NCDENR

North Carolina Department of Environment and Natural Resources
Division of Air Quality

Michael F. Easley, Governor

William G. Ross, Jr., Secretary
B. Keith Overcash, P.E., Director

February 12, 2004

J.I. Palmer, Jr., Esq.
Regional Administrator
US EPA, Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, Georgia 30303-8960

RE: Recommendations for 8-hour Ozone Nonattainment Designations

Dear Mr. Palmer:

On February 6, 2004, Secretary Ross submitted a letter on behalf of North Carolina in response to EPA's comments on our 8-hour ozone nonattainment boundaries recommendations. As indicated in our letter, we are recommending areas that are less than the MSA boundary. In addition to the reasons stated in the letter, we are submitting with this letter additional technical background information that was used to determine the recommendations.

Each area is described separately in the attached document and satisfies the criteria as set in EPA's March 28, 2000 memorandum entitled "Boundary Guidance on Air Quality Designations for the 8-hour Ozone National Ambient Air Quality Standard (NAAQS)". In setting the boundaries, we are confident that we have captured the main sources of influence to the surrounding areas that will result in successfully protecting the health of all citizens within North Carolina. By recommending the full and partial counties indicated, we are certain that once the federal and state regulations cited in the February 6, 2004 letter are fully implemented, there will continue to be a downward trend of emissions. We anticipate attainment in all areas except the Charlotte area by 2007 as indicated by our air quality modeling. Attainment is anticipated in the Charlotte MSA by 2010.

It is our duty to protect the air quality of North Carolina to the full extent granted to us. We believe that the attached information presents a compelling argument against full county designations in our State.

Sincerely,

B. Keith Overcash, P.E.

BKO/lg/at

attachment

cc: Secretary Bill Ross

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State of North Carolina's

Recommendation on Boundaries of

8-Hour Ozone

Nonattainment Areas

Supplemental Submittal

February 17, 2004
Governor Michael F. Easley

Introduction

This detailed technical documentation is being provided in response to the United States Environmental Protection Agency's (EPA's) letter of December 3, 2003 and includes updated information. This document only covers areas of concern where there are differences between recommendation by the EPA and that of the State of North Carolina. Cumberland, Haywood, and Swain counties are not included in this document because both parties agreed to the nonattainment boundaries.

Background

North Carolina is firm in its belief that the entire Metropolitan Statistical Area is not an appropriate boundary for 8-hour ozone nonattainment boundaries. As mentioned in Secretary Ross's letter of February 6, 2004, included as Appendix A, the Office of Management and Budget cautions against the use of the MSA boundary for nonstatistical purposes. It is also important to remember that the Clean Air Act cited the presumption of MSA boundaries for those 1-hour ozone areas classified under Subpart 2 as Serious, Severe, or Extreme. None of the areas within North Carolina are anticipated to fall into these classifications. We expect the majority of North Carolina's areas will be designated under Subpart 1 of the Clean Air Act, except for the Charlotte area. The Charlotte area is expected to be classified moderate. North Carolina continues to believe that MSA boundaries are not appropriate for the nonattainment areas in North Carolina. The supporting technical information for each area follows this discussion.

North Carolina's Monitoring Network

Under the 1-hour ozone standard, North Carolina had three areas that were designated nonattainment following the 1990 Clean Air Act Amendments – Charlotte/Gastonia, Greensboro/Winston-Salem/High Point, and Raleigh/Durham. At that time, North Carolina operated 14 monitors in the State. In an effort to better understand the transport of ozone pollution from these core urbanized counties of Mecklenburg, Gaston, Forsyth, Guilford, Wake, and Durham to their neighboring, more rural counties, North Carolina began expanding the ozone monitoring network in the early 1990's. The result is that North Carolina has a denser network of ozone monitors, particularly in some of the rural counties. The rural nature of these counties was a major consideration in NC's recommendation of the 8-hour nonattainment boundaries.

North Carolina and the Local and Tribal Programs operate a network of 47 ozone monitors. Thirty of these monitors were established as State and Local Air Monitoring Stations (SLAMS). These SLAMS monitors were selected based on specific monitoring objectives (background concentration, area of highest concentration, high population, source impact, transport, and rural impact) as required by EPA and siting scales (micro, middle, neighborhood, urban, and regional) established by EPA. Eight of these monitors were further designated as National Air Monitoring Stations (NAMS) by the EPA and have the primary objective to provide ozone data from areas of expected highest concentration and population exposure and are used to evaluate trends in national air quality. The remaining 17 monitors are Special Purpose Monitors that were established by the State of North Carolina to evaluate models, study ozone formation and transport, and obtain a better understanding of ozone in North Carolina. Appendix B provides a

listing of each of the 47 monitors, their designation by EPA, and the date on which they were established.

State Control Program Initiatives

Two major pieces of State legislation that will, along with Federal initiatives, bring most of North Carolina's monitors into compliance by 2007 are the Clean Smokestacks Act (officially titled the Air Quality/Electric Utilities Act - SB 1078) and the Clean Air Bill (SB953) that included the On-Board Diagnostics II (OBDII) Emissions Inspection Program. These programs address the two majors sources of ozone precursors in the State: utilities and motor vehicles. The key features of each program are summarized below.

Clean Smokestacks Act

- Requires significant actual emissions reductions year round from coal-fired power plants in North Carolina. The act differs from federal rules, which apply only seasonal controls and allow utilities to buy pollution credits from other states instead of cutting air pollution from power plants in the state.

- North Carolina's utilities must reduce actual emissions of nitrogen oxides (NOx) from 245,000 tons in 1998 to 56,000 tons by 2009 (77% reduction). This represents about a one-third reduction of the total NOx emissions from all sources in North Carolina.

Clean Air Bill

The Clean Air Bill, passed in 1999, is aimed at reducing motor vehicle emissions across North Carolina. The bill:

- Establishes statewide goals for cutting emissions of nitrogen oxides, the major ozone-forming pollutant in North Carolina, and for reducing the growth of vehicle miles traveled in the state.

- Sets goals for the purchase of low-emission vehicles for the state motor fleet, and encourage the purchase of such vehicles for buses used by public school and transportation systems.

OBDII Emissions Inspection Program

- Requires 1996 and newer vehicles to receive an emissions inspection in 48 counties across the State (previously only 9 counties had an emissions inspection program). The program is currently being phased in according to the following schedule:

    - July 1, 2003 – Cabarrus, Durham, Forsyth, Gaston, Guilford, Lincoln, Mecklenburg, Orange, and Wake.

    - July 1, 2003 - Catawba, Cumberland, Davidson, Iredell, Johnston, and Rowan.

    - Jan. 1, 2004 - Alamance, Chatham, Franklin, Lee, Lincoln, Moore, Randolph, and Stanly.

    - July 1, 2004 - Buncombe, Cleveland, Granville, Harnett, and Rockingham.
    - Jan. 1, 2005 - Edgecombe, Lenoir, Nash, Pitt, Robeson, Wayne, and Wilson.
    - July 1, 2005 - Burke, Caldwell, Haywood, Henderson, Rutherford, Stokes, Surry, and Wilkes.
    - Jan. 1, 2006 - Brunswick, Carteret, Craven, New Hanover, and Onslow.
- The inspection will address all emissions from motor vehicles including NOx, VOCs, and CO (the previous program only addressed VOC and CO emissions).
- OBDII can reduce NOx emissions by an average of 9 percent in 2010 and VOC emissions by 10 percent for the same year.

Local Control Program Initiatives

In addition to the State programs outlined above, local initiatives across the State are being implemented to further attainment of our State's air quality goals. For example, in an unprecedented move in November of 1998, the residents of Mecklenburg County approved a one-half cent increase in the local sales tax to fund new transit operations throughout the County. The money that has been generated by that tax is already being used to fund regional rail in the area and increased public transportation initiatives. In addition, four areas across the State, led by local coalitions, have adopted the Early Action Compact (EAC) process to achieve the standards earlier than required by the EPA. The EAC areas in North Carolina are Fayetteville (Cumberland County), Unifour (Alexander, Burke, Caldwell, and Catawba Counties), the Triad (Alamance, Caswell, Davidson, Davie, Forsyth, Guilford, Randolph, Rockingham, Stokes, Surry and Yadkin Counties), and the Mountain area (Buncombe, Haywood, Henderson, Madison and Transylvania Counties). These areas have taken the burden of establishing control measures at the local level and are working to lead the way to attainment of the air quality standards, to protect their local constituents health, and to continue local economic growth.

Other local initiatives that will also impact the timely attainment of the air quality goals in North Carolina include Sustainable Environment for Quality of Life (SEQL) in the greater Charlotte area in partnership with EPA, the Clean Cities designations in the Triangle and Charlotte, the Breathe Initiative in Charlotte, the Great Triangle Regional Council's efforts on air quality, the Wake County Air Quality Task Force, and many others.

Summary of Recommendation

North Carolina has evaluated the 2000-2003 monitoring and has determined that a total of 28 out of 45 monitors currently violate the 8-hour ozone standard. The highest design value (DV) in the State at 0.100 ppm is observed at the Rockwell monitor located in the southern part of Rowan County. The lowest design value in the State at 0.074 ppm is observed at the Bryson City monitor in Swain County. The higher design values tend

to occur along the I-85/I-40 corridor from Charlotte through the Triad and over to the Triangle, where most of the people live and work.

Table 1 is North Carolina's recommendation of areas classified as either nonattainment or attainment under the 8-hour ozone standard. These nonattainment boundary recommendations are reflected in the attached map entitled, "North Carolina's Proposal on Potential 8-hour Ozone Nonattainment Boundaries" (Figure 1).

Full county designations are recommended for Alamance, Cumberland, Davidson, Durham, Forsyth, Gaston, Guilford, Mecklenburg, Orange, and Wake Counties. These counties are considered to be the core counties within their respective area and the chief contributor to the precursors of ozone. Full designation of these counties will capture up to fifty percent of the NOx and sixty percent of the VOC of the future years' anthropogenic emission sources, ultimately leading to the reduction of transport to the surrounding areas. Partial county designations are recommended for Alexander, Burke, Cabarrus, Caldwell, Caswell, Catawba, Chatham, Davie, Edgecombe, Franklin, Granville, Haywood, Iredell, Johnston, Lincoln, Person, Randolph, Rockingham, Rowan, Swain, and Union Counties. The boundaries set forth by the State include the primary contributors of emissions from these less urbanized counties. In most instances, the partial county designations are represented by city or township boundaries, or metropolitan planning organization (MPO) boundaries.

Table 1. North Carolina – Ozone (8-Hour Standard).

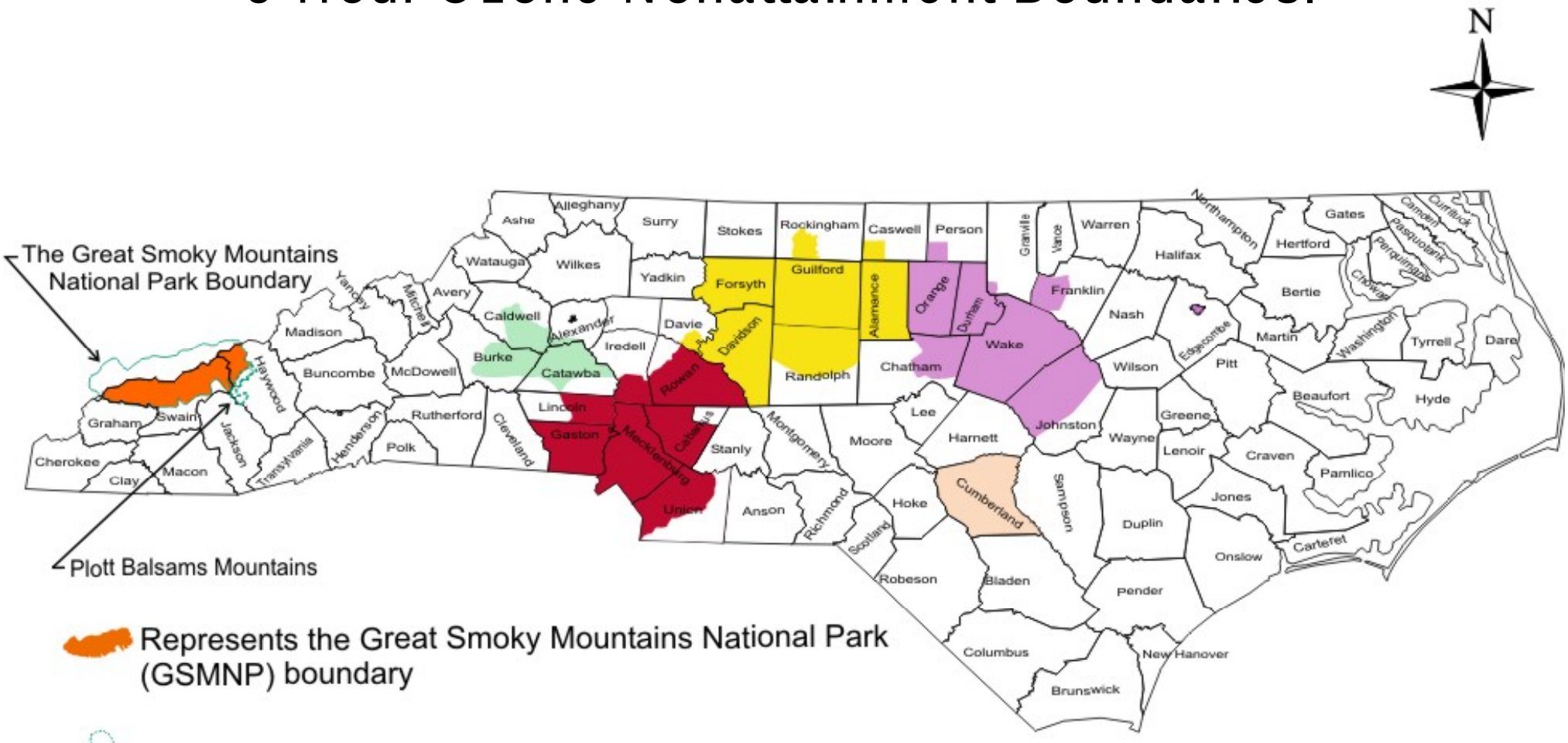
Designated Area	Designation Type	Classification Type
Charlotte-Gastonia-Rock Hill Area: Gaston County Mecklenburg County Cabarrus County Central Cabarrus Township Concord Township Georgeville Township Harrisburg Township Kannapolis Township Midland Township New Gilead Township Odell Township Poplar Tent Township Iredell County Davidson Township Coddle Creek Township Lincoln County All parts east of South Fork of Catawba River from Catawba County Line to Highway 150 to Gaston County Line	Nonattainment	

Table 1. North Carolina – Ozone (8-Hour Standard).		
Designated Area	Designation Type	Classification Type
Rowan County Atwell Township China Grove Township Franklin Township Gold Hill Township Litaker Township Locke Township Morgan Township Providence Township Salisbury Township Union County Mecklenburg Union Metropolitan Planning Organization Boundary as adopted May 2003		
Fayetteville Area: Cumberland County	Nonattainment – EAC area	
Greensboro-Winston-Salem-High Point Area: Alamance County Davidson County Forsyth County Guilford County Caswell County Stoney Creek Township Davie County Jerusalem Township Randolph County North of Highway 64 and including the Asheboro municipal boundary Rockingham County New Bethel Township	Nonattainment – EAC area	
Hickory-Morganton: Alexander County Taylorsville municipal boundary Unifour Metropolitan Planning Organization Boundary Burke County Unifour Metropolitan Planning Organization	Nonattainment – EAC area	

Table 1. North Carolina – Ozone (8-Hour Standard).		
Designated Area	Designation Type	Classification Type
Boundary Caldwell County Unifour Metropolitan Planning Organization Boundary Catawba County Unifour Metropolitan Planning Organization Boundary		
Raleigh-Durham-Chapel Hill Area: Durham County Orange County Wake County Chatham County Baldwin Township Center Township New Hope Township Williams Township Franklin County Franklinton Township Youngsville Township Granville County Dutchville Township Johnston County West of Interstate 95 Person County Bushy Fork Township	Nonattainment	
Rocky Mount Area: Edgecombe County Leggett municipal boundary	Nonattainment	
Great Smoky Mountains National Park Haywood County Park Boundary Swain County Park Boundary	Nonattainment	
Plott Balsam Mountains Above 4000 feet elevation in these mountain ranges in Haywood County	Nonattainment	
Rest of State	Attainment	

Figure 1. North Carolina's Recommendation on

8-Hour Ozone Nonattainment Boundaries.



Reductions in emissions will be required in areas as needed, even in areas not designated nonattainment.

Not To Scale
8-hrOZnonATT
Rev.2-11-04
07-15-03

Criteria Used to Formulate Recommendation

In the March 28, 2000 guidance on 8-hour ozone non-attainment boundaries, EPA established criteria for States that chose to propose smaller nonattainment boundaries, including partial counties, than those matching the C/MSA. Tables 2-6 address these criteria for the areas within North Carolina that are less than the MSA or county boundary. Each criterion was evaluated against the same statistics for the more urbanized counties in each area that the State recommends be designated nonattainment in full.

