State of South Carolina

Office of the Governor

MARK SANFORD
GOVERNOR

POST OFFICE BOX 12267
COLUMBIA 29211

July 14, 2003

Mr. J. I. Palmer, Jr., Regional Administrator
United States Environmental Protection Agency, Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303-8960

Dear Mr. Palmer:

In response to the United States Environmental Protection Agency's (EPA) letter of March 19, 2003, I have asked Lewis Shaw from South Carolina's Department of Health and Environmental Control to provide updated recommendations for 8-hour ozone National Ambient Air Quality Standard designations and supporting information to EPA.

South Carolina's commitment to ensuring cleaner air for our citizens has been clearly demonstrated by achieving compliance with all national air quality standards for more than a decade. We recognize that air quality has a direct impact on the public's health, environment, economy and quality of life. Providing our citizens a healthy and safe environment as soon as possible is of primary concern. Our continued commitment to cleaner air sooner for the citizens of South Carolina is demonstrated by forty-five of South Carolina's forty-six counties joining us in a statewide ozone early action initiative to attain compliance with the 8-hour standard no later than December 2007. In that the primary goal of this effort is attainment of the standard as expeditiously as possible, EPA should give great deference to the judgment of the states in determining what steps are needed to assure prompt compliance with the national 8-hour ozone standard.

The staff of your agency and those from DHEC have an excellent working relationship, and I am certain that they will work effectively through this process.

Sincerely,

Mark Sanford

cc: Mr. Earl Hunter, DHEC
Mr. Lewis Shaw, DHEC

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

July 14, 2003

Mr. J. I. Palmer, Jr., Regional Administrator
United States Environmental Protection Agency, Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303-8960

Dear Mr. Palmer

As requested by Governor Mark Sanford, the Department of Health and Environmental Control (DHEC) submits this letter and supporting information in response to the United States Environmental Protection Agency's (EPA) letter of March 19, 2003. In this letter EPA requested updated recommendations for 8-hour ozone National Ambient Air Quality Standard designations. In making our recommendations we have followed EPA guidance to the degree possible and practical. As requested by EPA, our recommendations are based on 2000, 2001, and 2002 monitored ozone data. Because 2003 ozone data will be available prior to final designations being made by EPA, states should be provided the opportunity to update their recommendation accordingly.

As you are aware, determining the size of boundaries for non-attainment areas is an extremely difficult and controversial task. The debate centers around the advantages and disadvantages in establishment of smaller versus larger boundary areas. This discussion should not distract us from our ultimate goal – attainment of the standard as expeditiously as possible. As stated in Governor Sanford's letter to you dated July 14, 2003, EPA should give great deference to the judgment of the states in determining what steps are needed to assure prompt compliance with the national 8-hour ozone standard.

Our recommendations carry with them our commitment to comply with the national 8-hour ozone standard in an expeditious manner. The commitment to bring cleaner air sooner to the citizens of South Carolina is shared by our local leaders and is demonstrated by forty-five of South Carolina's forty-six counties which have joined us in a state-wide ozone early action initiative to attain compliance with the 8-hour standard no later than December 2007.

While EPA may be concerned about interstate designation issues in the Aiken-Augusta and the Charlotte-Rock Hill areas, EPA should delineate any South Carolina areas independently from any adjacent state's areas. This will facilitate any area of ozone non-attainment being re-designated as attainment as expeditiously as possible. The Department continues to be committed to working with adjacent states to assure mutual attainment of national air quality standards. An example of our commitment is the March 14, 2003 Memorandum of Understanding between DHEC and North Carolina's Department of Environment and Natural Resources which addresses mutual air quality concerns and cooperative actions.

I hope the attached supporting information is sufficient to allow your concurrence with our recommendations. However, should you have any questions or concerns or should your staff need additional information regarding this matter, please contact me at (803) 896-8940 or Jim Joy, Chief of the Bureau of Air Quality at (803) 898-4123.

Sincerely,

R. Lewis Shaw

R. Lewis Shaw, P.E., Deputy Commissioner
Environmental Quality Control

Cc Governor Mark Sanford
Earl Hunter, SCDHEC Commissioner

Boundary Recommendations for the 8-Hour Ozone Standard in South Carolina

Introduction

Section I. 2003 Area Designation Recommendations

In response to the United States Environmental Protection Agency's (EPA) letter of March 19, 2003, requesting updated recommendations for 8-hour ozone National Ambient Air Quality Standard (air quality standard) designations and in accordance with the requirements of Section 107(d) of the Clean Air Act (CAA), the South Carolina Department of Health and Environmental Control (Department), as designee of the Governor of the State of South Carolina, submits the following recommendations. This submittal is made on the basis of air quality data, planning and control considerations, and other air quality-related concerns. These recommendations also take into consideration comments received at the public meeting, via the web page developed for this purpose, and in various other forums.

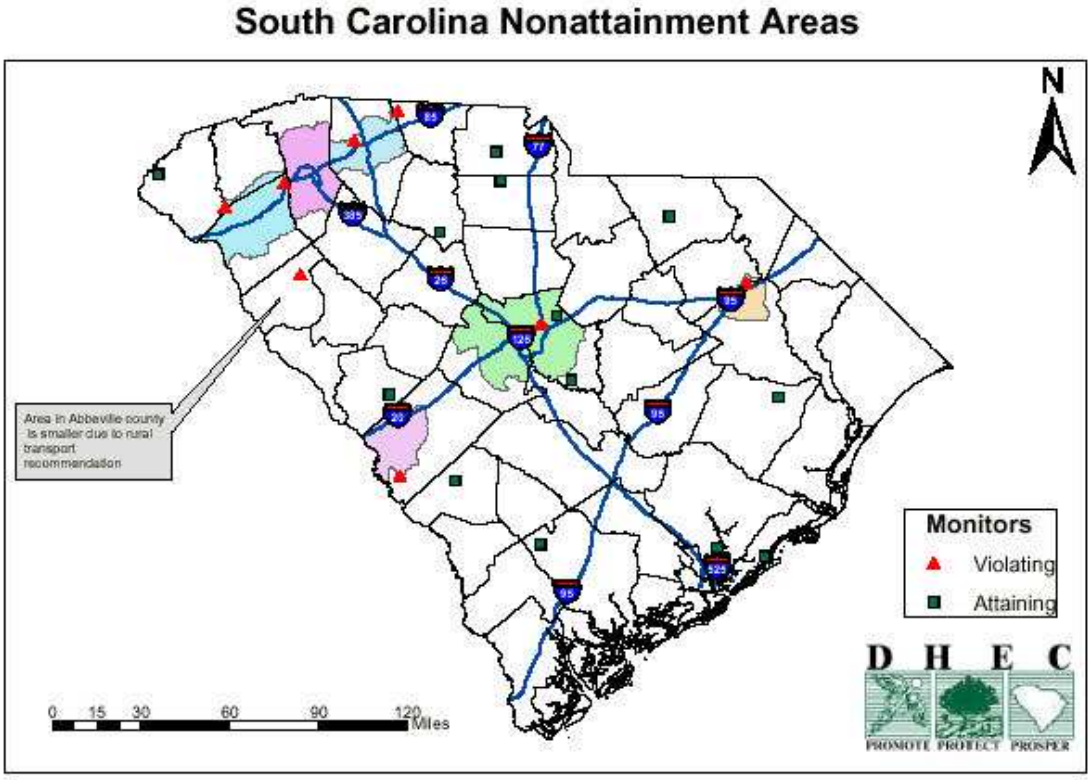
Table 1
South Carolina Recommended Area Designations
Ozone (8-hr Standard)

