relaxation would not increase NO_2 concentrations.

On-road mobile, off-road mobile and area sources are not believed to be large contributors to directly emitted fine particulate matter less than 2.5 micrometers ($PM_{2.5}$) or indirectly formed $PM_{2.5}$ concentrations. In North Carolina, directly emitted $PM_{2.5}$ is a very small component of the overall $PM_{2.5}$ ambient concentrations. The primary species impacting $PM_{2.5}$ concentrations are the secondarily formed sulfates and organic carbons. Sulfates are formed through the chemical reaction of sulfur dioxide (SO_2) and ammonia and the majority of the organic carbons come from natural sources like trees. A 2009 analysis of SO_2 emissions, which is a primary contributor to the formation of $PM_{2.5}$ within North Carolina, found about 3.3% of total SO_2 emissions came from on-road, off-road and area sources combined, while the remaining 96.7% came from point sources (see "Redesignation Demonstration and Maintenance Plan for the Hickory (Catawba County) and Greensboro/Winston-Salem/High Point (Davidson and Guilford Counties) Fine Particulate Matter Nonattainment Areas", submitted to USEPA on 18 December 2009, Figure 4-2, p. 4-4). Based on this, it is concluded that the relatively small RVP related emissions change in particulate matter will not affect $PM_{2.5}$ NAAQS.

For the reasons outlined above, it is not likely that relaxation of the RVP standard will result in a violation of the ozone, CO, NO_2, SO_2, $PM_{2.5}$ and PM_{10} NAAQS.

3.4 CONTINGENCY PLAN

3.4.1 Overview

The two main elements of the North Carolina contingency plan are tracking and triggering mechanisms to determine when contingency 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 8-hour ozone NAAQS at any of the Triangle area monitors. The secondary trigger will be a monitored air quality pattern that suggests an actual 8-hour ozone NAAQS violation may be imminent. The tertiary trigger will be a monitored fourth high exceedance of the NAAQS. Upon either the primary or secondary triggers being activated, the NCDAQ will commence analyses to determine what additional measures, if any, will be necessary to attain or maintain the 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. Each adopted rule will include a schedule that will require compliance with the rule no later than 3 years after adoption of the rule. 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 Emissions 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 baseline, interim and final years of the emission inventory in this maintenance demonstration.

3.4.2 Primary and Secondary Triggers

The primary trigger of the contingency plan will be a violation of the 8-hour ozone standard, or when the three-year average of the 4th highest values is equal to or greater than 0.085 ppm at a monitor in the Triangle 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 0.085 ppm.

The secondary trigger will apply where no actual violation of the 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 0.085 ppm or greater at a single monitor within the Triangle area. The trigger date will be 60 days from the date that the State observes a 4th highest value of 0.085 ppm or greater at a monitor for which the previous season had a 4th highest value of 0.085 ppm or greater.

Similarly, the tertiary trigger will not be an actual violation of the 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 Triangle area has a 4th highest value of 0.085 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 0.085 ppm or greater at any monitor.

3.4.3 Action Resulting From Trigger Activation

Once the primary or secondary trigger is activated, the Planning Section of the NCDAQ 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 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 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 in the Triangle area counties, diesel inspection and maintenance program, implementation of diesel retrofit programs, including incentives for performing retrofits, and additional controls in upwind areas.

Once the tertiary trigger is activated, the Planning Section of the NCDAQ 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 is completed, the NCDAQ will work with the local air awareness program and develop an outreach plan to identify any additional voluntary measures that can be implemented. If the 4th highest exceedance occurs early in the season, the NCDAQ will work with entities identified in the outreach plan to determine if the measures can be implemented during the current season, otherwise, NCDAQ will work with the local air awareness coordinator to implement the plan for the following ozone season.

3.4.4 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 NCDAQ. The NCDAQ will commit to review these emissions inventories to determine if an unexpected growth in NOx emissions in the Triangle area may endanger the maintenance of the

8-hour ozone standard. Additionally, as new VMT data is provided by the North Carolina Department of Transportation (NCDOT), the NCDAQ commits to review this data and determine if any unexpected growth in VMT may endanger the maintenance of the 8-hour ozone standard.