Criterion 1: Emissions and air quality in adjacent areas (including adjacent C/MSA's) – North Carolina used the percent of NOx emissions that the county contributes to the area's total NOx emissions in 2000 for this criterion. North Carolina did not focus as much attention to the anthropogenic sources of VOC because natural VOC emissions account for about 80 percent of the State's total VOC emission inventory. Air quality is addressed separately in Criterion 3.

Criterion 2: Population density and degree of urbanization including commercial development (significant difference from surrounding areas) – North Carolina used the 2000 population density by county and for the areas proposed to be excluded from the non-attainment boundary. The 2000 Population and land area data are from the 2000 Census and future year projections are from the NC Office of State Budgets and Management, State Demographics Unit.

Criterion 3: Monitoring data representing ozone concentrations in local and larger areas (urban or regional scales) - North Carolina evaluated the ozone concentrations across the state and in each urbanized area. The ozone concentrations in the counties recommended as partial are presented in the table. North Carolina also considered the expected ozone concentrations in the future years of 2007 and 2010, as discussed in this document. These numbers are based on emissions and air quality modeling using SMOKE as the emissions model and MAQSIP as the air quality model.

Criterion 4: Location of emission sources (emission sources and nearby receptors should generally be included in the same non-attainment area) – Maps showing the location of the Title V NOx and Title V VOC sources in the State compared to the recommendation of 8-hour ozone non-attainment areas are provided in Appendix C. Major NOx sources outside of the nonattainment boundary are labeled and are subject to the NOx SIP Call and the NC Clean Smokestacks Act. However, North Carolina continues to believe that this criterion is less important than some of the other criteria due to the statutory authority to regulate sources regardless of non-attainment designations.

Criterion 5: Traffic and commuting patterns – North Carolina evaluated VMT and commuting patterns. The percent of workers commuting from the partial or recommended attainment county into the core urbanized counties in each area is presented in Tables 2-6. The percentage noted represents the entire commuting population within the county.

Criterion 6: Expected growth (including extent, pattern and rate of growth) – North Carolina evaluated the 2007 population density and this information is presented in the table for the county and the portion recommended as attainment. Future year population projections are from the NC State Demographics Unit.

Criterion 7: Meteorology (weather/transport patterns) – North Carolina addressed the typical source region that impacts the downwind monitors where the State is recommending a partial county for nonattainment. The back trajectory analysis included in the July 15, 2003 submittal should be referenced for further information.

Criterion 8: Geography/Topography (mountain ranges or other air basin boundaries) – The only areas where this criterion is important are in the mountains and the Hickory-Newton-Conover area where it abuts the mountains.

Criterion 9: Jurisdictional boundaries (e.g., counties, air districts, existing 1-hour non-attainment areas, reservations, etc.) – North Carolina considered the MPO boundaries in several instances because these areas have or are in the process of completing regional models and plans. The partial counties all contain boundaries that have either clear definitions from the Census (townships) or physical boundaries (interstates, rivers,etc.).

Criterion 10: Level of control of emission sources – North Carolina believes this criterion is important to understanding the impact of certain counties and their sources on future non-attainment. Most of the sources within our State are in the process of being controlled, so evaluating the expected NOx reductions between 2000 and 2007 and between 2007 and 2010 is important to capture the downward trend in emissions. This information is captured in Tables 2-6. For many counties, there are no further reductions that can be achieved; so designating a large rural county accomplishes nothing in terms of attaining the 8-hour ozone standard.

Criterion 11: Regional emission reductions (e.g., NOx SIP call or other enforceable regional strategies) – North Carolina considered the impact of the NOx SIP call and the Clean Smokestacks legislation when determining the boundary recommendations.

Charlotte/Gastonia/Rock Hill, SC Area

The Charlotte-Gastonia-Rock Hill, SC MSA encompasses six counties in North Carolina and York County in South Carolina. The six North Carolina Counties are Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan, and Union. The Mecklenburg and Gaston are the core counties in this area. Based on the emissions and air quality modeling mentioned above, Figures 2 shows the actual 2001-2003 and predicted future design values for 2007 and 2010, respectively. The green shaded counties indicate the area for which the ozone forecast is developed each day from May 1 through September 30. Based on the projected growth and emission reductions, North Carolina expects three of the monitors to attain by 2007, and the remaining four monitors to attain by 2010 with the State and Federal control measures that are currently under implementation.

The boundary review began with the existing 1-hour ozone maintenance area. That area includes the full county boundaries of both Mecklenburg and Gaston County, as these are the more urbanized counties. Next, the review of the violating monitor locations was completed. Lincoln County includes the Crouse monitor and in reviewing the population density, DAQ determined that the western part of Lincoln County should not be added to the area designated as nonattainment due to its low population density. In addition, Lincoln County is not a part of an existing MPO and only confirms the rural nature of the County. As part of Mecklenburg-Union Metropolitan Planning Organization's (MUMPO) review of jurisdictional boundaries, they recently adopted a new MPO boundary that includes a portion of western Union County. Given the rural nature of eastern Union County, the MPO boundary appeared to be consistent with the recommendations used in Lincoln County (exclude the more rural parts of the county from nonattainment). Elected officials urged DAQ to consider excluding the rural townships in both Cabarrus and Rowan Counties. The criteria used to determine which townships to exclude were those that had population densities similar to those townships that were excluded from Union and Lincoln Counties. Southern Iredell County was added to capture the I-77 commuting corridor. This addition to the boundary coincides with MUMPO's new MPO boundary in Iredell County. In addition, DAQ felt strongly that any sources that would be excluded from the designated nonattainment area were being adequately addressed by State and Federal rules for those source categories. Table 2 provides detailed information for each criteria used in the boundary determination.

Table 2. Charlotte/Gastonia/Rock Hill, SC Area Recommendation Criteria used for Attainment Designation.													
Criteria:	**1**	**3**	**2**	**6**	**4**	**5**	**7**	**8**	**9**	**10**		**10**	**11**
County	NOx Emissions (% of MSA)	2001-2003 8-hour ozone design value (ppm)	Population Density (persons/sq.mile) **Entire county density in bold** *Recommended attainment portion density in italics*		Location of Emissions Sources	Commuting patterns: % of core county workers commuting from entire county	Meteorology (predominant wind direction during high ozone episodes in NC is southwest; least predominant is east-northeast)	Geography/ topography issues	Jurisdictional boundaries	Projected % NOx reduction		Date of vehicle I/M program implementation	Regional emissions reductions
			2000	2007						2000-2007	2007-2010		
Mecklenburg[1]	27%	0.098	**1,322**	**1,591**	All Title V NOx and VOC sources are within recommended boundary.	69.3% to Mecklenburg 5.3% to Gaston	Typical summertime southwesterly flow will transport pollution northeast of Mecklenburg County. High ozone events are characterized by light winds speeds and recirculation patterns.	None	Full County Boundary	33%	17%	July 2002	NSC and CSA[2] affect Allen and Riverbend Steam Stations in Gaston Co.

[1] Counties in bold are the recommended full counties.
[2] CSA: The NC Clean Smokestacks Act, enacted in 2002. This multipollutant law requires significant year-round, non-tradable emissions reductions from coal-fired power plants in North Carolina. Even with the projected NOx emissions increase, the Crouse monitor in Lincoln Co. is projected to be in attainment in 2007. It should also be noted that these units operate at a low emissions rate, 0.09 lbsNOx/MMBTU.

Table 2. Charlotte/Gastonia/Rock Hill, SC Area Recommendation Criteria used for Attainment Designation.

Criteria:	**1**	**3**	**2**	**6**	**4**	**5**	**7**	**8**	**9**	**10**		**10**	**11**
County	NOx Emissions (% of MSA)	2001-2003 8-hour ozone design value (ppm)	Population Density (persons/sq.mile) **Entire county density in bold** *Recommended attainment portion density in italics*		Location of Emissions Sources	Commuting patterns: % of core county workers commuting from entire county	Meteorology (predominant wind direction during high ozone episodes in NC is southwest; least predominant is east-northeast)	Geography/ topography issues	Jurisdictional boundaries	Projected % NOx reduction		Date of vehicle I/M program implementation	Regional emissions reductions
			2000	2007						2000-2007	2007-2010		
Gaston[1]	31%	N/A	**534**	**562**	All Title V NOx and VOC sources are within recommended boundary.	4.9% % to Mecklenburg 75% to Gaston	Typical summertime southwesterly flow will transport pollution northeast of Gaston County and throughout the MSA. High ozone events are characterized by light winds speeds and recirculation patterns.	None	Full County Boundary	51%	17%	July 2002	NSC and CSA affect Allen and Riverbend Steam Stations in Gaston Co.
Cabarrus	6%	N/A	**360** *103*	**432** *123*	All Title V NOx and VOC sources are within recommended boundary.	4.8% to Mecklenburg 0.5% to Gaston	Cabarrus Co. is strongly influenced by southwesterly transport from the major Charlotte urban area. The county can also be impacted by transport from the Triad.	None	Recommended boundary excludes three townships.	24%	12%	July 2002	NOx SIP Call and CSA affect Buck Steam Station in neighboring Rowan Co.
Iredell	12%[3]	N/A	**213** *166*	**253** *197*	Five Title V NOx and VOC sources are outside of recommended boundary. Five Title V VOC sources and two Title V NOx sources are within the boundary.	2.0% to Mecklenburg 0.4% to Gaston	Iredell Co. is impacted by predominantly south and southwesterly flow resulting in transport from the major Charlotte urban area. The county can also be impacted by transport from Hickory and the Triad.	None	Recommended boundary includes two townships adjacent to Mecklenburg to capture I-77 corridor development. Consistent with MPO boundary.	22%	43%	July 2003	NOx SIP Call and CSA affect Marshall Steam Station in neighboring Catwaba Co. and Transcontinental Natural Gas pipeline in Iredell Co.
Lincoln	3%	0.092	**213** *195*	**247** *226*	All Title V NOx and VOC sources are within the recommended boundary.	1.4% to Mecklenburg 4.2% to Gaston	Transport from the major Charlotte urban area under southerly flow and recirculation patterns common during high episodes impacts Lincoln Co. The Hickory MSA can also impact Lincoln Co. during these events.	None	Recommended boundary follows river and a highway.	(58%) increase[4]	4%	January 2004	NOx SIP Call and CSA affect Allen and Riverbend units in Gaston Co. and Marshall Steam Station in Catawba Co.

[3] Transcontinental is subject to NOx SIP Call.

Table 2. Charlotte/Gastonia/Rock Hill, SC Area Recommendation Criteria used for Attainment Designation.													
Criteria:	**1**	**3**	**2**	**6**	**4**	**5**	**7**	**8**	**9**	**10**		**10**	**11**
County	NOx Emissions (% of MSA)	2001-2003 8-hour ozone design value (ppm)	Population Density (persons/sq.mile) **Entire county density in bold** *Recommended attainment portion density in italics*		Location of Emissions Sources	Commuting patterns: % of core county workers commuting from entire county	Meteorology (predominant wind direction during high ozone episodes in NC is southwest; least predominant is east-northeast)	Geography/ topography issues	Jurisdictional boundaries	Projected % NOx reduction		Date of vehicle I/M program implementation	Regional emissions reductions
			2000	2007						2000-2007	2007-2010		
Rowan	17%[5]	0.099 Enochville monitor 0.100 Rockwell monitor	**255** *71*	**283** *79*	All except three Title V NOx and VOC sources are within the recommended boundary.	1.0% to Mecklenburg 0.3% to Gaston	Rowan Co. is strongly influenced by southwesterly transport from the major Charlotte urban area. The county can also be impacted by transport from the Triad.	None	Recommended boundary excludes five townships with 2000 population densities ranging from 49 to 95 persons/sq.mile.	41%	30%	July 2003	NOx SIP Call and CSA affect Buck Steam Station in Rowan Co.
Union	4%	0.088	**194** *85*	**245** *107*	All Title V NOx and VOC sources are within recommended boundary.	5.2% to Mecklenburg; 0.2% to Gaston	Union Co. is strongly influenced by major Charlotte urban area pollution during recirculation events and weak wind flow patterns.	None	Recommended boundary follows MPO boundary.	27%	14%	July 2002	NOx SIP Call and CSA affect electric generating units as discussed above.

[4] The episodic base year emissions for Lincoln Co. are lower than projected future emissions, due to projected increased future use of natural gas combustions turbine peaking units at the Duke Power Lincoln electricity-generating unit in Lincoln County. All Title V sources in Lincoln County are within the recommended nonattainment area boundary. Total estimated Lincoln County NOx emissions are 12 tpd in 2000 and 19 tpd in 2007.
[5] Buck Steam Station is located in southern Rowan Co. and will be required to install controls to meet the NOx SIP Call and CSA.

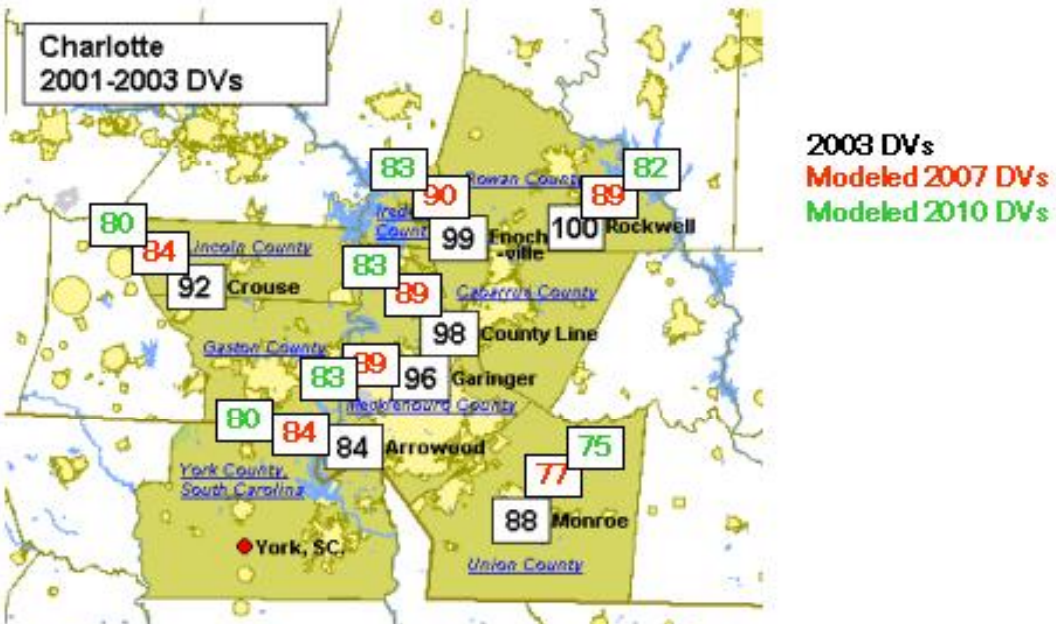


Figure 2. Present and Future 8-hr Ozone Design Values in the Charlotte Area.

The State has invested a lot of resources into air quality modeling of future years with the recommended boundaries and using the control strategies that we have adopted. Figures 3-6 show that emissions in future years will trend downward. Our modeling results further prove that a larger non-attainment boundary is not necessary at this time as all monitors are expected to attain by the year 2010.

Figure 3. 2000 Charlotte Area NOx Emissions by Source Category.

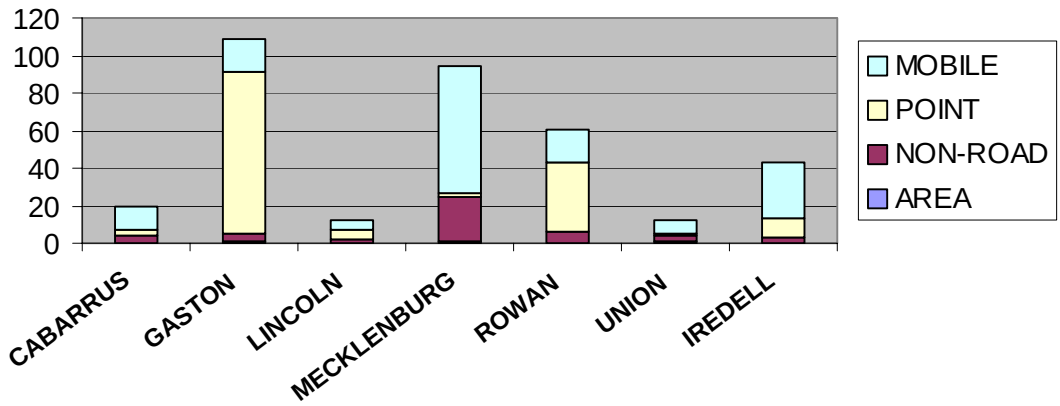


Figure 4. 2007 Charlotte Area NOx Emissions by Source Category.