Area, or portion thereof	Designation Type	Classification Type*
Due West Monitoring Site	Nonattainment	
Aiken	Nonattainment	
Anderson	Nonattainment	
Columbia	Nonattainment	
Florence	Nonattainment	
Greenville	Nonattainment	
Spartanburg	Nonattainment	
Remainder of State	Attainment / Unclassifiable	

** Classification type cannot be determined because the federal 8-hour ozone implementation rule has not been finalized. The Department respectfully requests that EPA not finalize designations until the implementation rule has been finalized. States should be provided the opportunity to fully understand what implementation of the 8-hour ozone standard means to a given area and to update these recommendations accordingly.*

Additional data to support the recommendations found in Table 1 are provided in the documents evaluating each recommended nonattainment area boundary. The criteria and data provided to justify the Department's recommendations are specific to each individual area and are consistent with the guidance provided by EPA. Further, the supplementary information provided for each area substantiates how these recommendations are consistent with the definition of nonattainment in section 107(d)(1) of the CAA and why these recommended nonattainment areas are appropriate. These separate and distinct boundaries will promote greater efficiency in the administration of control strategies and facilitate implementation of the various State plans developed to ensure attainment and maintenance of the air quality standards. If additional control measures are required to attain the 8-hour ozone standard, the Department has the statutory authority under S. C. Code sections 48-1-20 and 48-1-50(23) to promulgate and implement regulations and to require more stringent controls on industrial and mobile sources to realize appropriate

emissions reductions outside of any nonattainment area.



These separate and distinct boundaries will encompass the urbanized portions of four of the eight SC Metropolitan Statistical Areas (MSA) (based upon 1990 Census) and portions of eleven counties and will allow the State better coordination of emissions controls within the jurisdictional boundaries of the various areas. Further, section 182(h) of the CAA states that EPA may treat an ozone nonattainment area as a rural transport area if EPA finds that sources of volatile organic compounds (VOC) and oxides of nitrogen (NO_x) emissions within the area do not make a significant contribution to the ozone concentrations measured in the area or in other areas. Detailed discussion concerning rural transport will follow in the Due West nonattainment boundary section.

Section II. Background and General Requirements

On April 30, 1971, EPA promulgated air quality standards for photochemical oxidants under section 109 of the CAA (36 FR 8186). Identical primary and secondary air quality standards were set at an hourly average of 0.08 parts per million (ppm) total photochemical oxidants not to be exceeded more than one hour per year. By law, EPA is required to review pollutant criteria every five years, so as to integrate new health developments into the regulatory process. A reevaluation of the human health studies prompted EPA into altering the photochemical oxidants air quality standard and establishing identical primary and secondary ozone (O_3) air quality standard of 0.12 ppm in 1979 (43 FR 16962). The 1979 air quality standard defined attainment of the standards as occurring when the expected number of days per calendar year with maximum hourly average concentrations greater than 0.12 ppm is equal to or less than one. A violation of this standard would occur if there were four or more exceedances of the standard in a three-

year period. On July 18, 1997 (62 FR 38856), based on its review of the available scientific evidence linking exposures to ambient ozone to adverse health and welfare effects at levels allowed by the 1-hour standard, EPA again promulgated revisions to the air quality standard for ozone. EPA revised the standards to establish the more stringent 8-hour standard at a level of 0.08 ppm based on the 3-year average of the annual fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area. The 1-hour secondary standard was also replaced by an 8-hour secondary standard identical to the new primary standard.

Promulgation of these new ozone standards in 1997 triggered the requirement under section 107 of the CAA and section 6103 of the Transportation Equity Act for the 21st Century (TEA-21) for EPA to designate areas as attainment/unclassifiable or nonattainment for the revised air quality standard. The process for designations provides each state an opportunity to recommend area designations including appropriate boundaries to EPA. The Department is taking this opportunity to submit to EPA this updated list of all areas (or portions thereof) in the State, designating as:

1. Nonattainment, any area that does not meet (or contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
2. Attainment, any area (other than an area identified in clause (1) that meets the national primary or secondary ambient air quality standard for the pollutant, or
3. Unclassifiable, any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard.

On July 14, 2000, the Governor of South Carolina, through the Department, in accordance with the requirements of section 107 of the CAA and as requested by EPA, submitted initial boundary recommendations for the 8-hour ozone standard based upon 1997 through 1999 monitored ozone data. The Department recommended that the jurisdictional boundaries of seven Metropolitan Planning Organizations (MPO) be designated nonattainment areas. Upon receipt of the Department's recommendations, EPA proposed modifications, recommending that whole counties be designated nonattainment, and requested more information and further documentation to adequately support the Department's partial county recommendations.

On November 14, 2002, EPA requested that the Department submit updated, revised, or new designation recommendations and supporting documentation based on the 2000 through 2002 quality assured air monitoring data. The November 14, 2002, memorandum was revised on February 27, 2003, (transmitted to the states on March 19, 2003) extending the deadline for submittal of the boundary recommendations from April 15, 2003, to July 15, 2003. This submittal fulfills the request for boundary recommendations by July 15, 2003.