Additionally, under the AERR the NCDAQ is required to develop a comprehensive, annual, statewide emissions inventory every three years and is due eighteen months after the completion of the inventory year. The AERR inventory years coincide with the baseline, interim and final years of the maintenance plan. Therefore, the NCDAQ 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 8-hour ozone standard in this area.

4.0 MOTOR VEHICLE EMISSIONS BUDGET FOR CONFORMITY

4.1 TRANSPORTATION CONFORMITY

The purpose of transportation conformity is to ensure that Federal transportation actions occurring in nonattainment and maintenance areas do not hinder the area from attaining and maintaining the 8-hour ozone standard. This means that the level of emissions estimated by the NCDOT or the metropolitan planning organizations for the Transportation Implementation Plan (TIP) and Long Range Transportation Plan must not exceed the motor vehicle emission budgets (MVEBs) as defined in this maintenance plan.

4.2 ON-ROAD MOBILE SOURCE VOC INSIGNIFICANCE

Section 93.109(k) in the Transportation Conformity Rule Amendments for the new 8-hour ozone and fine particulate matter NAAQS addresses areas with insignificant motor vehicle emissions. The rule suggests that such a finding would be based on a number of factors, including the percentage of motor vehicle emissions in the context of the total SIP inventory, the current state of air quality as determined by monitoring data for that NAAQS, the absence of SIP motor vehicle control measures, and historical trends and future projections of the growth of motor vehicle emissions. Although there is a vehicle control measure in place in the Triangle area, an inspection and maintenance program, the current program was established for additional reductions in NOx emissions. There are incidental VOC emissions reductions as a result of this program, approximately 2 tons per day in 2005, however it is not believed the reduction of VOC emissions resulted in decreased ozone levels.

The NCDAQ has examined the 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. The biogenic sector is the most abundant source of VOC emissions in North Carolina and accounts for approximately 90% of the total VOC emissions statewide. The overwhelming abundance of biogenic VOC emissions makes the majority of North Carolina a NO_x limited environment for the formation of ozone. This holds true in the Triangle area.

Also noteworthy are the projected decreases in on-road mobile VOC emissions through the year 2017 despite projected VMT increases. These reductions are due mainly to the retirement of older vehicles and the growing fleet of Tier 2 vehicles on the roads in future years. Some additional reductions are attributable to North Carolina's inspection and maintenance program.

Additionally, the NCDAQ has performed a number of modeling sensitivities to determine the impact of on-road mobile source VOCs on ozone formation in the Triangle area. The results of these sensitivities indicate no change in future ozone concentrations in the Triangle area when on-road mobile VOCs are significantly changed. These sensitivities are discussed in more detail in Appendix C.3.

The NCDAQ believes on-road mobile VOCs are insignificant contributors to ozone formation in the Triangle maintenance area. Emission estimates indicate on-road mobile VOC is a small percentage of the total VOC emissions inventory. On-road mobile VOC emissions are projected to decrease into the future, notwithstanding VMT increases. The area is currently well below the NAAQS and emission sensitivity modeling indicates no change in future ozone concentrations when VOC emissions are significantly changed. For these reasons, the NCDAQ will not be setting MVEB for VOC for the Triangle maintenance area. NCDAQ will revisit the setting of MVEB for VOC if there is indication that the Triangle area has become VOC sensitive for ozone formation.

4.3 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 and mobile) and the projected level of emissions from all source categories. The safety margins for the Triangle area were presented earlier in Section 3.3.4, Table 3-7. 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 NCDAQ has decided to allocate a portion of the safety margin to the MVEB to allow for unanticipated growth in VMT, changes to vehicle mix assumptions, etc. that will influence the emission estimations. The NCDAQ has developed and implemented a four-step approach for determining a percentage factor to use to calculate the amount of safety margin to apply to the MVEB and it is outlined in Appendix C.3. The percent increases to the MVEBs for the Triangle area are listed in the table below.