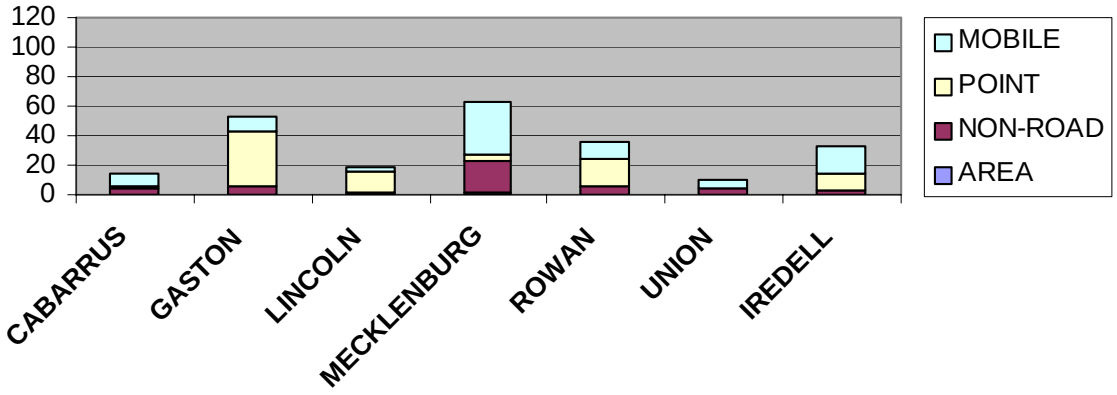


Figure 5. 2010 Charlotte Area NOx Emissions by source Category

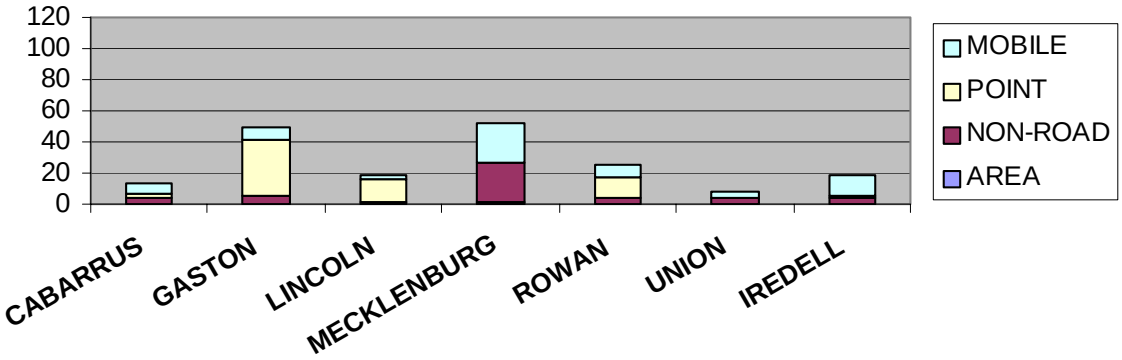
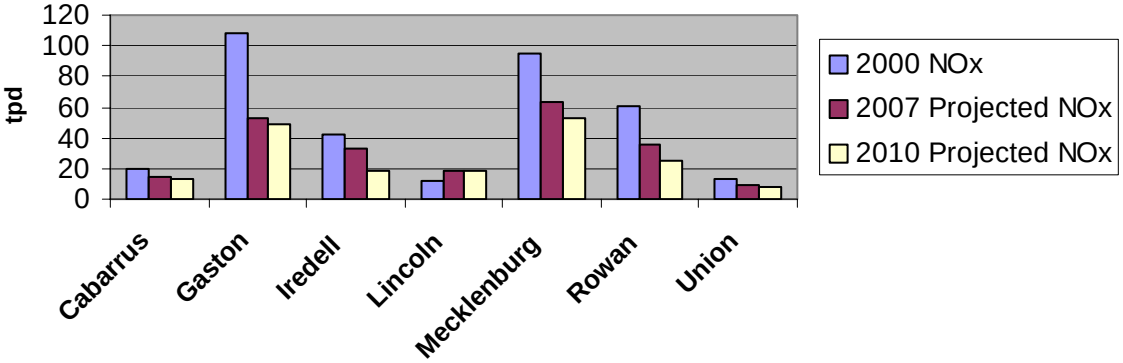


Figure 6. Total NOx Contributions by County for the Charlotte Area.



Greensboro/Winston-Salem/High Point Area

The Greensboro - Winston Salem – High Point (Triad) area of North Carolina contains eight counties. These Counties are Alamance, Davidson, Davie, Forsyth, Guilford, Randolph, Stokes, and Yadkin. North Carolina has been doing emissions and air quality modeling for the Triad area to support the Early Action Compact process. Based on the emissions and air quality modeling mentioned above, Figures 7 shows the actual 2001-2003 and predicted future design values for 2007 and 2010, respectively. The green shaded counties indicate the area for which the ozone forecast is developed each day from May 1 through September 30. With the projected growth and emission reductions, North Carolina expects all but one of the monitors to attain by 2007, and all monitors to attain by 2010 with the State and Federal control measures that are currently under implementation.

The 8-hour nonattainment boundary review began with the original 1-hour nonattainment designation - Forsyth, Guilford, Davidson Counties and small portion of Davie County. Alamance County was included in its entirety to capture the I-85/I-40 commuting corridor and the expected growth along that corridor. Yadkin County was excluded due to rural nature of the county (based on population density) and limited emissions sources in the area. Stokes County was also excluded because the major source in the county (Duke Power's Belew's Creek) has been addressed by the NOx SIP call and the county is rural. Randolph County from Asheboro north has been added to the Triad area because of the population growth, and the high commuting patterns from Asheboro to the Greensboro/High Point area. The remaining southern portion of Randolph County includes the NC Zoo and Uhwarrie National Forest and is rural, therefore excluded from the nonattainment area. In addition, DAQ has recommended the townships where violating monitors are located in Rockingham and Caswell Counties because these monitors are downwind of major urbanized areas, and based on our air quality modeling results are the recipients of ozone transport from the Triad. The point source emissions in Rockingham County from Duke Power's Dan River facility and Transcontinental Natural Gas Pipeline are addressed in the NOx SIP call and the Clean Smokestacks Act. Table 3 provides detailed information for each criteria used in the boundary determination.

Table 3. Greensboro/Winston-Salem/High Point Area Recommendation Criteria used for Attainment Designation.

Criteria:	**1**	**3**	**2**	**6**	**4**	**5**	**7**	**8**	**9**	**10**		**10**	**11**
County	NOx Emissions (% of MSA)	2001-2003 8-hour ozone design value (ppm)	Population Density (persons/sq.mile) **Entire county density in bold** *Recommended attainment portion density in italics*		Location of Emissions Sources	Commuting patterns: % of core county workers commuting from entire county	Meteorology (predominant wind direction during high ozone episodes in NC is southwest; least predominant is east-northeast)	Geography/ topography issues	Jurisdictional boundaries	Projected % NOx reduction		Date of vehicle I/M program implementation	Regional emissions reductions
			2000	2007						2000-2007	2007-2010		
Alamance[1]	3%	N/A	**304**	**345**	All Title V sources are within the recommended boundary.	2.4% to Guilford 0.2% to Forsyth	Typical summertime westerly and southwesterly flow can transport pollution east and northeast of Alamance Co. High ozone events are characterized by light winds speeds and recirculation patterns.	None	Full County Boundary	22%	14%	January 2004	NOx SIP Call and CSA[2] affect Belews Creek and Dan River units in Stokes and Rockingham Cos.
Davidson[1]	10%	N/A	**267**	**292**	All Title V sources are within the recommended boundary.	5.5% to Guilford 6.5% to Forsyth	Typical summertime southwesterly flow will transport pollution northeast of Davidson Co. and throughout the MSA. High ozone events are characterized by light winds speeds and recirculation patterns.	None	Full County Boundary	36%	0%	July 2003	NOx SIP Call and CSA[2] affect Belews Creek and Dan River units in Stokes and Rockingham Cos.
Forsyth[1]	8%	0.093	**747**	**819**	All Title V sources are within the recommended boundary.	6.1% to Guilford 70.1% to Forsyth	Typical summertime southwesterly flow will transport pollution northeast of Forsyth Co. High ozone events are characterized by light winds speeds and recirculation patterns. Westerly flow can result in transport east of Forsyth Co.	None	Full County Boundary	29%	11%	July 2002	NOx SIP Call and CSA[2] affect Belews Creek and Dan River units in Stokes and Rockingham Cos.

[1] Counties in bold are the recommended full counties.
[2] CSA: The North Carolina Clean Smokestacks Act, enacted in 2002. This multipollutant law requires significant year-round, non-tradable emissions reductions from coal-fired power plants in North Carolina.

Table 3. Greensboro/Winston-Salem/High Point Area Recommendation Criteria used for Attainment Designation.

Criteria:	**1**	**3**	**2**	**6**	**4**	**5**	**7**	**8**	**9**	**10**		**10**	**11**
County	NOx Emissions (% of MSA)	2001-2003 8-hour ozone design value (ppm)	Population Density (persons/sq.mile) **Entire county density in bold** *Recommended attainment portion density in italics*		Location of Emissions Sources	Commuting patterns: % of core county workers commuting from entire county	Meteorology (predominant wind direction during high ozone episodes in NC is southwest; least predominant is east-northeast)	Geography/ topography issues	Jurisdictional boundaries	Projected % NOx reduction		Date of vehicle I/M program implementation	Regional emissions reductions
			2000	2007						2000-2007	2007-2010		
Guilford[1]	11%	0.089	**648**	**730**	All Title V sources are within the recommended boundary.	69.6% to Guilford 4.5% to Forsyth	Typical summertime southwesterly flow will transport pollution northeast of Guilford Co. High ozone events are characterized by light winds speeds and recirculation patterns. Westerly flow can result in transport east of Guilford Co.	None	Full County Boundary	34%	8%	July 2002	NOx SIP Call and CSA[2] affect Belews Creek and Dan River units in Stokes and Rockingham Cos.
Caswell	1%	0.088	**55** *55*	**60** *60*	There are no Title V facilities in Caswell Co.	0.3% to Guilford 0% to Forsyth	Typical southwesterly flow transports pollution from the urban Triad counties and strongly influences ozone in Caswell Co.	None	Recommended boundary follows township where monitor is located	27%	32%	N/A	NOx SIP Call and CSA[2] affect Belews Creek and Dan River units in Stokes and Rockingham Cos.
Davie	2%	0.093	**131** *124*	**151** *143*	Davie Co. contains one Title V facility that is outside of the recommended boundary.	3.1% to Forsyth 0.2% to Guilford	Several major urban areas can significantly impact ozone in Davie Co., depending on the predominant wind flow. South/Southwesterly: Charlotte; West/Southwesterly: Hickory; North/Northeasterly: Triad;	None	Recommended boundary follows township where monitor is located	34%	24%	N/A	NOx SIP Call and CSA impose controls on Marshall Steam Station in Catawba Co. and Buck S.S. in Rowan Co.
Randolph	3%	0.085	**166** *131*	**188** *149*	All Title V sources are within the recommended boundary.	0.4% to Forsyth 7.5% to Guilford	The Sophia monitor captures pollution from the Triad (northerly flow) and Charlotte (southwesterly flow) urban areas.	None	Recommended boundary includes Asheboro and the area north of Highway 64, covering the more urbanized portion of Randolph Co.	27%	12%	January 2004	NOx SIP Call and CSA impose controls on nearby Buck, Belews Creek and Dan River power plants

[2] CSA: The North Carolina Clean Smokestacks Act, enacted in 2002. This multipollutant law requires significant year-round, non-tradable emissions reductions from coal-fired power plants in North Carolina.

Table 3. Greensboro/Winston-Salem/High Point Area Recommendation Criteria used for Attainment Designation.

Criteria:	**1**	**3**	**2**	**6**	**4**	**5**	**7**	**8**	**9**	**10**		**10**	**11**
County	NOx Emissions (% of MSA)	2001-2003 8-hour ozone design value (ppm)	Population Density (persons/sq.mile) **Entire county density in bold** *Recommended attainment portion density in italics*		Location of Emissions Sources	Commuting patterns: % of core county workers commuting from entire county	Meteorology (predominant wind direction during high ozone episodes in NC is southwest; least predominant is east-northeast)	Geography/ topography issues	Jurisdictional boundaries	Projected % NOx reduction		Date of vehicle I/M program implementation	Regional emissions reductions
			2000	2007						2000-2007	2007-2010		
Rockingham	8%	0.091	**162** *162*	**168** *168*	All except two Title V sources are outside the recommended boundary. Transcontinental Natural Gas Pipeline, a large NOx and VOC source, is within the boundary.	0.5% to Forsyth 4.4% to Guilford	Rockingham Co. is downwind of the core urbanized parts of the Triad (southwesterly flow), and the monitor is capturing pollution transported from the Triad. The monitor can also be impacted by upwind large point sources under westerly flow.	None	Recommended boundary follows township where monitor is located	46%	(11%) increase	July 2004	NOx SIP Call and CSA impose controls on Dan River power plant and Transcontinental Natural Gas Pipeline, both in Rockingham Co.
Stokes	57%[3]	N/A	**99**	**110**	All sources are outside the boundary, as Stokes Co. is recommended as attainment.	6.0% to Forsyth 0.6% to Guilford	Typical south-southwesterly flow transports pollution from the urban Triad counties and strongly influences ozone in Stokes Co.	None	NC recommends the entire county remain as attainment.	92%	1%	July 2005	NOx SIP Call and CSA will result in 90% reduction of NOx emissions from Belews Creek power plant.
Yadkin	1%	N/A	**108**	**121**	All sources are outside the boundary, as Yadkin Co. is recommended as attainment. Yadkin contains limited point sources totaling 0.03 TPD in 2000.	3.2% to Forsyth 0.1% to Guilford	Transport from the major Triad urban area under southerly flow and recirculation patterns common during high episodes impacts Yadkin Co. Under southwesterly flow transport from Hickory can also impact Yadin Co.	None	NC recommends the entire county remain as attainment.	34%	23%	N/A	NOx SIP Call and CSA will result in 90% reduction of NOx emissions from Belews Creek power plant.

[3] Point sources in Stokes County contribute 56% of the total Greensboro/Winston Salem/High Point 2000 NOx emissions. NOx SIP Call and CSA controls on Belews Creek power plant, the only large NOx point source in Stokes Co, are expected to achieve a 93% reduction in Stokes Co. point source NOx from 324.1 TPD in 2000 to 22.8 TPD in 2007.

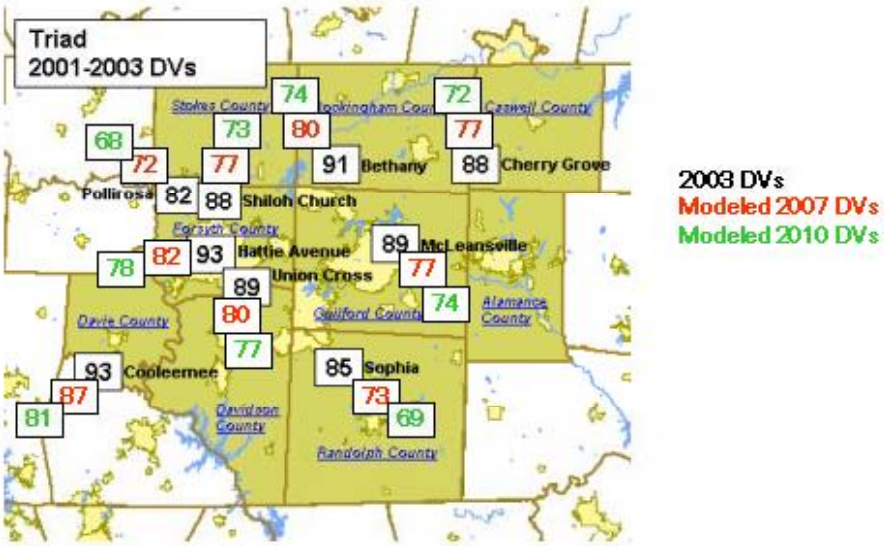


Figure 7. Present and Future 8-hour Ozone Design Values in the Triad Area

Figures 8-11 show the 2000, modeled 2007, and modeled 2010 NOx emissions for the Triad area counties. Modeling projections show a significant decrease by 2007 so please note the change in scale between Figure 8 and Figures 9-10.

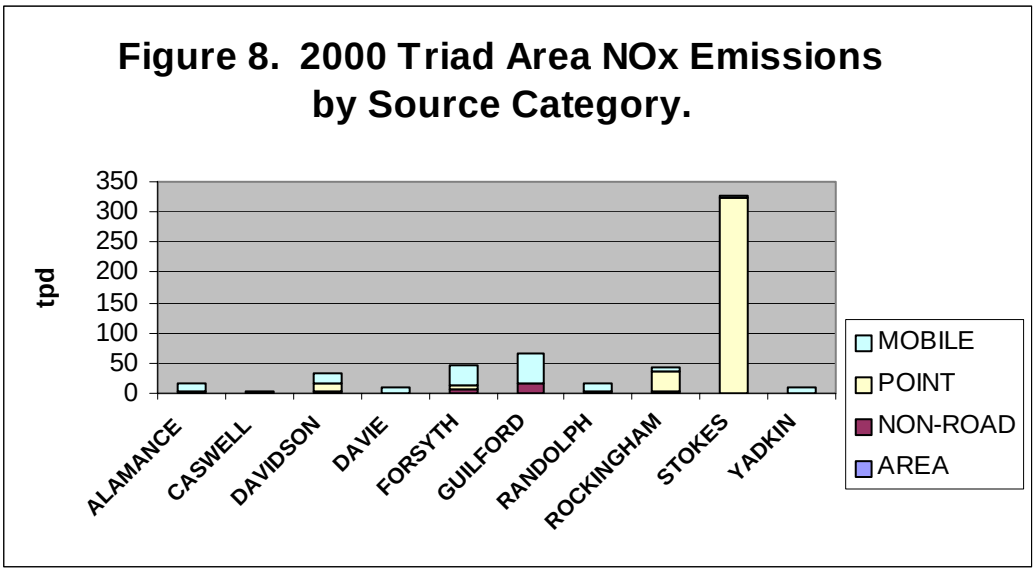


Figure 9. 2007 Triad Area NOx Emissions by Source Category.