Section 107 of the CAA allows the Governor, in consultation with State and local air pollution control agencies, to undertake a study to evaluate monitoring data and recommend nonattainment area boundaries. Whenever a Governor finds and demonstrates to the satisfaction of EPA, and EPA concurs in such finding, that with respect to a portion of EPA's recommended modifications, in this case entire counties, that sources in the portion do not contribute significantly to violation of the national ambient air quality standard, EPA shall approve the Governor's request to exclude such portion from the nonattainment area. In making such finding, the Governor and EPA shall consider how each of the following factors affect the drawing of nonattainment area boundaries and how the resulting recommendation is consistent with the definition of nonattainment in section 107(d)(1) of the CAA:

A. Emissions and air quality in adjacent areas (including adjacent Consolidated MSA or MSA)
B. Population density and degree of urbanization including commercial development (significant difference from surrounding areas)

C. Monitoring data representing ozone concentrations in local areas and larger areas (urban or regional scale)
D. Location of emission sources (emission sources and nearby receptors should generally be included in the same nonattainment area)
E. Traffic and commuting patterns
F. Expected growth (including extent, pattern and rate of growth)
G. Meteorology (weather/transport patterns)
H. Geography/topography (mountain ranges or other air basin boundaries)
I. Jurisdictional boundaries (e.g., counties, air districts, existing 1-hour nonattainment areas, Reservations, etc.)
J. Level of control of emission sources
K. Regional emission reductions (e.g., NO_x SIP Call or other enforceable regional strategies)

In accordance with EPA's March 28, 2000, *Boundary Guidance on Air Quality Designations for the 8-Hour Ozone National Ambient Air Quality Standards*, the Department will address each of the seven recommended nonattainment area boundaries in separate documents and demonstrate how the resulting recommendations are consistent with the definition of nonattainment in section 107(d)(1) of the CAA. Each nonattainment area boundary recommendation will be divided into Sections A through K, in correlation with the eleven factors listed above, and will address how these factors affect the drawing of nonattainment area boundaries. Sections G, H, I, J, and K contain factors common to all areas, they are included in Section V of this Introduction.

Section III. State of South Carolina 2000 - 2002 Design Values

Table 2 lists all of the ambient ozone monitoring sites located in South Carolina and their 2000 through 2002 annual fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor and reported in parts per million (ppm). For the primary and secondary ozone standards, the 3-year average annual fourth-highest daily maximum 8-hour concentration is also the design value for the site. The third decimal place of the computed value is rounded, with values equal to or greater than 5 rounding up. Thus, a computed 3-year average ozone concentration of 0.085 ppm is the smallest value that is greater than 0.08 ppm. These calculated design values were utilized in formulating the Department's current designation recommendations. The location, scale, and objective of each monitoring site will be discussed in more detail in each of the Department's recommended area designations and associated nonattainment area boundaries.

Table 2
State of South Carolina 2000 - 2002 Design Values

County	Site ID	Site Name	4th Maximum 8-Hr. (ppm)			Design Value (ppm)
			2000	2001	2002	
Abbeville	45-001-0001	Due West	0.085	0.082	0.088	**0.085**
Aiken	45-003-0003	Jackson Middle School	0.093	0.081	0.092	**0.088**
Aiken	45-003-0004	Wagener DOT	0.075	0.079	0.089	0.081
Anderson	45-007-0003	Powdersville	0.084	0.088	0.093	**0.088**
Barnwell	45-011-0001	Barnwell CMS	0.090	0.074	0.086	0.083
Berkeley	45-015-0002	Bushy Park Pump	0.080	0.071	0.074	0.075
Charleston	45-019-0042	U S Army Reserve	0.082	0.068	0.074	0.074
Charleston	45-019-0046	Cape Romain Wildlife Refuge	0.076	0.068	0.074	0.072

Table 2 State of South Carolina 2000 - 2002 Design Values						
County	Site ID	Site Name	4th Maximum 8-Hr. (ppm)			Design Value (ppm)
			2000	2001	2002	
Cherokee	45-021-0002	Cowpens National Battle Ground	0.088	0.080	0.093	**0.087**
Chester	45-023-0002	Chester Airport	0.078	0.083	0.093	0.084
Colleton	45-029-0002	Ashton	0.080	0.076	0.085	0.080
Darlington	45-031-0003	Pee Dee Exp. Station	0.087	0.081	0.090	**0.086**
Edgefield	45-037-0001	Trenton	0.079	0.077	0.094	0.083
Oconee	45-073-0001	Round Mt. Fire Tower (Long Creek)	0.082	0.078	0.094	0.084
Pickens	45-077-0002	Clemson CMS	0.081	0.088	0.088	**0.085**
Richland*	45-079-0007	Parklane - State Park Health Ctr	0.096	0.082	0.084	**0.087**
Richland*	45-079-0021	Congaree Bluff	0.073	0.076	0.082	0.077
Spartanburg	45-083-0009	North Spartanburg Fire Station	0.089	0.090	0.093	**0.090**
Union	45-087-0001	Delta	0.079	0.079	0.085	0.081
Williamsburg	45-089-0001	Indiantown	0.077	0.067	0.077	0.073
York	45-091-0006	York CMS	0.076	0.080	0.096	0.084

**An additional monitor in Richland County is not listed since it was relocated within the county in 2002 and does not have three years of data from the same location.*