Table 4-1 Percent Increase To Mobile Vehicle Emissions Budget

County	2008	2017
Chatham	15%	25%
Durham	10%	20%
Franklin	10%	20%
Granville	15%	25%
Johnston	10%	20%
Orange	10%	20%
Person	15%	25%
Wake	10%	20%

Motor Vehicle Emission Budgets

As part of the consultation process on setting MVEBs, NCDAQ sent out a request for comment on setting the geographic extent of the MVEBs to all of the transportation partners. A copy of the letter can be found in Appendix B. In the letter, NCDAQ expressed its preference for setting county level budgets and some of the reasons why NCDAQ believed county level budgets were appropriate.

The NCDAQ received comments from several of the transportation partners regarding the geographic extent of the MVEBs. Some of the partners wanted county-by-county budgets; others wanted regional budgets. Copies of the letters received can be found in Appendix B. Upon careful consideration of all arguments, NCDAQ decided to move forward with setting county-by-county MVEBs. NCDAQ believes that the concerns raised in the requests for regional budgets can be addressed by adding to the safety margins for the areas of concern.

Additionally, there was discussion through the interagency consultation process on the years to set MVEBs for the Triangle 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, 2017). Through the interagency consultation process, it was decided that another MVEBs would be set for the year 2008 in the Triangle maintenance plan.

Although the emissions up to this point have been expressed in terms of tons per day, the MVEBs will be set in terms of kilograms (kg) per day. The reason for the change is how the emission factors used to calculate mobile emissions are created. The MOVES model generates the emission factors in grams per mile. In past conformity exercises, there have been some issues with conversion to tons per day, as well as concerns with how the MVEBs were rounded

to the hundredth place. Setting MVEBs in kilograms per day will avoid these issues in future conformity determinations.

The table below shows the counties with their on-road mobile NOx emissions expressed in tons per day and the corresponding kilograms per day values for 2008 and 2017.

Table 4-2 On-road Mobile Source NOx Emissions Triangle Maintenance Area

County	Current 7.8 psi RVP		Revised 9.0 psi RVP	
	2008		2017	
	Tons/day	Kg/day	Tons/day	Kg/day
Chatham*	3.34	3,033	1.86	1,690
Durham	24.73	22,438	11.58	10,509
Franklin	5.00	4,537	2.43	2,204
Granville	6.73	6,105	2.89	2,622
Johnston	22.40	20,320	10.87	9,865
Orange	15.23	13,820	6.76	6,137
Person	3.16	2,871	1.48	1,340
Wake	71.46	64,825	35.31	32,034
Total	152.05	137,951	73.18	66,401

* Chatham County emissions for maintenance area only.

The NCDAQ will set MVEBs, for transportation conformity purposes, as county budgets within the Triangle maintenance area for 2008 and 2017. Tables 4-3 through 4-10 below list the NOx MVEBs in kilograms per day, for transportation conformity purposes, by county for the years 2008 and 2017. Upon the USEPA's affirmative adequacy finding for these county level sub-area MVEBs, these MVEBs will become the applicable MVEBs for each county.

Table 4-3 Chatham County MVEB in kilograms per day

	2008	2017
NOx Emissions (kg/day)		
Base Emissions	3,033	1,690
Safety Margin Allocated to MVEB	455	422
NOx Conformity MVEB	**3,488**	**2,112**

Table 4-4 Durham County MVEB in kilograms per day

	2008	2017
NOx Emissions (kg/day)		
Base Emissions	22,438	10,509
Safety Margin Allocated to MVEB	2,244	2,101
NOx Conformity MVEB	**24,682**	**12,610**

Table 4-5 Franklin County MVEB in kilograms per day

	2008	2017
NOx Emissions (kg/day)		
Base Emissions	4,537	2,204
Safety Margin Allocated to MVEB	454	441
NOx Conformity MVEB	**4,991**	**2,645**

Table 4-6 Granville County MVEB in kilograms per day

	2008	2017
NOx Emissions (kg/day)		
Base Emissions	6,105	2,622
Safety Margin Allocated to MVEB	916	656
NOx Conformity MVEB	**7,021**	**3,278**

Table 4-7 Johnston County MVEB in kilograms per day

	2008	2017
NOx Emissions (kg/day)		
Base Emissions	20,320	9,865
Safety Margin Allocated to MVEB	2,032	1,972
NOx Conformity MVEB	**22,352**	**11,838**