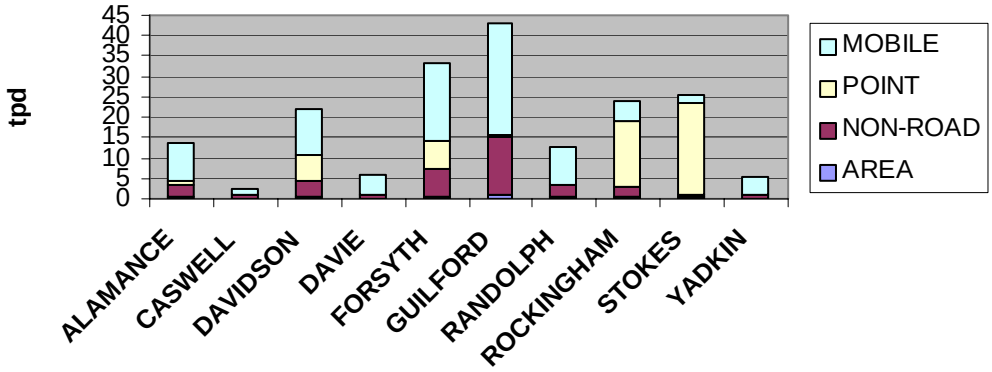


Figure 10. 2010 Triad Area NOx Emissions by Source Category.

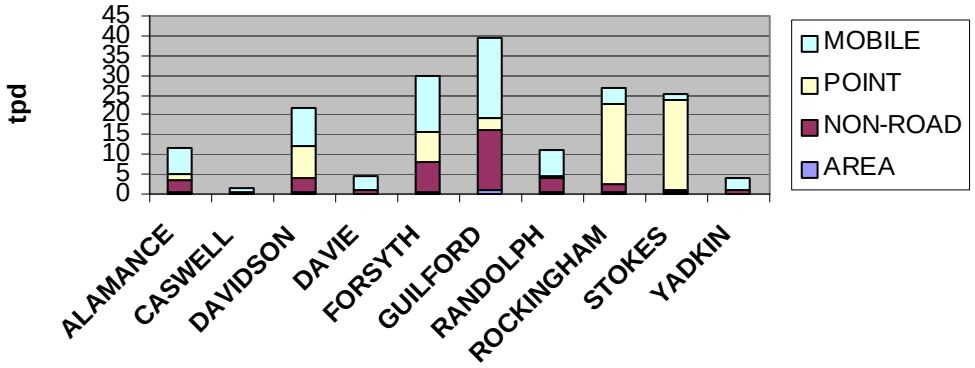
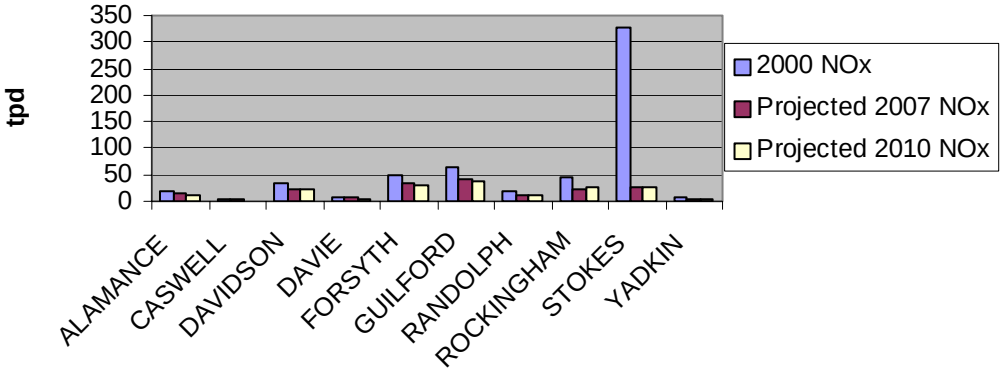


Figure 11. Total NOx Contributions by County to the Triad Area



Hickory/Morganton Area

The Hickory-Morganton area consists of four counties: Alexander, Burke, Caldwell, and Catawba. The largest city in the Hickory-Morganton area is Hickory, of which parts of the city are contained within several counties in the MSA. Figure 12 shows the actual 2001-2003 and predicted future design values for 2007 and 2010, respectively. The green shaded counties indicate the area for which the ozone forecast is developed each day from May 1 through September 30.

Emissions from Charlotte and the Triad often impact the monitors in Lenoir and Taylorsville. The Taylorsville monitor is located in Alexander County and is very rural. The Lenoir monitor is in a small industrialized city at the foot of the mountains. Transport is an issue for both these monitors. The recommended designations were designed to acknowledge the more urbanized area of Hickory, Lenior, and Morganton, but not to adversely impact the more rural parts of the counties (Burke, Caldwell, and Catawba). The MPO recently completed the required review of their jurisdictional boundaries, in which it establishes where the urbanized area will be for the next 20 years. This MPO boundary was the starting point for the nonattainment boundary (transportation conformity requirements would suggest the use of this boundary for air quality purposes). However, the MPO boundary did not reach all the way to Taylorsville, which is a statement to the removed nature of the town even in relation to Hickory. Therefore, we recommended the municipal boundary (city limit) of Taylorsville to capture a small area around the monitor. Transported pollution to the Taylorsville monitor was a key reason for this addition to the suggested use of the MPO boundary. Table 4 provides detailed information for each criteria used in the boundary determination.

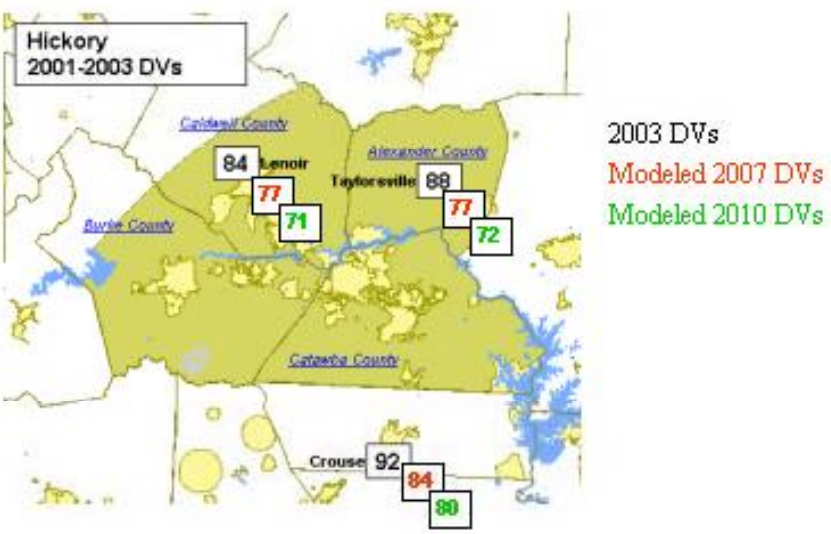


Figure 12. Present and Future 8-Hour Design Values for the Hickory Area.

Table 4. Hickory/Morganton Area Recommendation Criteria used for Attainment Designation.

Criteria:	**1**	**3**	**2**	**6**	**4**	**5**	**7**	**8**	**9**	**10**		**10**	**11**
County	NOx Emissions (% of MSA)	2001-2003 8-hour ozone design value (ppm)	Population Density (persons/sq.mile) **Entire county density in bold** *Recommended attainment portion density in italics*		Location of Emissions Sources	Commuting patterns: % of core county workers commuting from entire county	Meteorology (predominant wind direction during high ozone episodes in NC is southwest; least predominant is east-northeast)	Geography/ topography issues	Jurisdictional boundaries	Projected % NOx reduction		Date of vehicle I/M program implementation	Regional emissions reductions
			2000	2007						2000-2007	2007-2010		
Alexander	2%	0.088	**129**[1] *81*	**146** *91*	Three Title V NOx sources within boundary; two outside boundary. Two Title V VOC sources outside boundary.	6.0% to Catawba (Lowest VMT in MSA)	Alexander Co. is climatologically downwind of the urbanized portion of the MSA. The county is often impacted by transport from the Charlotte and Triad urban areas.	None	Recommended boundary follows MPO boundary and municipal boundary.	20%	6%	N/A	NOx SIP Call and CSA[2] affect Marshall Steam Station in Catawba Co.
Burke	11%	N/A	**176**[1] *119*	**193** *130*	All Title V sources are within boundary.	8.8% to Catawba	Burke Co. is strongly influenced by Charlotte and Hickory urban areas under southerly flow and recirculation commonly observed during high ozone events.	Mountain range along western part of county – recommended as attainment.	Recommended boundary follows MPO boundary.	31%	21%	July 2005	NOx SIP Call and CSA affect Marshall Steam Station in Catawba Co.

[1] 75% of the Hickory/Morganton area population is captured in the recommended nonattainment area boundary.
[2] CSA: The NC Clean Smokestacks Act, enacted in 2002. This multipollutant law requires significant year-round, non-tradable emissions reductions from coal-fired power plants in North Carolina.

Table 4. Hickory/Morganton Area Recommendation Criteria used for Attainment Designation.

Criteria:	**1**	**3**	**2**	**6**	**4**	**5**	**7**	**8**	**9**	**10**		**10**	**11**
County	NOx Emissions (% of MSA)	2001-2003 8-hour ozone design value (ppm)	Population Density (persons/sq.mile) **Entire county density in bold** *Recommended attainment portion density in italics*		Location of Emissions Sources	Commuting patterns: % of core county workers commuting from entire county	Meteorology (predominant wind direction during high ozone episodes in NC is southwest; least predominant is east-northeast)	Geography/ topography issues	Jurisdictional boundaries	Projected % NOx reduction		Date of vehicle I/M program implementation	Regional emissions reductions
			2000	2007						2000-2007	2007-2010		
Caldwell	6%	0.084	**164**[1] *41*	**172** *43*	All Title V sources are within boundary.	8.5% to Catawba	Caldwell Co. is strongly influenced by the Charlotte and Hickory urban areas under southerly flow and recirculation commonly observed during high ozone events.	Mountain range along western part of county – recommended as attainment.	Recommended boundary follows MPO boundary.	30%	6%	July 2005	NOx SIP Call and CSA affect Marshall Steam Station in Catawba Co.
Catawba	81%[3]	N/A	**354**[1] *139*	**398** *156*	All Title V sources except Marshall Steam Station are within boundary. Marshall S. S. is subject to NOx SIP call and CSA controls	N/A	The Hickory area is strongly impacted by upstream urban areas (Triad & Charlotte) during high ozone events. Recirculation within the MSA is also a factor in high ozone events during the summertime.	None	Recommended boundary follows MPO boundary.	42%	18%	July 2003	NOx SIP Call and CSA affect Marshall Steam Station in Catawba Co.

[3] Point sources in Catawba Co. contribute 67% of the total Hickory/Morganton 2000 NOx emissions. Marshall Steam Station emits the bulk of Catawba's point source NOx, and this source is being controlled, resulting in a projected 46% reduction in Catawba point source NOx from 96.2 TPD in 2000 to 51.8 TPD in 2007. All other point sources in Catawba Co. are within the recommended nonattainment area boundary.

Figures 13-16 show the 2000, modeled 2007, and modeled 2010 NOx emissions for the Triad area counties. Modeling projections show a significant decrease by 2007 so please note the change in scale between Figure 13 and Figures 14-15.

Figure 13. 2000 Hickory Area NOx Emissions by Source Category.

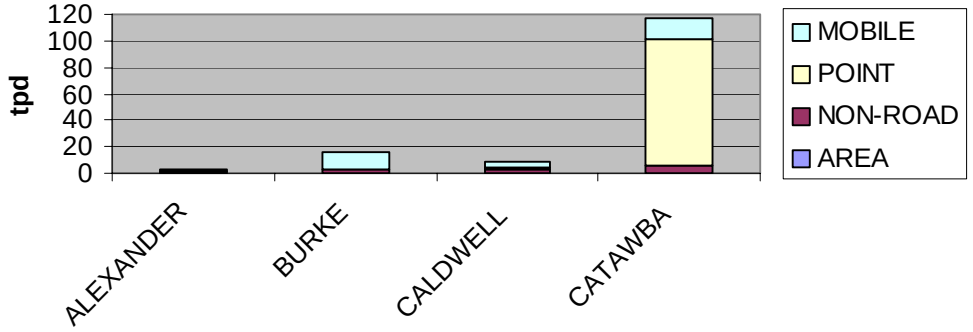
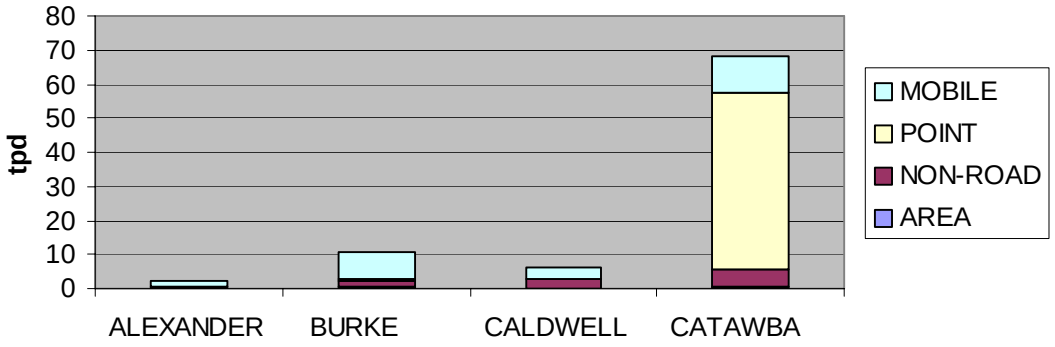
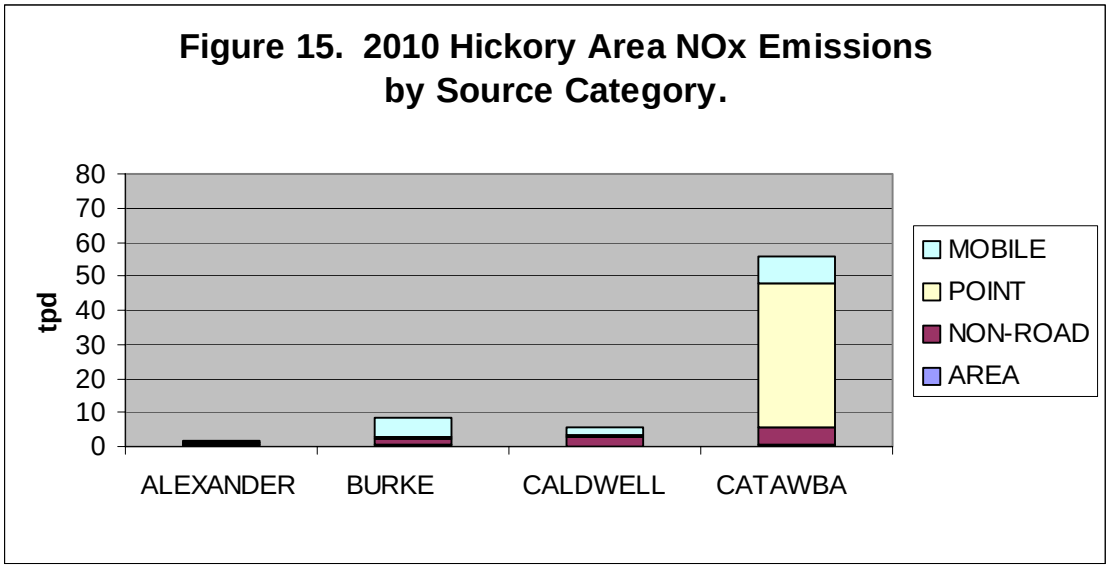
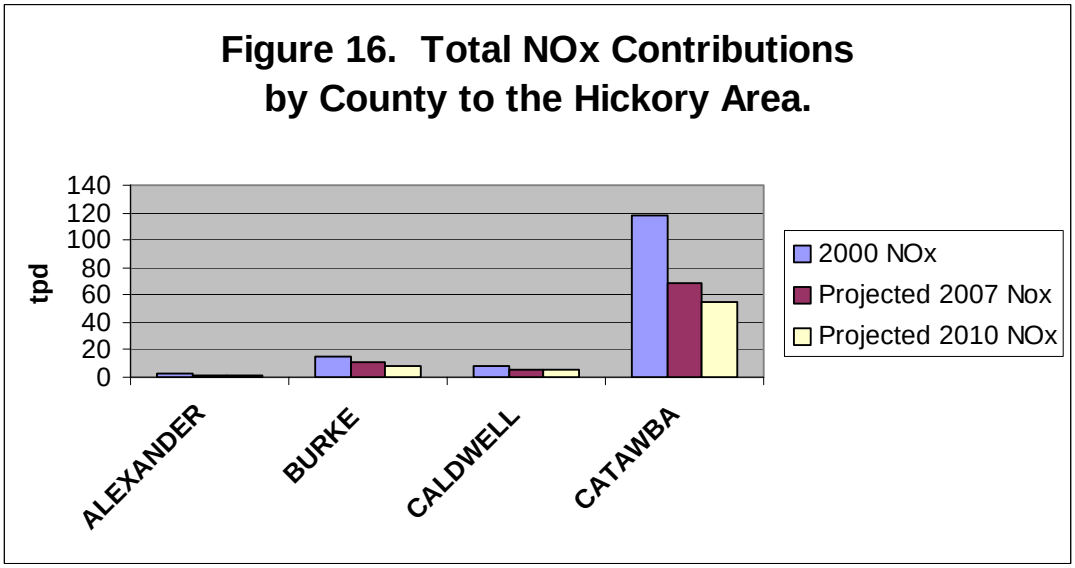


Figure 14. 2007 Hickory Area NOx Emissions by Source Category.