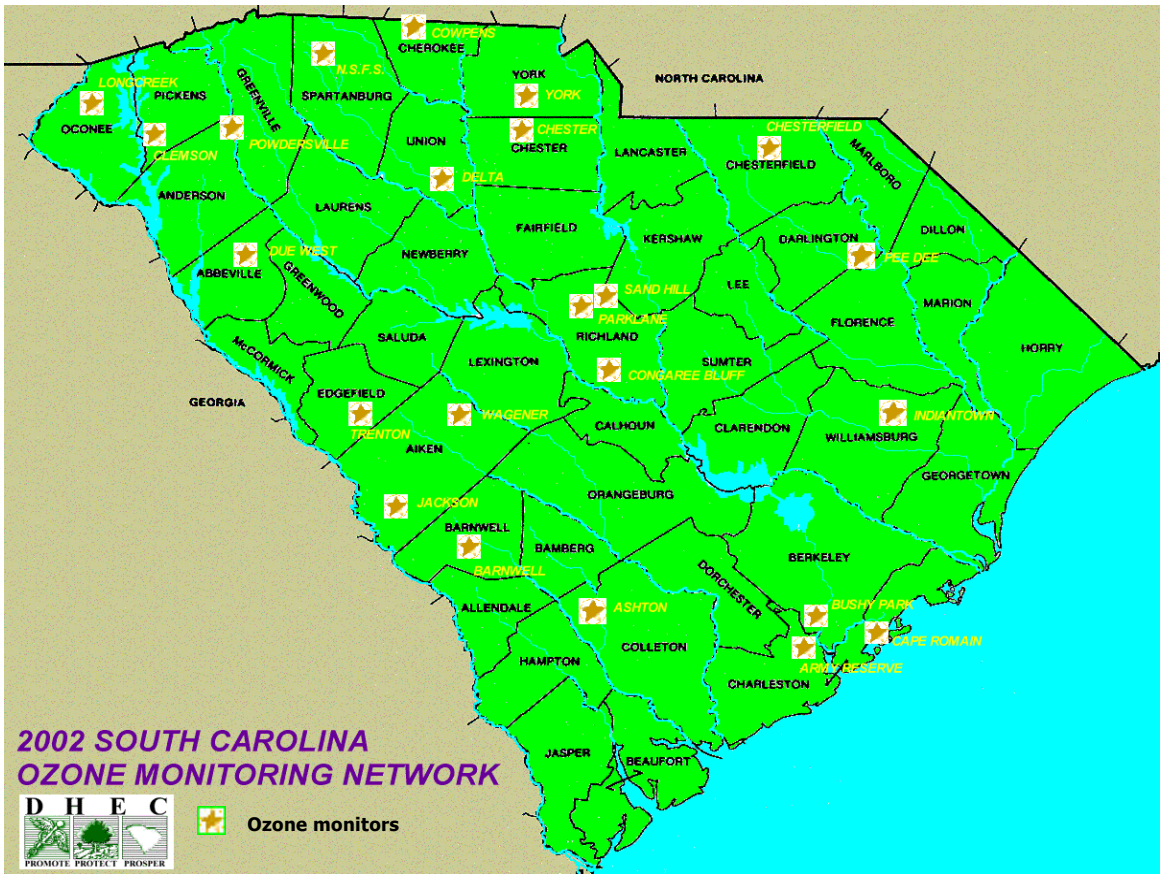
The Department respectfully requests to be allowed to update this recommendation with the latest quality assured air quality data before final designations are made.

Section IV. Ozone Monitoring Network

The Department has developed an extensive ozone monitoring network to establish general or background information in rural areas, to determine the effects of NO_x and/or VOC emissions from specific sources, to monitor concentrations in suburban and urban areas, and to ascertain interstate and intrastate transport. In 2002 there were twenty-one (21) ozone monitors, strategically located throughout the State, with at least three years of quality assured data. These monitors were located in accordance with EPA monitor citing guidance. (See Figure 1).

Aiken County, Charleston County, and Richland County have multiple ozone monitoring sites with at least three years of quality assured data. In Charleston County both monitors indicate attainment of the ozone standards. In both Aiken and Richland Counties, one monitor indicates attainment of the standards while the second monitor indicates design values above the standards. In light of this fact, the Department does not regard county lines as the most suitable boundary for nonattainment areas.

Figure 1: 2002 SC Ozone Monitoring Network



Section V. Factors Common to All Areas

The meteorology (weather/transport patterns), geography/topography (mountain ranges or other air basin boundaries), jurisdictional boundaries, emission control strategies, and regional emission reductions (e.g., NO_x SIP Call or other enforceable regional strategies) contain factors common to all seven of the recommended nonattainment area boundaries. These factors will be addressed in this section of the document and labeled as:

G. Meteorology (weather/transport patterns),
H. Geography/topography (mountain ranges or other air basin boundaries),
I. Jurisdictional boundaries (e.g., counties, air districts, existing 1-hour nonattainment areas, Reservations, etc.)
J. Level of control of emission sources,
K. Regional emission reductions (e.g., NO_x SIP Call or other enforceable regional strategies).

These headings correspond with the factors listed in Section II and will help eliminate duplication in each of the supporting documents for the seven recommended nonattainment areas.

G. Climatology / Meteorology

The overall climatology of an area is paramount to the formation and mass movement of secondary pollutants such as ozone throughout the lowest layers of the troposphere. As a result, though the overall emission volume may remain constant across a given monitoring site, the ambient concentration of ozone at that site may change according to even the most subtle shift in the overall weather pattern. This is indeed the rule across the whole of the State of South Carolina.

The "Ozone Season" in South Carolina runs from April 1 through October 31 of each year, roughly parallel to that experienced in most areas of the Southeastern United States. The main climatological feature influencing the overall weather pattern during this period is a large ridge of stable, sinking air known as the "Bermuda High." This semi-permanent feature is normally situated just off the South Atlantic Seaboard, with its core of anticyclonic circulation centered due east of South Carolina. The average strength and position of this ridge provides a steady southwesterly flow of moist, tropical air from the Gulf of Mexico that, under normal circumstances, keeps the lower atmosphere well mixed and quite humid. These are two main factors that normally provide conditions non-conducive to the formation of elevated levels of ozone.

When the Bermuda High becomes anomalously shifted from its normal position, conditions conducive to the formation of elevated ozone may occur in many areas of South Carolina. This is mainly the case in the months during the Ozone Season immediately following an El Nino winter. During this period, which only occurs once every 4 or 5 years, the Bermuda High flattens out and builds southwestward well into the Gulf of Mexico. This shifts the moist flow out of the Gulf to the west, well away from the South Atlantic Coast. With the core of the ridge virtually parked on top of South Carolina, air stagnation can occur.