Table 4-8 Orange County MVEB in kilograms per day

	2008	2017
NOx Emissions (kg/day)		
Base Emissions	13,820	6,137
Safety Margin Allocated to MVEB	1,382	1,227
NOx Conformity MVEB	**15,202**	**7,364**

Table 4-9 Person County MVEB in kilograms per day

	2008	2017
NOx Emissions (kg/day)		
Base Emissions	2,871	1,340
Safety Margin Allocated to MVEB	431	335
NOx Conformity MVEB	**3,302**	**1,674**

Table 4-10 Wake County MVEB in kilograms per day

	2008	2017
NOx Emissions (kg/day)		
Base Emissions	64,825	32,034
Safety Margin Allocated to MVEB	6,483	6,407
NOx Conformity MVEB	**71,308**	**38,441**

New Safety Margins

A total of 14,396 kg/day (15.87 tons/day) and 13,563 kg/day (14.95 tons/day) of 2008 and 2017 NOx safety margin, respectively, were added to the MVEB for the Triangle area. The revised safety margins, which take into consideration the portion of the safety margin applied to the MVEB, for each projected year is listed below in Table 4-11.

Table 4-11 New Safety Margins for the Triangle Area

Year	VOC TPD	NOx TPD
2005	N/A	N/A
2008	-11.96	-14.62
2011	-23.82	-65.34
2014	-30.73	-94.13
2017	-35.37	-102.34

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 Raleigh-Durham-Chapel Hill 8-hour ozone maintenance area.

5.2 EVIDENCE OF COMPLIANCE

Three counties in the Triangle area (Durham, Wake and part of Granville 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 inspection and maintenance program. An inspection and maintenance program was established in the Triangle as prescribed by the 1990 CAA. Therefore, North Carolina has fully approved SIPs for this area.

Additionally, the following rules regulating emissions of VOCs and/or NOx in Triangle maintenance 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

Although 15A NCAC 2D .0925, .0926, .0927, .0928, .0932, and .0933, have been approved as part of the SIP, their applicability to these counties has not been submitted to the USEPA for approval as part of the federally-approved state implementation plan. These rules are, however, state enforceable in these counties. The extension of these rules to these counties was part of the State's air toxic program and not part of any federally mandated program.

Section 15A NCAC 2D .1000 also regulates emissions from motor vehicles in the counties near the Raleigh-Durham-Chapel Hill area and requires the use of the on board diagnostic system, which will indicate 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 require 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 Raleigh-Durham-Chapel Hill 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.

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 USEPA 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 USEPA 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 USEPA 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 and part D of the Act 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 USEPA in its latest guidance on meeting redesignation requirements as contained in a memorandum from John Calcagni, Director, Air Quality Management Division, Office of Air Quality Planning and Standards to the USEPA Regional Offices dated September 4, 1992, (See Appendix A), 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 NCDAQ commits to continue operating the current ozone monitors in the Triangle 8-hour ozone maintenance area, providing sufficient funding is available for continued operation. Any monitor shutdowns or relocations will only be made with the approval of USEPA. 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.

NCDAQ believes that North Carolina has met all of the requirements of Section 110 and part D.

7.0 CONCLUSION

The most recent three years of ozone monitoring data for the Raleigh-Durham-Chapel Hill maintenance area demonstrate compliance with the NAAQS for 8-hour ozone. Since the 1990's, there have been many major programs enacted in North Carolina that have led to significant actual, enforceable emissions reductions, which have led to improvements in the air quality in the Triangle area. Additionally, the maintenance plan demonstrates that the projected emissions inventories for 2017, the final year of the maintenance plan and ten years beyond the redesignation year, as well as the interim years, are all less than the base year emissions inventory without the current RVP requirement of 7.8 psi. Therefore, maintenance of the 8-hour ozone NAAQS has also been demonstrated. It has also been demonstrated that relaxation of the Federal RVP standard will not interfere with the attainment of other NAAQS.

This redesignation demonstration and maintenance plan has been prepared to meet the requirements of the 1990 Clean Air Act Amendments.