Raleigh/Durham/Chapel Hill Area

The Raleigh - Durham - Chapel Hill (Triangle) area of North Carolina contains six counties: Chatham, Durham, Franklin, Johnston, Orange, and Wake. Based on the emissions and air quality modeling mentioned above, Figure 17 shows the actual 2001-2003 and predicted future design values for 2007 and 2010, respectively. The green shaded counties indicate the area for which the ozone forecast is developed each day from May 1 through September 30. Based on the projected growth and emission reductions, North Carolina expects all of the monitors to attain by 2007, and predicts even lower design values at all monitors by 2010 with the State and Federal control measures that are currently under implementation.

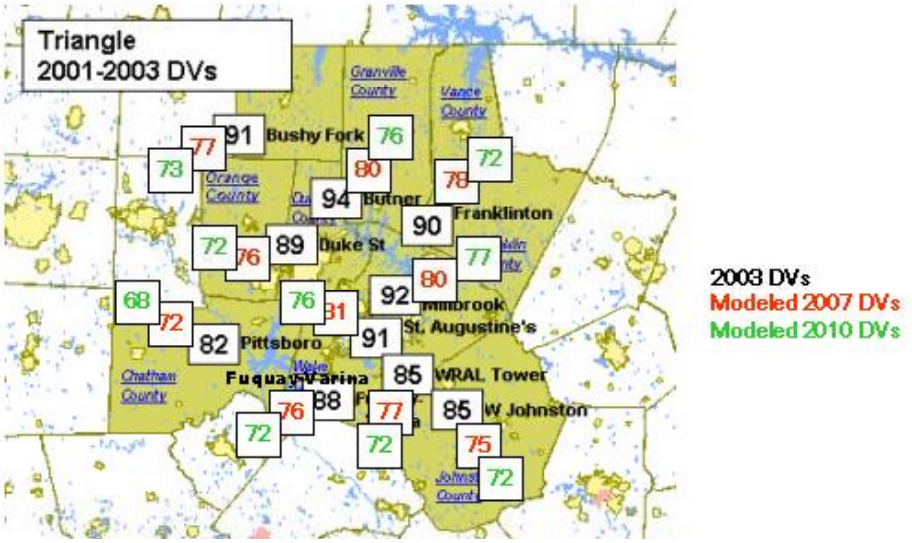


Figure 17. Present and Future 8-Hour Design Values for the Triangle Area.

The review started with the original 1-hour nonattainment area – Wake and Durham Counties and the Dutchville Township in Granville. DAQ has also included Orange County in the recommendation to capture the I-40/I-85 corridor mobile source emissions. The portion of Chatham County that includes the attaining monitor and the more populated townships adjacent to Orange and Durham Counties were included in the designated area. The western portion of Johnston County surrounding the monitor was also included in the designated area because it is impacted by the emissions from the Triangle. The eastern part of Johnston County was excluded because it is rural, containing many wetland areas. For both Granville and Franklin Counties the townships surrounding the monitors that are adjacent to the core counties (Wake and Durham) were included in the nonattainment designated area. The northern portions of these counties were excluded because of low overall emissions. Granville and Franklin counties are generally downwind of the urbanized Triangle area. In addition, the southern portion of Person County surrounding the monitor was included in the designated area. The northern portion of Person County does have two major sources (Roxboro and Mayo facilities) however; those sources have been controlled under NOx SIP call and the Clean Smokestack Act. Table 5 provides detailed information for each criteria used in the boundary determination.

Table 5. Raleigh/Durham/Chapel Hill Area Recommendation Criteria used for Attainment Designation.

Criteria:	**1**	**3**	**2**	**6**	**4**	**5**	**7**	**8**	**9**	**10**		**10**	**11**
County	NOx Emissions (% of MSA)	2001-2003 8-hour ozone design value (ppm)	Population Density (persons/sq.mile) **Entire county density in bold** *Recommended attainment portion density in italics*		Location of Emissions Sources	Commuting patterns: % of core county workers commuting from entire county	Meteorology (predominant wind direction during high ozone episodes in NC is southwest; least predominant is east-northeast)	Geography/ topography issues	Jurisdictional boundaries	Projected % NOx reduction		Date of vehicle I/M program implementation	Regional emissions reductions
			2000	2007						2000-2007	2007-2010		
Durham[1]	8%	0.089	**769**	**855**	All Title V sources are within boundary.	50.7% to Durham 3.9% to Wake	High ozone events are strongly influenced by recirculation and light wind speeds. Typical southwesterly flow can transport pollution throughout portions of the MSA.	None	Full County Boundary	30%	13	July 2002	NOx SIP Call and CSA[2] will produce significant NOx reductions from the Cape Fear Steam Station in Chatham Co.
Orange[1]	6%	N/A	**296**	**336**	All Title V sources are within boundary.	9.9% to Durham 1.2% to Wake	High ozone events are strongly influenced by recirculation and light wind speeds. Typical southwesterly flow can transport pollution throughout portions of the MSA.	None	Full County Boundary	34%	29	July 2002	NOx SIP Call and CSA[2] will produce significant NOx reductions from the Cape Fear Steam Station in Chatham Co.
Wake[1]	19%	0.092	**755**	**951**	All Title V sources are within boundary.	26.1% to Durham 75.6% to Wake	Typical summertime southwesterly flow will transport pollution northeast of Wake Co. High ozone events are characterized by light winds speeds and recirculation patterns.	None	Full County Boundary	27%	18	July 2002	NOx SIP Call and CSA[2] will produce significant NOx reductions from the Cape Fear Steam Station in Chatham Co.
Chatham	7%	0.082	**72** *57*	**84** *66*	Three of the four Title V NOx and VOC sources are located outside of the recommended boundary.	1.6% to Durham 0.8% to Wake	Chatham Co. is strongly impacted by transported pollution from the urban Triangle counties during recirculation and weak wind flow events. Occasionally, transport from the Triad and Charlotte urban areas can impact Chatham Co.	None	NC recommends the four townships adjacent to Orange, Durham, and Wake Cos. as nonattainment. The remaining townships have population densities of 21-54 persons/sq.mile, with one exception. Matthews Township, containing Siler City, contains 177 persons/sq.mile.	63%	11%	January 2004	NOx SIP Call and CSA[2] will produce significant NOx reductions from the Cape Fear Steam Station in Chatham Co.

[1] Counties in bold are the recommended full counties.
[2] CSA: The North Carolina Clean Smokestacks Act, enacted in 2002. This multipollutant law requires significant year-round, non-tradable emissions reductions from coal-fired power plants in North Carolina.

Table 5. Raleigh/Durham/Chapel Hill Area Recommendation Criteria used for Attainment Designation.

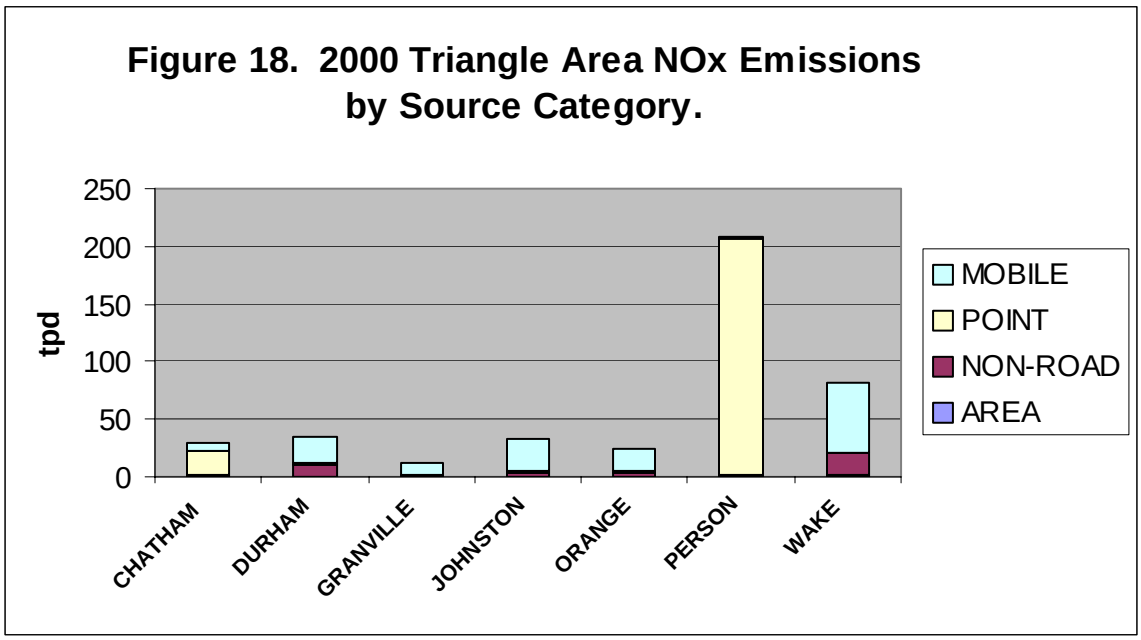
Criteria:	**1**	**3**	**2**	**6**	**4**	**5**	**7**	**8**	**9**	**10**		**10**	**11**
County	NOx Emissions (% of MSA)	2001-2003 8-hour ozone design value (ppm)	Population Density (persons/sq.mile) **Entire county density in bold** *Recommended attainment portion density in italics*		Location of Emissions Sources	Commuting patterns: % of core county workers commuting from entire county	Meteorology (predominant wind direction during high ozone episodes in NC is southwest; least predominant is east-northeast)	Geography/ topography issues	Jurisdictional boundaries	Projected % NOx reduction		Date of vehicle I/M program implementation	Regional emissions reductions
			2000	2007						2000-2007	2007-2010		
Franklin	1%	0.090	**96** *84*	**113** *99*	All except one Title V source are located within the recommended boundary.	0.6% to Durham 2.9% to Wake	Franklin Co. is strongly impacted by emissions from the major urban area of the Triangle under typical southwest flow. The county can also be impacted by transport from the Triad under westerly flow.	None	NC recommends the townships of Franklinton and Youngsville. The monitor is located in Franklinton Township, but Youngsville Township was also included so that the nonattainment area is continuous with Wake Co.	25%	15%	January 2004	NOx SIP Call and CSA will produce significant NOx reductions from the Cape Fear Steam Station in Chatham Co.
Granville	3%	0.094	**91** *72*	**104** *82*	Three Title V sources are within the recommended boundary; one is outside of the boundary.	2.8% to Durham 0.7% to Wake	Granville Co. is strongly impacted by emissions from the major urban area of the Triangle under southwesterly flow. The county can also be impacted by transport from the Triad under westerly flow.	None	The boundary recommendation is the Dutchville Township, which contains the monitor. This is the same boundary as the 1-hour nonattainment boundary.	40%	11%	January 2004	NOx SIP Call and CSA require significant reductions from Roxboro and Mayo units in neighboring Person Co.

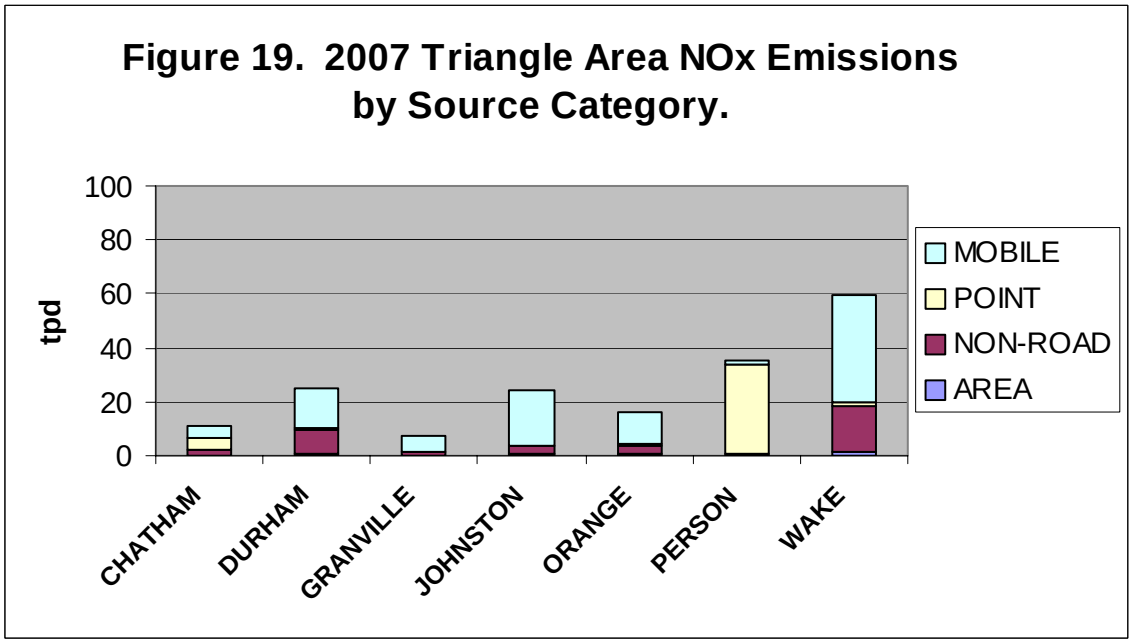
Table 5. Raleigh/Durham/Chapel Hill Area Recommendation Criteria used for Attainment Designation.

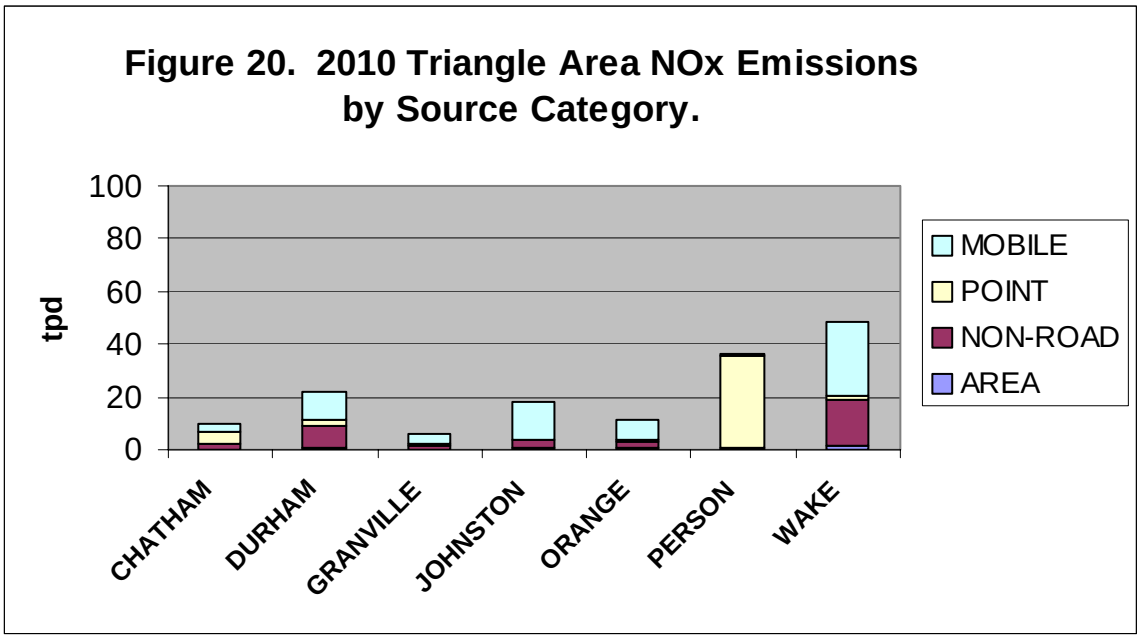
Criteria:	**1**	**3**	**2**	**6**	**4**	**5**	**7**	**8**	**9**	**10**		**10**	**11**
County	NOx Emissions (% of MSA)	2001-2003 8-hour ozone design value (ppm)	Population Density (persons/sq.mile) **Entire county density in bold** *Recommended attainment portion density in italics*		Location of Emissions Sources	Commuting patterns: % of core county workers commuting from entire county	Meteorology (predominant wind direction during high ozone episodes in NC is southwest; least predominant is east-northeast)	Geography/ topography issues	Jurisdictional boundaries	Projected % NOx reduction		Date of vehicle I/M program implementation	Regional emissions reductions
			2000	2007						2000-2007	2007-2010		
Johnston	8%	0.085	**154** *117*	**196** *148*	All Title V sources are within the recommended boundary.	1.0% to Durham 6.6% to Wake	Johnston Co. is strongly impacted by emissions from the major urban area of the Triangle. Occasionally, pollution from Fayetteville can impact Johnston Co. under southerly flow.	None	The recommended boundary surrounds the entire county west of I-95; this area contains 88% of the 2000 population.	27%	24%	January 2003	NOx SIP Call and CSA require significant reductions from the Cape Fear Steam Station in Chatham Co. and the Roxboro and Mayo units in Person Co.
Person	49%[3]	0.091	**91** *91*	**100** *100*	All Title V sources (three NOx, six VOC) are outside of the recommended boundary.	2.4% to Durham 0.2% to Wake	Typical south-southwesterly flow transports pollution from the urban Triangle counties and strongly influences ozone in Person Co. Under westerly flow, pollution from the Triad can also impact Person Co.	None	The boundary recommended is the Bushy Fork Township, where the monitor is located.	83%	(4%) increase	N/A	NOx SIP Call and CSA require significant reductions from Roxboro and Mayo units in Person Co.