The three main underlying causes of air stagnation under this shifted Bermuda High are lack of horizontal wind flow, a stable boundary layer, and, most importantly, reduced availability of ambient moisture. In such a situation, the lower atmosphere dries out considerably, with less cloud coverage available to absorb the incoming solar radiation (UV) needed for efficient conversion of ozone from its primary component pollutants. In addition, there is much less titration and/or deposition of the pollutant back to its basal components after nightfall, when the UV source is removed. Once ozone formation perpetuates, the stable air mass traps it, pooling it closer to the ground. With little horizontal wind flow available to mix the atmosphere, the pollutant takes much longer to disperse throughout the boundary layer.

Air stagnation under an anomalous Bermuda High occurs far too sparingly to account for every elevated ozone event in South Carolina. Frequently, elevated ozone readings have been monitored when conditions were not altogether favorable for its production in that particular area. It is in these cases where transport of ozone from upwind sources comes into play.

H. Geography / Topography

The topography of South Carolina is divided into two distinct areas, commonly known as the Piedmont and the Coastal Plain. The line of demarcation runs from the eastern boundary of Aiken County through central Chesterfield County to the North Carolina border. Along this line elevations begin at about 300 feet and increase in steps to over 1,000 feet in the extreme northwestern counties, culminating in isolated peaks of 2,000 to over 3,500 feet above mean sea level. East of the line, there are evidences of outcroppings from the lower Appalachians in a ridge of low hills and rather broken country between the

Congaree River and the north fork of the Edisto River, and also in a rather hilly and rolling region in the upper Lynches River drainage basin between the Catawba-Wateree and the Great Pee Dee Rivers. In about one-third of the coastal plain (or what is commonly known as the upper coastal plain), the elevations decrease rather abruptly from 300 to 100 feet, thence to the coast. The major part of the coastal area is not over 60 feet above mean sea level. In this region of lower levels, to the eastward and southward, the great swamp systems of the State predominate.

The slope of the land from the mountains seaward is toward the southeast, and all of South Carolina's streams naturally follow that general direction to the Atlantic Ocean. The South Piedmont section of the State is on the eastern slope of the Appalachian Mountains with the main ridge of the mountains about 30 miles west. To some extent these mountains act as a barrier for the wind and tend to protect the area from the full force of the cold air masses during the winter months. The relatively flat areas of the Central Plains and the coastal region allow free air movement and are conducive to effective dispersion of pollutants.

I. Jurisdictional boundaries

Metropolitan Planning Organizations

Metropolitan areas are the nation's economic engines. Almost three-quarters of US citizens live and work in these urbanized regions. Metropolitan Planning Organizations (MPO) are designated for each urbanized area with a population exceeding 50,000 as measured in the latest decennial census. There may be more than one MPO in each MSA. Metropolitan Planning Organizations are required to develop a unified planning work program. The unified planning work program describes planning activities, discusses planning priorities facing the area, and describes all metropolitan transportation and transportation related air quality planning activities. The quality of each metropolitan transportation infrastructure - highways, bridges, airports, transit systems, rails, and ports - is a primary factor in American economic competitiveness.[1]

The Intermodal Surface Transportation Efficiency Act (ISTEA) was designed to put in place a framework to guide the operations, management and investment in a surface transportation system that is largely in place. The legislation strengthened the metropolitan planning process, enhanced the role of local elected officials, required stakeholder involvement, and encouraged movement toward integrated, modally mixed strategies for greater system efficiency, mobility and access. Highway funding levels since 1992 have provided for a state's dual goals of relieving congestion and reducing emissions. The Congestion Mitigation and Air Quality Improvement program, was established under the Transportation Equity Act for the 21st Century (TEA-21), a law Congress expects to reauthorize this session. As a condition for spending Federal highway or transit funds in urbanized areas, the Federal highway and transit statutes require the designation of MPOs, which have responsibility for planning, programming, and coordination of Federal highway and transit investments. The various MPOs are responsible for predicting future growth and planning for development in their respective jurisdictional areas. Transportation Enhancement funds are allocated through these organizations. Proposed projects are evaluated and approved by the members of the MPO (primarily elected officials) and funded in the area's Transportation Improvement Program (TIP). Additionally, much of the detailed information needed for transportation planning and conformity determinations are based on data from within the MPO boundaries.

The area covered by each MPO includes the current urbanized areas and all contiguous areas likely to

[1] Association of Metropolitan Planning Organizations

be urbanized within 20 years.[2] Geographical boundaries for the MPO are established by the MPO itself in agreement with the Governor of each state. These boundaries are defined by a distinct geographical area and are updated and reviewed every five years. States and MPOs annually certify to the Federal Highway Administration that their metropolitan transportation planning process is addressing the major issues facing their area and is being conducted in accordance with applicable Federal requirements.

Based on air quality monitoring data from 2000 – 2002, areas that represent several of the existing South Carolina MPO jurisdictional boundaries are being recommended for designation as nonattainment areas for the new 8-hour ozone standard. Nonattainment area boundaries based on the jurisdictional boundaries of the MPOs will promote local solutions to local problems and facilitate development and implementation of more specific SIP elements to help each nonattainment area attain the air quality standard as expeditiously as possible.

Metropolitan Statistical Areas

As a part of the review of the data and information, the Department considered county lines and/or Metropolitan Statistical Areas (MSA) as the boundaries for recommended nonattainment area designations but has determined that such nonattainment area boundaries would lead to inefficiency in the coordination of State Implementation Plan (SIP) development and implementation of control measures. MSA boundaries are based on city and county populations in urbanized areas, with "outlying counties" being included in the MSA contingent upon their commuting patterns into the central counties. Under the standards, the county (or counties) that contains the largest city becomes the "central county" (counties), along with any adjacent counties that have at least 50 percent of their populations in the urbanized area surrounding the largest city. The MSA is named according to the populations of the largest central cities.

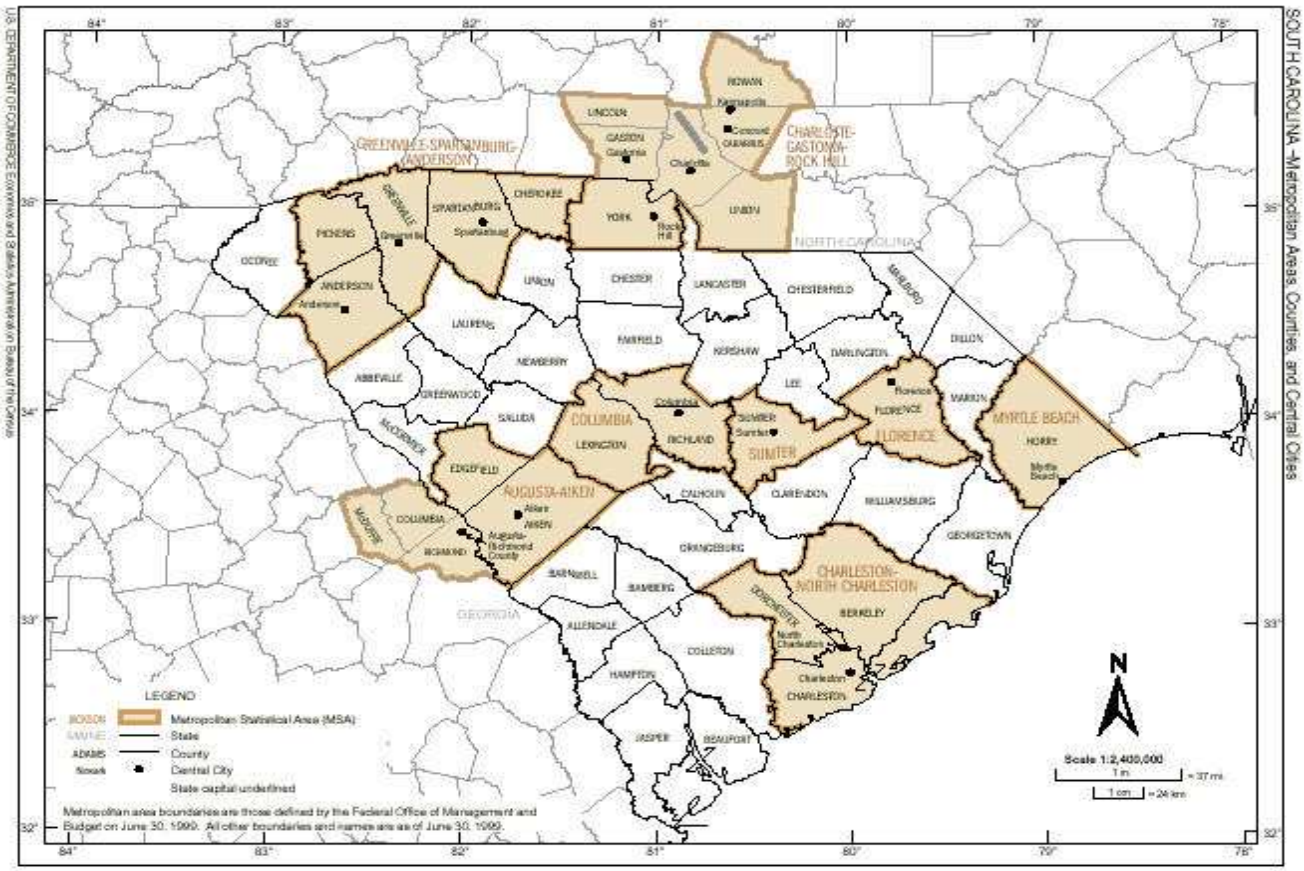
Figure 2 shows the sixteen South Carolina counties that are incorporated in eight separate MSAs. In South Carolina, two MSA have multiple MPOs located within its boundaries, these MSAs cross State lines. The York MPO is located in the "Charlotte - Gastonia - Rock Hill, NC-SC MSA" along with the various North Carolina MPOs. The Aiken MPO is in the "Augusta - Aiken, GA-SC MSA." The "Greenville - Spartanburg - Anderson, SC MSA" incorporates the Anderson MPO, Greenville MPO, and Spartanburg MPO. The "Columbia, SC MSA" incorporates the Columbia MPO, and the "Florence, SC MSA" incorporates the Florence MPO. County lines and MSAs do not consider the jurisdictional boundaries of the various State and local governments and their MPO, whose jurisdictional boundaries may cross county lines.

Many of the counties in the individual MSAs have large areas designated as rural. Typically, these rural areas have very few, if any, stationary sources that make a significant contribution to the ozone concentrations measured in the area, or in other areas. In the Augusta - Aiken, GA-SC MSA, Edgefield County, an outlying county, and a large portion of Aiken County are primarily rural. Also, the Florence, SC MSA has significant land area designated as rural.

Furthermore, the Department does not consider MSA boundaries a reliable tool for the designation of nonattainment areas. The data from the twenty-one ozone monitoring sites indicate that several areas demonstrating attainment of the air quality standard would be declared nonattainment areas simply due to the fact that the county is incorporated within an MSA and not due to the air quality or emissions within the area.

[2] Travel Model Improvement Program

Figure 2 [3]
State of South Carolina
Metropolitan Statistical Areas for 1990



1. Augusta-Aiken, GA-SC MSA (SC - Aiken, Edgefield; GA - Richmond, Columbia, McDuffie Counties)
2. Greenville-Spartanburg-Anderson, SC MSA (Cherokee, Spartanburg, Greenville, Pickens, Anderson Counties)
3. Charleston-North Charleston, SC MSA (Berkeley, Charleston, Dorchester Counties)
4. Florence, SC MSA (Florence County)
5. Myrtle Beach, SC MSA (Horry County)
6. Columbia, SC MSA (Lexington and Richland Counties)
7. Sumter, SC MSA (Sumter County)
8. Charlotte-Gastonia-Rock Hill, NC-SC MSA (NC - Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan, Union; SC - York Counties)