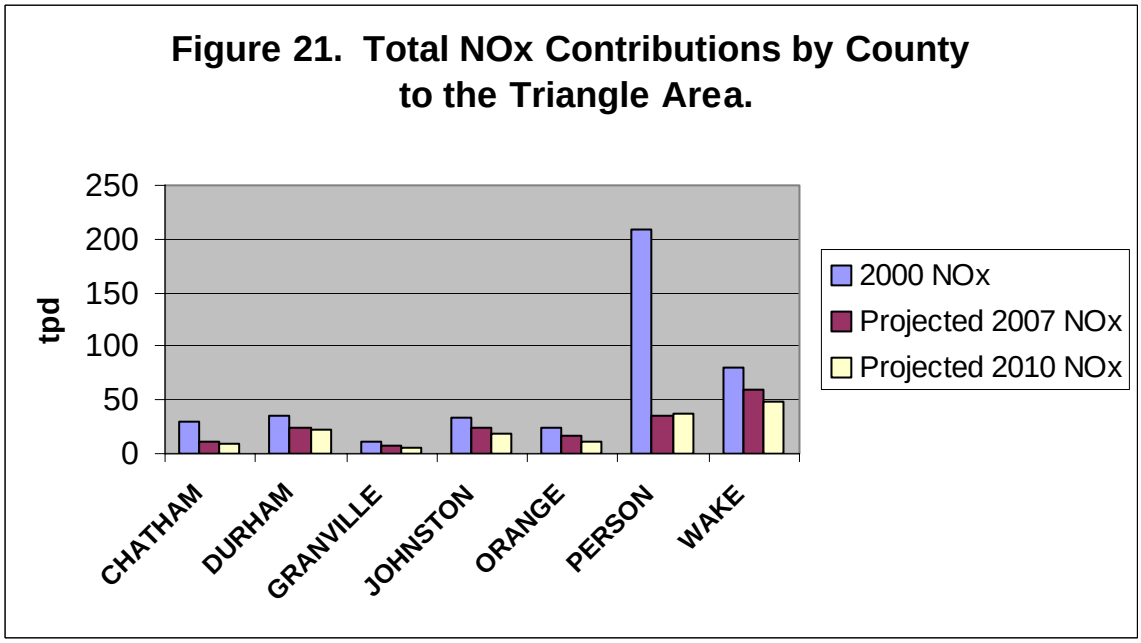
[3] The Roxboro and Mayo power plants, located in Person Co., are subject to the CSA and NOx SIP Call. Overall, the NOx emissions are projected to decrease by 83% between 2000 and 2007 in Person Co., primarily due to controls on these facilities.

Figures 18-21 show the 2000, modeled 2007, and modeled 2010 NOx emissions for the Triad area counties. Modeling projections show a significant decrease by 2007 so please note the change in scale between Figure 18 and Figures 19-20.









Rocky Mount Area

The Rocky Mount area consists of two counties in eastern North Carolina: Edgecombe and Nash. North Carolina recommends that only the area immediately surrounding the nonattaining monitor (located in Leggett in Edgecombe County) be designated nonattainment, and not the entire MSA. Figure 22 shows the actual 2001-2003 and predicted future design values for 2007 and 2010, respectively. It is North Carolina's argument that the violations that occur at the monitor are mainly due to transport from

the larger Triangle MSA to the west and mobile emissions from the I-95 interstate corridor, which is located in close proximity to the monitor. Table 6 provides detailed information for each criteria used in the boundary determination.

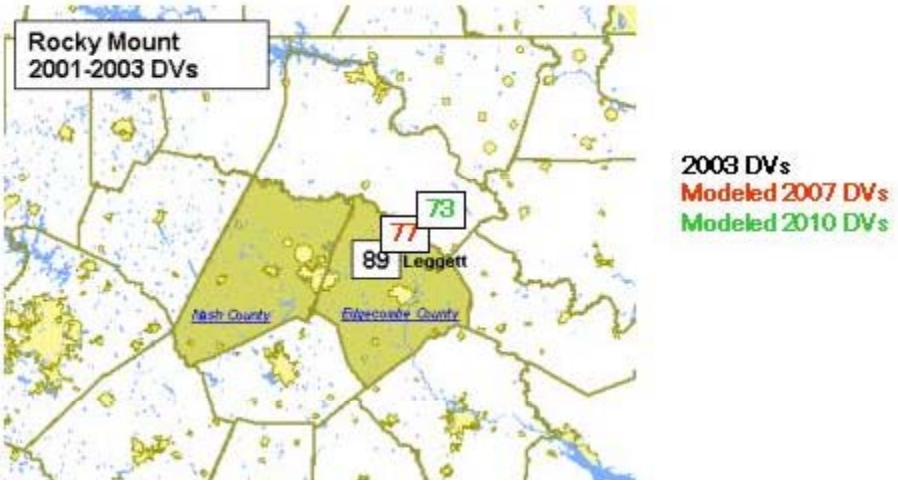


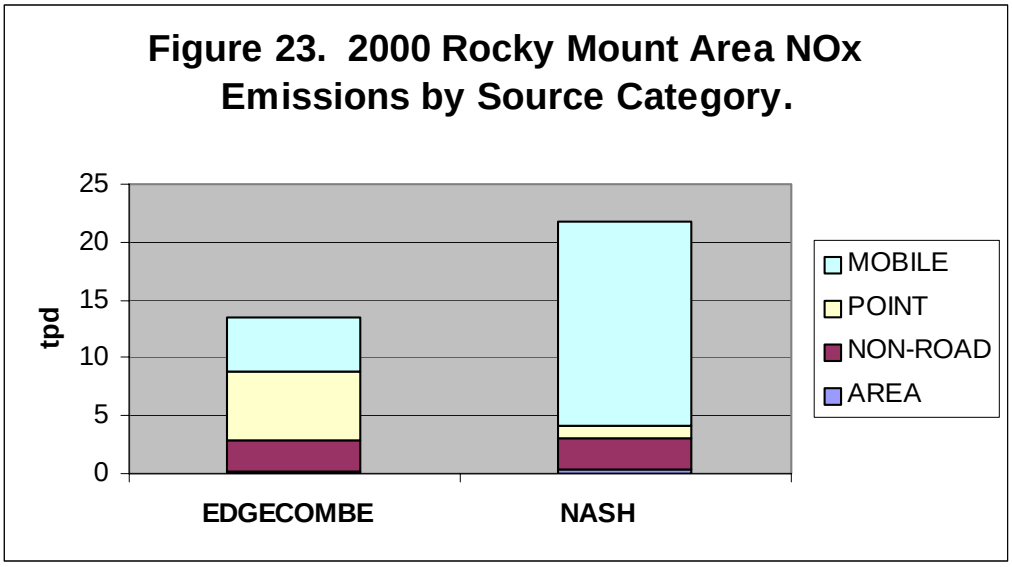
Figure 22. Present and Future 8-Hour Design Values for the Rocky Mount Area.

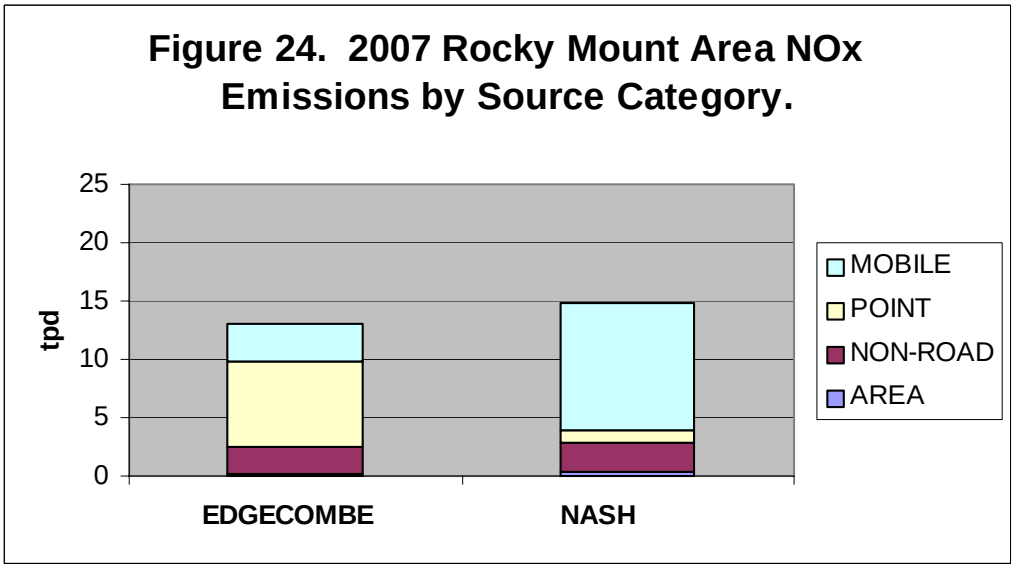
Table 6. Rocky Mount Area Recommendation Criteria used for Attainment Designation.

Criteria:	**1**	**3**	**2**	**6**	**4**	**5**	**7**	**8**	**9**	**10**		**10**	**11**
County	NOx Emissions (% of MSA)	2001-2003 8-hour ozone design value (ppm)	Population Density (persons/sq.mile) **Entire county density in bold** *Recommended attainment portion density in italics*		Location of Emissions Sources	Commuting patterns: % of core county workers commuting from entire county	Meteorology (predominant wind direction during high ozone episodes in NC is southwest; least predominant is east-northeast)	Geography/ topography issues	Jurisdictional boundaries	Projected % NOx reduction		Date of vehicle I/M program implementation	Regional emissions reductions
			2000	2007						2000-2007	2007-2010		
Edgecombe	38%[1]	0.089	**110**	**107**	All Title V sources are outside of the recommended boundary.	0.1% to Wake	The Leggett monitor is impacted by transported pollution from the Triangle under westerly flow. There is also a strong correlation between high ozone concentrations in Raleigh and high ozone concentrations at the Leggett monitor. The Leggett monitor can also be impacted by emissions from Fayetteville and the I-95 corridor (southwest flow).	None	The boundary recommended is the Leggett municipal boundary, where the monitor is located.	4%	46%	January 2005	NOx SIP Call and CSA[2] require significant reductions from the Cape Fear Steam Station in Chatham County and the Roxboro and Mayo units in Person Co.
Nash	62%	n/a	**162**	**175**	All sources are outside the boundary, as Nash Co. is recommended as attainment.	0.8% to Wake	The Nash County is impacted by transported pollution from the Triangle under westerly flow. Nash County can also be impacted by pollution from Fayetteville and the I-95 corridor under typical southwest flow.	None	North Carolina recommends that Nash Co. be designated as attainment.	31%	(11%) increase	January 2005	NOx SIP Call and CSA require significant reductions from the Cape Fear Steam Station in Chatham County and the Roxboro and Mayo units in Person Co.

[1] Edgecombe and Nash are the only counties in the Rocky Mount MSA; thus each county contributes a high percentage of emissions to the MSA as compared to counties in larger MSAs.
[2] CSA: The NC Clean Smokestacks Act, enacted in 2002. This multipollutant law requires significant year-round, non-tradable emissions reductions from coal-fired power plants in North Carolina.

Figures 23-25 shows 2000, 2007 and 2010 total NO_x by source category for each county. Figure 26 shows the total NO_x emissions from Edgecombe and Nash Counties. While not immediately revealing in the graphs, NO_x emissions in the two counties are relatively low when compared to the total NO_x emissions from all counties recommended for nonattainment by North Carolina.





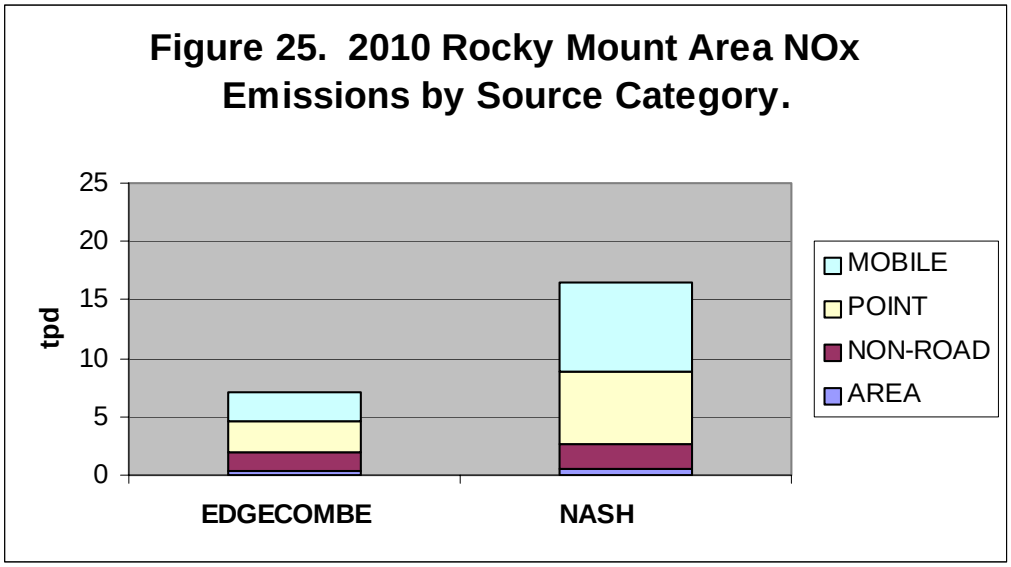


Figure 25. 2010 Rocky Mount Area NOx Emissions by Source Category.
tpd
25
20
15
10
5
0
EDGECOMBE
NASH
MOBILE
POINT
NON-ROAD
AREA

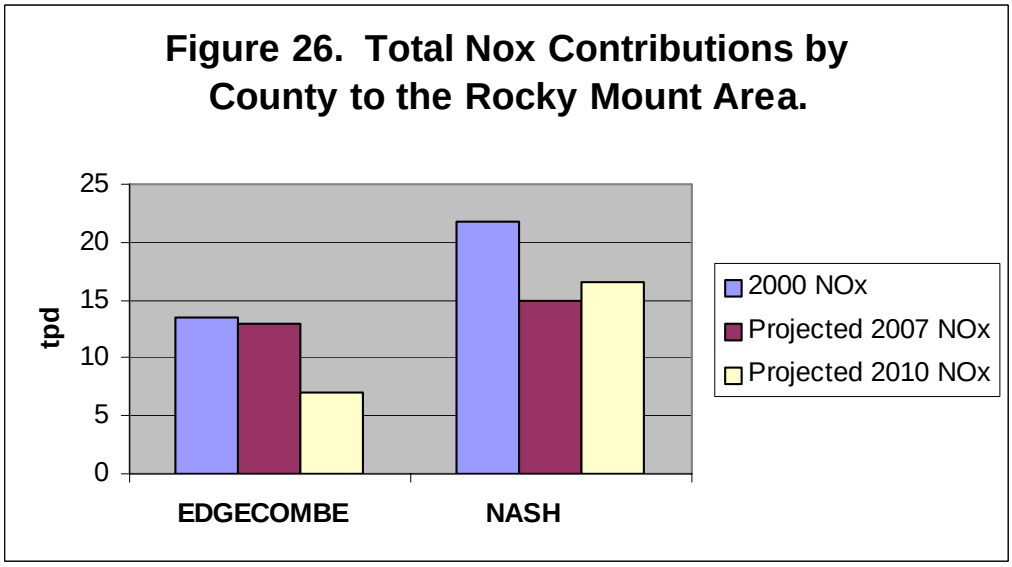


Figure 26. Total Nox Contributions by County to the Rocky Mount Area.
tpd
25
20
15
10
5
0
EDGECOMBE
NASH
2000 NOx
Projected 2007 NOx
Projected 2010 NOx

Appendix A

Secretary Ross's letter of February 6, 2004

NCDENR
North Carolina Department of Environment and Natural Resources

Michael F. Easley, Governor

William G. Ross Jr., Secretary

February 6, 2004

J. I. Palmer, Jr., Esq.
Regional Administrator
US EPA Region 4
Sam Nunn Federal Center
61 Forsyth Street, SW
Atlanta, Georgia 30303-8960

Subject: 8-Hour Ozone Non-Attainment Boundaries

Dear Mr. Palmer:

We have reviewed EPA's letter of December 3, 2003 commenting on North Carolina's recommendations for 8-hour ozone non-attainment boundaries. The purpose of this letter is to respond to EPA's comments and to address changes in our recommendations based on consideration of the 2003 ozone data.