[3] U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census

Office of Environmental Quality Control - Regional Offices

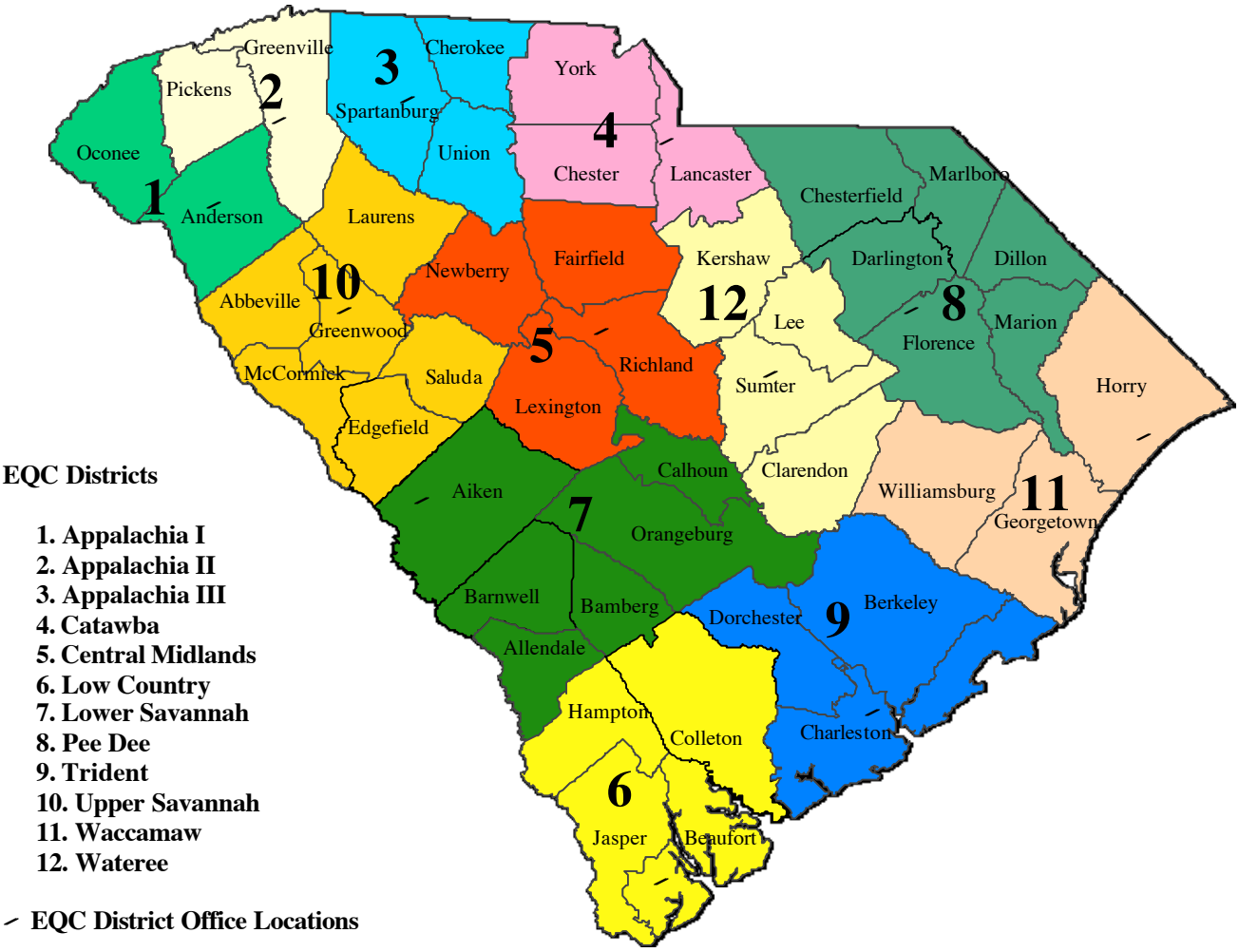
The Office of Environmental Quality Control (EQC) is the environmental regulatory arm of the South Carolina Department of Health and Environmental Control. EQC is responsible for the enforcement of Federal and State environmental laws and regulations, and for the issuing of permits, licenses and certifications for activities that may affect the environment. EQC is composed of four program areas, the Bureau of Air Quality, the Bureau of Land and Waste Management, the Bureau of Water, and the Bureau of Environmental Services.

The EQC Districts assist in implementation of the various State plans developed to ensure maintenance or attainment of the air quality standards. Twelve regional EQC offices, under the Bureau of Environmental Services, are located strategically across the State (Figure 3). Regional field staff provides direct support services to the EQC program areas and the general public. EQC District Services include emergency response activities, environmental monitoring for EQC bureau programs (Air Quality, Water, Land and Waste Management), facility inspections and evaluations, technical assistance, on-site presence at certain commercial hazardous waste facilities, shellfish regulation, and a summer pool inspection program. Particular emphasis is placed on the investigation and resolution of complaints associated with environmental and public health issues. Regional personnel also work closely with facility owners and operators to provide technical assistance and identify potential system problems before they present a risk to the environment or public health.

The EQC District Services air quality staff carries out a number of services designed to assist in protecting and maintaining the quality of the air in South Carolina. One of the primary responsibilities of the district air quality staff is to respond to all customer complaints involving excessive emissions, odors, and open burning. Another area of responsibility involves facility compliance. Facilities (sources) in each district are inspected each year for compliance with operation and maintenance and visible emissions requirements. Inspecting new sources for operating permits and ensuring that all sources have a current operating permit are also activities handled by the district air quality staff. District staff also maintains continuous air quality monitoring stations. Long term trends for particulate matter, ozone, SO_x and NO_x concentrations are monitored. Results from each of the district monitoring programs are combined, and used to provide a comprehensive picture of the air quality in South Carolina. Through compliance inspections, complaint response and monitoring activities, the district air quality staff helps to ensure that ambient air quality is maintained at the highest possible level.

Figure 3

South Carolina Department of Health and Environmental Control
Environmental Quality Control Regional Offices



EQC Districts

1. **Appalachia I**
2. **Appalachia II**
3. **Appalachia III**
4. **Catawba**
5. **Central Midlands**
6. **Low Country**
7. **Lower Savannah**
8. **Pee Dee**
9. **Trident**
10. **Upper Savannah**
11. **Waccamaw**
12. **Wateree**

EQC District Office Locations

J. Emission Control Strategies

The Department is primarily responsible for ensuring attainment and maintenance of the air quality standards established by EPA. Under section 110 of the CAA and related provisions, the Department must submit, for EPA approval, State implementation plans that provide for the attainment and maintenance of such standards through control programs directed to sources of the pollutants involved. The Department, in conjunction with EPA, also administers the prevention of significant deterioration (PSD) programs for these pollutants. In addition, Federal programs provide for nationwide reductions in emissions of these and other air pollutants under Title II of the CAA, which involves controls for automobile, truck, bus, motorcycle, off-road engine, and aircraft emissions. Since its inception in 1973, the Department has worked diligently to carry out the task of enforcing the CAA. The Department has also been delegated the authority to administer the new source performance standards under section 111 of the CAA and the national emission standards for hazardous air pollutants under section 112 of the CAA. During the past decade, the air quality in South Carolina has complied with all air quality standards, an accomplishment very few other States can claim.