After careful consideration of EPA's views and comments, we continue to believe that our original recommendations for the non-attainment areas of Charlotte-Gastonia-Rock Hill, Fayetteville, Greensboro-Winston-Salem- High Point, Hickory-Newton-Conover, Raleigh-Durham-Chapel Hill and Rocky Mount are appropriate, effective and consistent with applicable law, regulation and guidance.

It is our view that, by presuming that the boundaries of Metropolitan Statistical Areas should be the boundaries of non-attainment areas and by further ignoring its own guidance, EPA has given an arbitrary and unreasonable amount of deference to the Metropolitan Statistical Areas boundaries. EPA has proceeded despite Office of Management and Budget's (OMB) caution not to do so when implementing nonstatistical programs. OMB makes this point clearly in the December 27, 2000 Federal Register notice, in which the OMB states:

> "The general concept of a Metropolitan Statistical Area or a Micropolitan Statistical Area is that of an area containing a recognized population nucleus and adjacent communities that have a high degree of integration with that nucleus. The purpose of the Standards for Defining Metropolitan and Micropolitan Statistical Areas is to provide nationally consistent definitions for collecting, tabulating and publishing Federal statistics for a set of geographic areas. To this end, the Metropolitan Area concept has been successful as a statistical representation of the social and economic linkages between urban cores and outlying, integrated areas. This success is evident in the continued use and application of metropolitan area definitions across broad

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> areas of data collection, presentation and analysis. This success is also evident in the use of statistics for metropolitan areas to inform the debate and development of public policies and in the use of metropolitan area definitions to implement and administer a variety of nonstatistical Federal programs. These last uses, however, raise concerns about the distinction between appropriate uses – collecting, tabulating and publishing statistics as well as informing policy – and inappropriate uses – implementing nonstatistical programs and determining program eligibility. OMB establishes and maintains these areas solely for statistical purposes.
> In order to preserve the integrity of its decision making with respect to reviewing and revising the standards for designating areas, OMB believes that it should not attempt to take into account or anticipate any public or private sector nonstatistical uses that may be made of the definitions. It cautions that Metropolitan Statistical Area and Micropolitan Statistical Area definitions should not be used to develop and implement Federal, state and local nonstatistical programs and policies without full consideration of the effects of using these definitions for such purposes." (Emphasis added.)

The implementation of the 8-hour ozone standard is clearly a nonstatistical program for a number of reasons, including the influences of the weather and predominant wind flows. North Carolina believes that we adequately addressed this issue in the recommendations by evaluating wind flows on high ozone days at the rural monitors located downwind from the major urban areas. North Carolina also continues to believe that the evaluation of such data is critical to identifying appropriate boundaries. Indeed, it is one of the eleven criteria outlined in the EPA guidance on setting boundaries larger or smaller than the MSA.

We have conscientiously used EPA's eleven-point guidance to define reasonable, rational and necessary boundary designations. We clearly addressed how those factors affected the drawing of our lines; e.g., population densities, traffic and commuting patterns, meteorology, and level of control of emission sources. Please also consider these additional or expanded points along with the information we have previously submitted:

1. North Carolina has vigorously supported the 8-hour ozone standard, including the adoption of the new standard on April 1, 1999, and has implemented an extensive 8-hour ozone-forecasting program, covering six areas in our state. Our citizens are alerted on a daily basis as to the predicted quality of the air so that they can take action to protect their health. North Carolina has expended and continues to expend significant resources to provide this service to our citizens. This daily forecast

provides an efficient and effective indication to the public of when they need to act to avoid exposure to high ozone levels.

2. North Carolina has taken a proactive approach to addressing the new 8-hour ozone standard. For example, we enacted the Clean Air Bill of 1999, which changes our vehicle inspection and maintenance (I/M) program to an on-board diagnostic program and expands the program from 9 to 48 counties. This I/M program is one of the most expansive and progressive in the country. The North Carolina General Assembly passed this legislation during the time that the new standard was in the middle of litigation.

3. Another example of our State's proactive approach is North Carolina's passage of an aggressive multi-pollutant bill that will result in significant reductions in sulfur dioxide and year-round reductions in nitrogen oxides from our utilities.

4. North Carolina has invested significant resources to conduct an 8-hour ozone modeling analysis over the last several years. That work culminated in a 2007 analysis that shows all but five monitors in the state will attain the 8-hour ozone standard by 2007. It should be noted that four of the five monitors that will not attain the standard by 2007 are in the Charlotte region and are not required to attain until at least 2010. Modeling runs are now complete that show the Charlotte region in attainment by 2010. Thanks to our early modeling work, we were able to understand more clearly what controls were needed and how legislative initiatives might help to attain this new standard.

5. A key statutory authority in North Carolina is the state's ability to adopt controls on any source in the state if that source is contributing to violations of the ozone standard. Thus, we can take necessary steps to regulate our sources without a broad non-attainment designation. Further, our recent legislative actions show that our state is not only able to, but will, do what is necessary to protect the public's health.

6. North Carolina has successfully implemented, with EPA's approval, partial designations under the 1-hour ozone standard in both Granville and Davie Counties.

We have amended a few recommendations based on consideration of 2003 data. The Mount Mitchell monitor in Yancey County, the Bent Creek monitor in Buncombe County and the Frying Pan monitor in Haywood County are now measuring attainment. Therefore, the following areas are now recommended to be attainment based on the latest air quality data. Blue Ridge, Black and Great Craggy Mountains above 4000 feet in Buncombe, McDowell and Yancey Counties (Mt. Mitchell monitor); Buncombe County (Bent Creek monitor); Great Balsam Mountains above 4000 feet in Haywood and

Jackson Counties (Frying Pan monitor). Otherwise, North Carolina's recommendations remain as presented in my July 15, 2003 letter to you.

In closing, we will appreciate your careful consideration of these comments, as well as the additional technical evidence that will be provided to you next week regarding North Carolina's application of the eleven criteria. Please call me if you have questions. Thank you.

Sincerely,

William G. Ross, Jr.

WGB:np

cc: The Honorable Mike Easley, Governor, State of North Carolina
The Honorable Jim Fain, Secretary, NC Department of Commerce
The Honorable Lynda Tippett, Secretary, NC Department of Transportation
The Honorable Britt Cobb, Commissioner, NC Department of Agriculture and Consumer Services
Mr. Steve Page, Director, Office of Air Quality Planning and Standards, US EPA
Mr. Keith Overcash, Director, Division of Air Quality, NC DENR

Appendix B

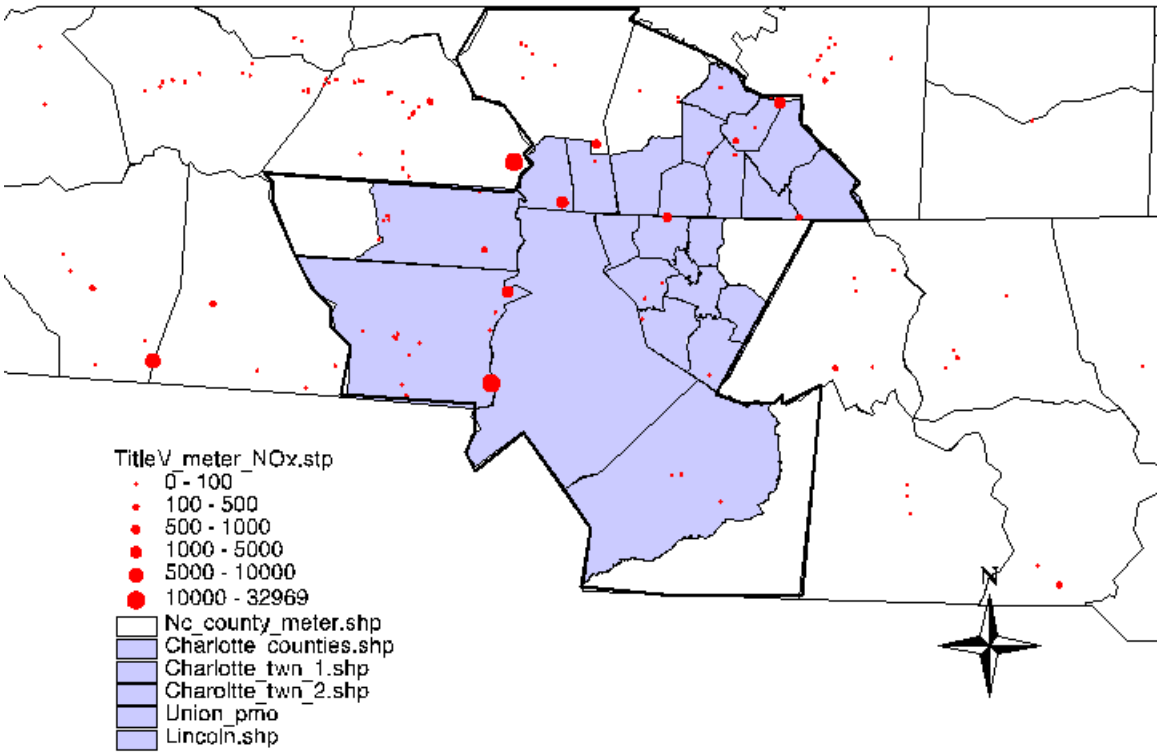
Listing of North Carolina's Monitoring Network

County	Site Name	AIRS Code	Designation	Operator	Date Established
Alexander	Taylorsville	37-003-0003	SLAMS	S 0776	1-Jan-81
Avery	Linville Falls Park	37-011-0002	SPM	S 0776	1-Aug-99
Buncombe	Bent Creek	37-021-0030	SLAMS	LP 0779	1-Apr-89
Caldwell	Lenoir	37-027-0003	SLAMS	S 0776	1-Jan-81
Camden	Camden	37-029-0099	SLAMS	S 0776	22-Jun-88
Caswell	Cherry Grove	37-033-0001	SPM	S 0776	26-Feb-93
Chatham	Pittsboro	37-037-0004	SLAMS	S 0776	14-Jun-93
Cumberland	Wade	37-051-0008	NAMS	S 0776	4-Apr-90
Cumberland	Golfview	37-051-1003	NAMS	S 0776	7-Jan-97
Davie	Cooleemee	37-059-0002	SLAMS	S 0776	15-Apr-96
Duplin	Kenansville	37-061-0002	SPM-SON	S 0776	10-Mar-92
Durham	Duke	37-063-0013	NAMS	S 0776	26-Oct-92
Edgecombe	Leggett	37-065-0099	SLAMS	S 0776	1-Jan-83
Forsyth	Hattie Avenue	37-067-0022	SLAMS	LP 0403	1-Jan-83
Forsyth	Pollirosa	37-067-0027	SLAMS	LP 0403	1-Apr-94
Forsyth	Shiloh Church	37-067-0028	SLAMS	LP 0403	1-Apr-96
Forsyth	Union Cross	37-067-1008	SLAMS	LP 0403	1-Apr-88
Franklin	Franklinton	37-069-0001	NAMS	S 0776	1-Apr-93
Graham	Joanna Bald	37-075-0001	SPM	S 0776	1-Apr-03
Granville	Butner	37-077-0001	NAMS	S 0776	1-Jan-79
Guilford	McLeansville	37-081-0011	SLAMS	S 0776	1-Jan-79
Haywood	Waynesville	37-087-0004	SPM	S 0776	1-Mar-99
Haywood	Fryingpan	37-087-0035	SPM-SAMI	S 0776	1-Jul-94
Haywood	Purchase Knob	37-087-0036	SPM-SAMI	S 0776	6-Jun-95
Jackson	Bartnet Knob	37-099-0005	SLAMS	CK-T 0272	1-Apr-99
Johnston	West Johnston	37-101-0002	SLAMS	S 0776	1-Jan-95
Lenoir	Lenoir Community College	37-107-0004	SPM	S 0776	1-Jun-97
Lincoln	Crouse	37-109-0004	SLAMS	S 0776	1-May-93
Martin	Jamesville	37-117-0001	SLAMS	S 0776	1-Dec-94
Mecklenburg	Garinger	37-119-0041	NAMS	LP 0669	30-Jul-99
Mecklenburg	Arrowood	37-119-1005	SLAMS	LP 0669	1-Jan-77
Mecklenburg	County Line	37-119-1009	NAMS	LP 0669	15-Oct-79
New Hanover	Castle Hayne	37-129-0002	SLAMS	S 0776	1-Jan-79
Northampton	Gaston	37-131-0002	SPM	S 0776	15-Feb-95
Person	Bushy Fork	37-145-0003	SLAMS	S 0776	31-Dec-97
Pitt	Farmville	37-147-0099	SLAMS-SON	S 0776	1-Jan-82
Randolph	Sophia	37-151-0004	SPM	LP 0403	1-Apr-01
Rockingham	Bethany	37-157-0099	SLAMS	S 0776	7-Jul-93
Rowan	Rockwell	37-159-0021	SPM	S 0776	1-Apr-93
Rowan	Enochville	37-159-0022	SPM	S 0776	13-Jun-95
Swain	Bryson City	37-173-0002	SLAMS	S 0776	1-Apr-95
Union	Monroe Middle School	37-179-0003	SPM	S 0776	7-Apr-99
Wake	Millbrook	37-183-0014	NAMS	S 0776	16-Sep-98
Wake	St. Augustine	37-183-0015	SPM	S 0776	6-Jun-91
Wake	Fuquay	37-183-0016	SPM	S 0776	1-Apr-93
Wake	WRAL Tower	37-183-0017	SPM	S 0776	1-May-93
Yancey	Mt.Mitchell	37-199-0003	SPM	S 0776	6-May-92

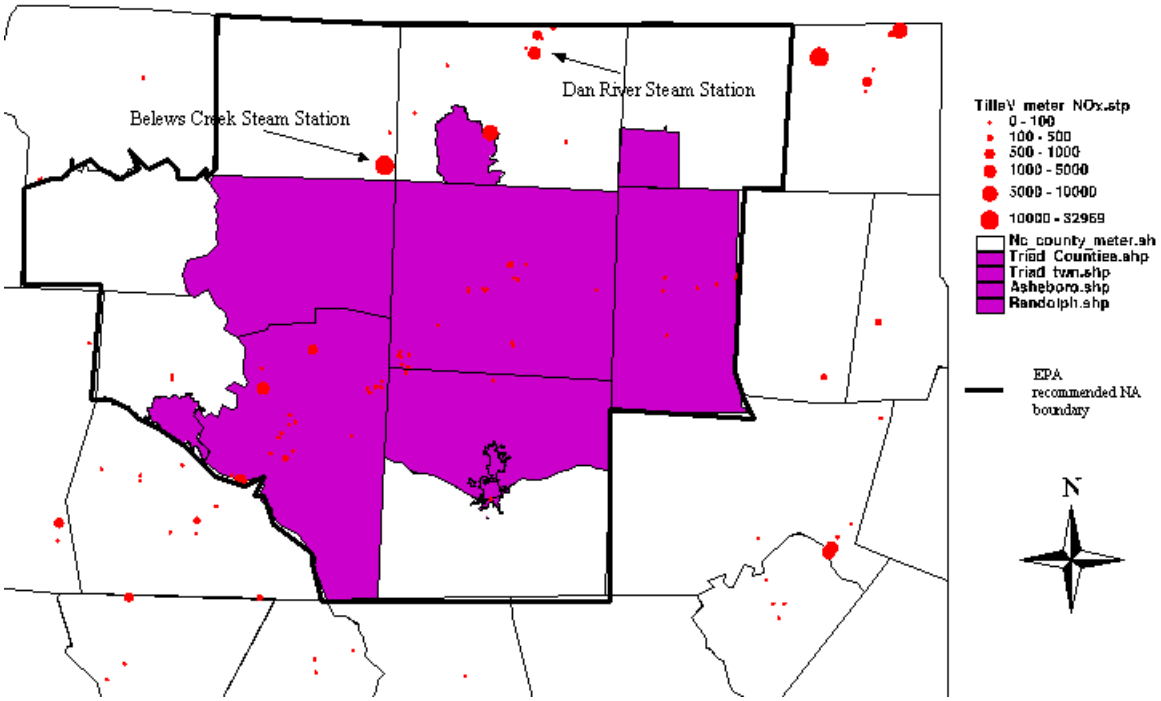
Appendix C

Maps of the Title V NOx and Title V VOC sources.

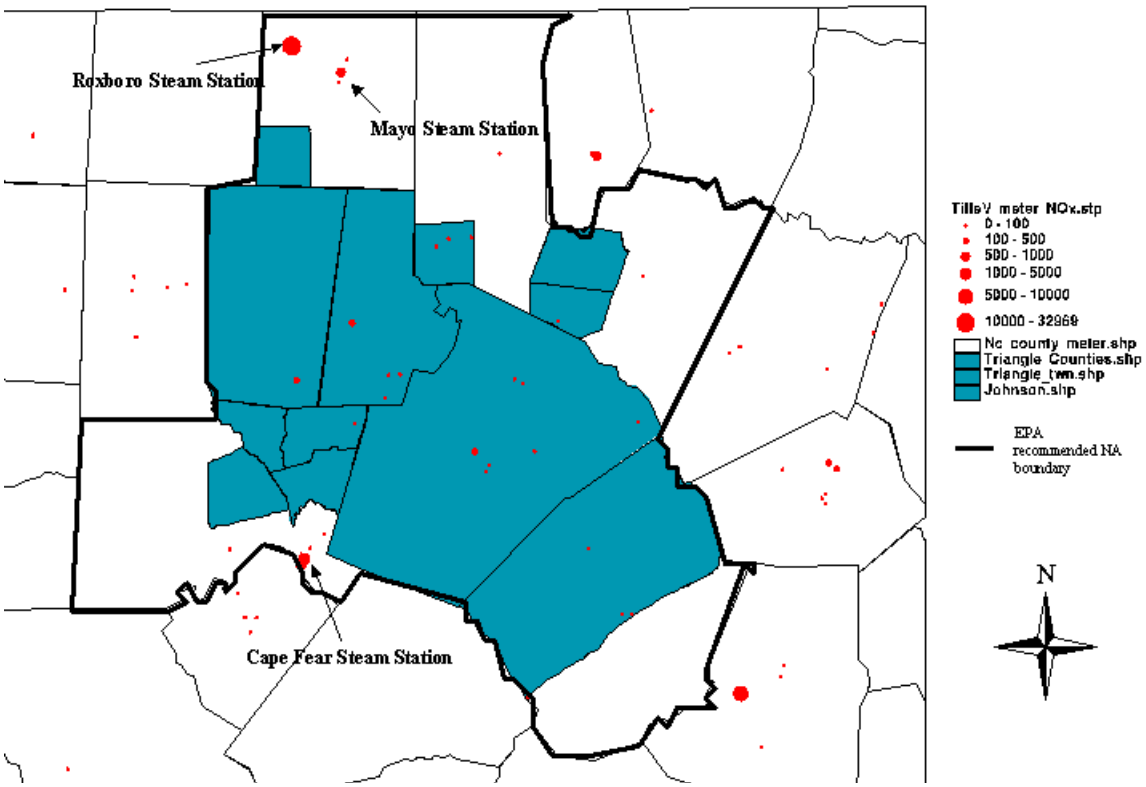
Title V NOx Sources (2001) for Charlotte Area



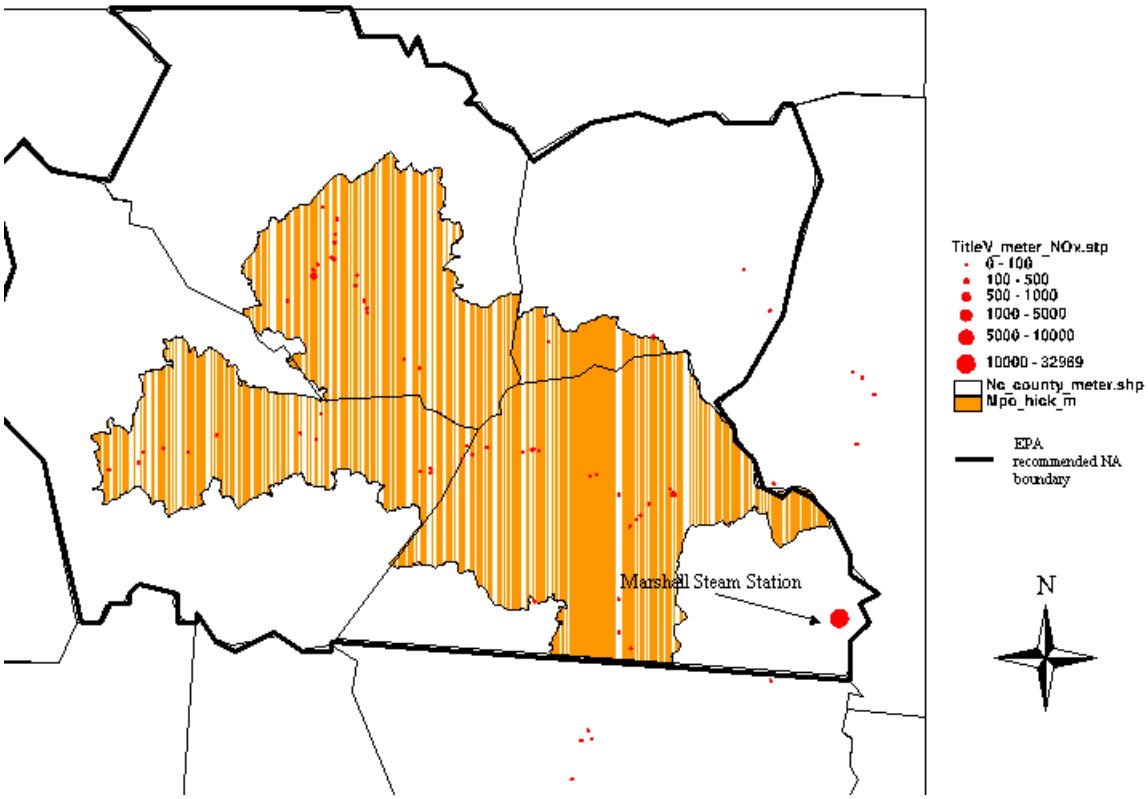
Title V NOx Sources (2001) for the Triad Area



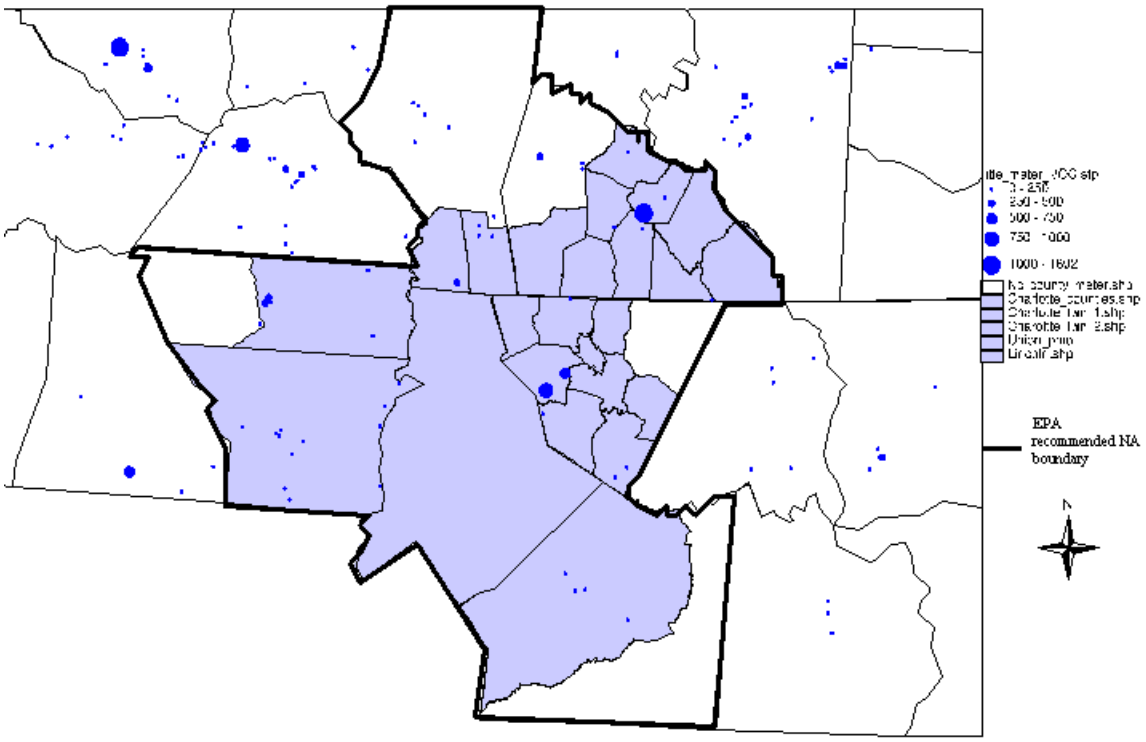
Title V NOx Sources (2001) for the Triangle Area



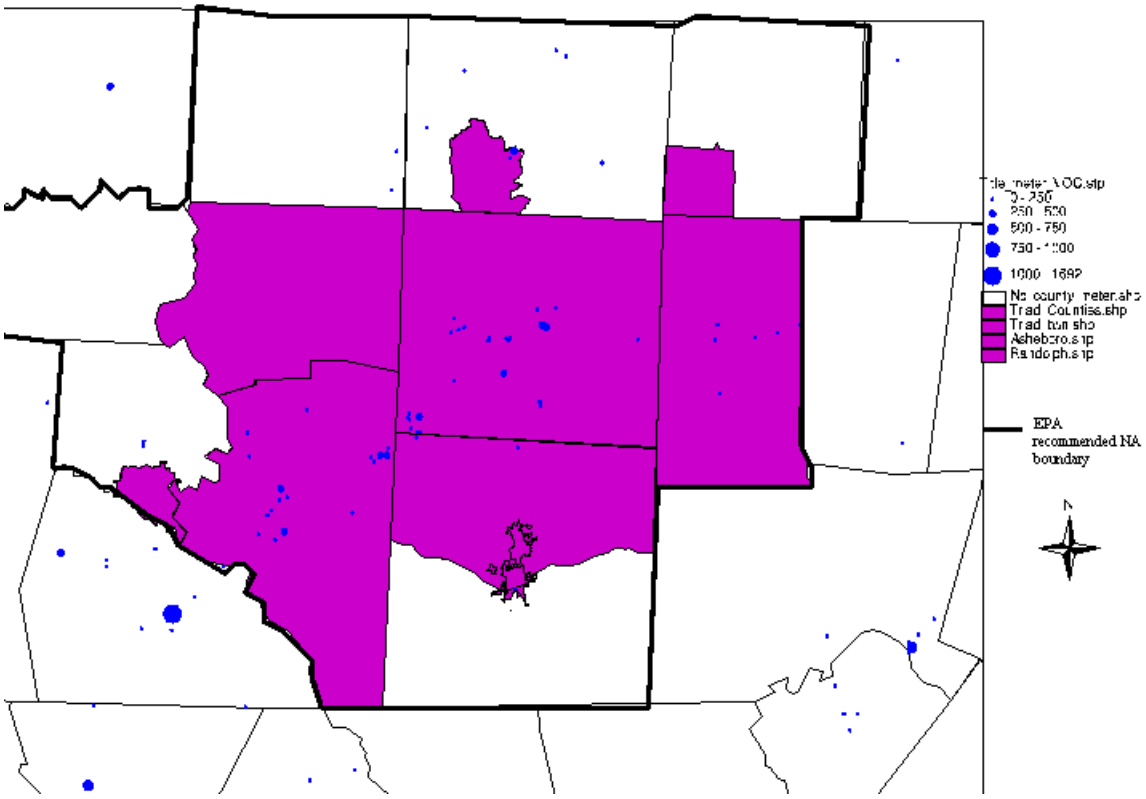
Title V NOx Sources (2001) for the Hickory Area



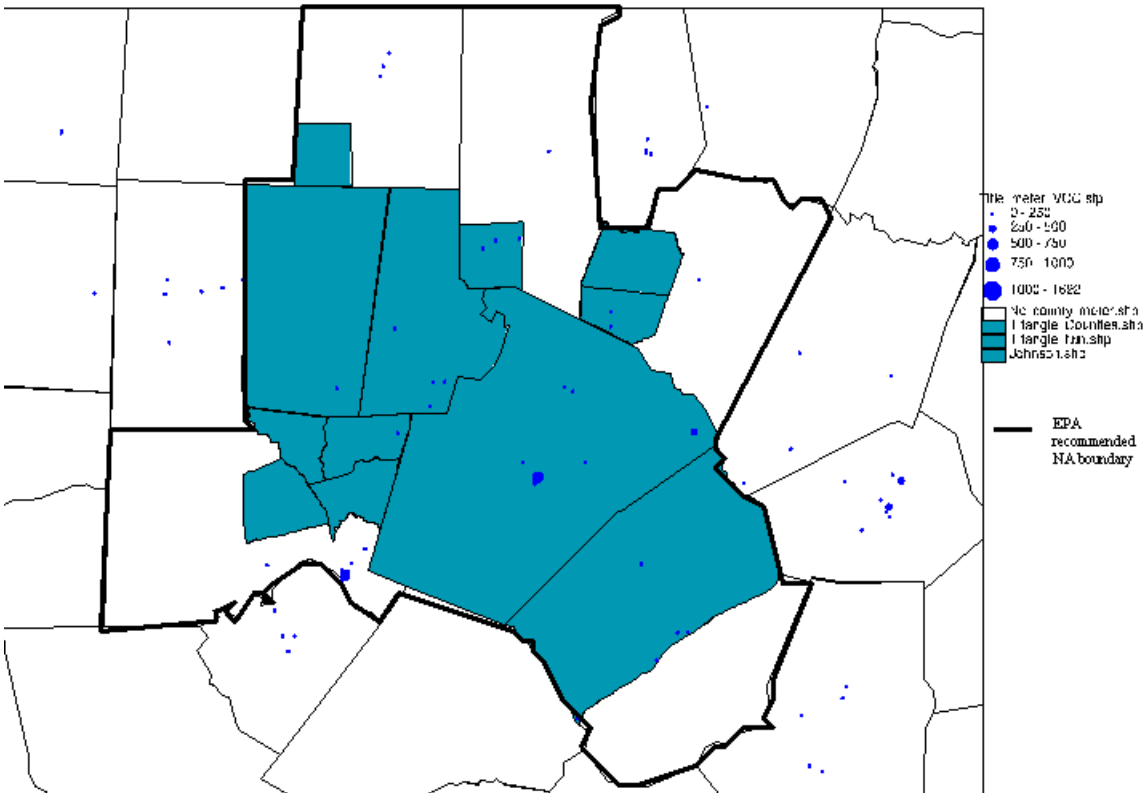
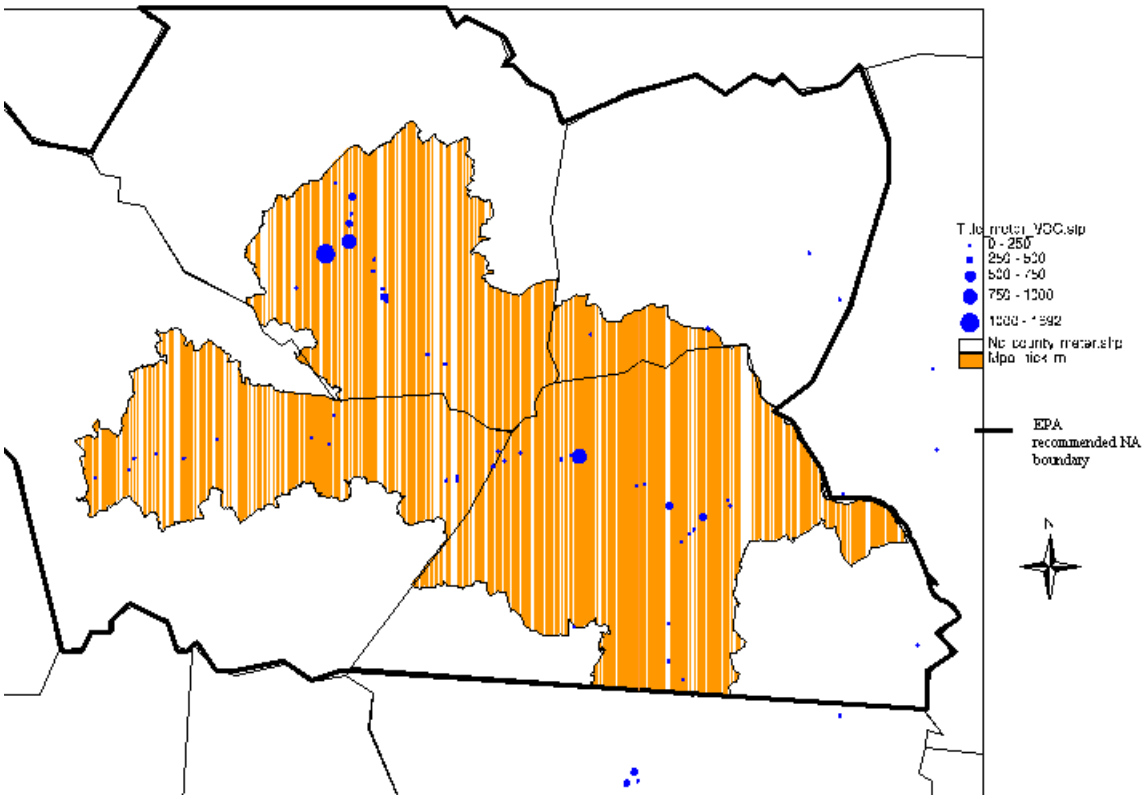
Title V VOC Sources for the Charlotte Area



Title V VOC Sources (2001) for the Triad Area



Title V VOC Sources for the Triangle Area



Title V VOC Sources for the Hickory Area