Sources of NO_x and VOC emissions have been inventoried and are listed in tables in the individual recommended boundary areas. In addition, an inventory of facilities in rural areas and counties having potential NO_x and VOC emissions of more than 100 TPY has been prepared and will also be discussed in each section.

If additional control measures are required to attain the air quality standard, the Department has the statutory authority to promulgate and implement regulations and to require more stringent controls on industrial and mobile sources to realize appropriate emissions reductions outside of nonattainment areas.

Figure 4:

NOx Sources in South Carolina

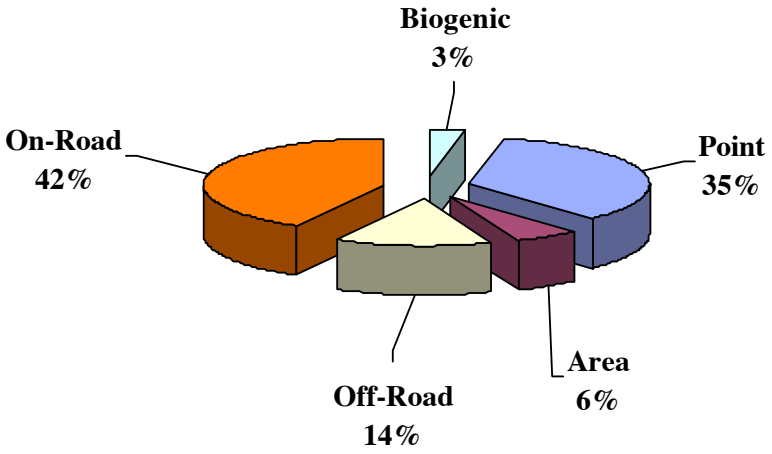
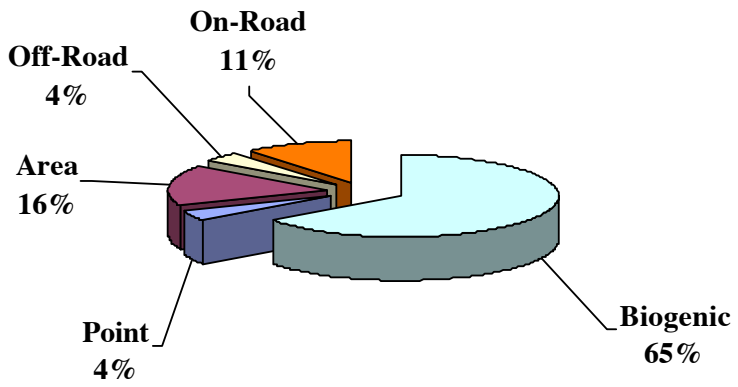


Figure 5:

VOC Sources in South Carolina



Figures 4 and 5 above illustrate the generic breakdown of the sources of NO_x and VOC in the State. On-road mobile sources of pollution include most forms of transportation such as automobiles, trucks, and airplanes. Off-road mobile sources include a wide variety of internal combustion engines not associated with highway vehicles. Examples of off-road mobile source would be construction equipment, lawn mowers, and boats. A point source of pollution refers to a source at a fixed point, such as a smokestack or storage tank, that emits air pollutants. An area source refers to a series of small sources that together can affect air quality in a region. Examples of area sources include gas stations and residential natural gas units. Biogenic emissions are emissions that originate from natural sources such as vegetation.

The Department recognizes the importance of controlling large concentrated emissions in urban areas but also recognizes the impact of ozone transport from areas outside of nonattainment boundaries. The latest air quality models and extensive emission inventories have been utilized to project the impact various parameters have in the urban and non-urban areas of South Carolina. The Department placed ozone monitors in rural or isolated areas throughout the State, as discussed in Section IV *Ozone Monitoring Network*; these strategically placed monitoring sites have been beneficial to the Department in ascertaining levels upwind of urban areas and analyzing ozone transport from areas inside and outside of the State.

Early Action Plan

The health of the citizens of South Carolina is a primary concern and the Department continues to seek proactive measures to meet our commitment to public health and environmental protection. South Carolina has been in attainment of the 1-hour ozone standard for the past decade, and will make every effort to attain the new 8-hour ozone air quality standard in all areas of the State as expeditiously as possible.

EPA has provided an option for areas currently meeting the 1-hour ozone standard, like those in South Carolina, to attain the 8-hour ozone standard by December 31, 2007, and obtain cleaner air sooner than Federally mandated. This option requires an expeditious time line for achieving emissions reductions

sooner than expected under the 8-hour ozone implementation rulemaking, while providing "fail-safe" provisions for the area to revert to the traditional SIP process if specific milestones are not met. Forty-five of South Carolina's forty-six counties have entered into Early Action Compacts. This action indicates that the local governments in the State of South Carolina are very concerned with air quality. Many of the counties entering into the Early Action Compacts do not have problems meeting the air quality standard and yet are still willing to plan and work with other areas to implement controls to ensure early attainment of the standards.

Interested stakeholders (i.e., local, State, and Federal government, citizens, public interest groups, and the business community) have been and will continue to be involved in the planning. By signing the Early Action Compact (EAC), EPA is agreeing to defer the effective date of the nonattainment designation for participating areas. However, areas that enter into an EAC but do not meet all of the terms of the EAC, including established milestones, will forfeit participation and be designated according to requirements within EPA's 8-hour ozone implementation rule. At a minimum, those requirements will include Transportation Conformity and nonattainment New Source Review.

Local areas are required to develop and implement a local early action plan that will promote the area's attainment by December 31, 2007, and maintenance of the standard until at least 2012. The local area must adopt local control strategies necessary to demonstrate attainment of the 8-hour ozone standard. The draft local plan is due to the Department by August 31, 2003.

The Department is required to develop and implement a State early action SIP demonstrating the participating area's attainment by December 31, 2007, and maintenance until at least 2012. The Department is currently evaluating the possibility of projecting out to 2017 to evaluate the air quality ten years after the "attainment" date. The SIP is due to EPA by December 31, 2004. The State must adopt local control strategies necessary to demonstrate attainment of the 8-hour ozone standard. Potential control strategies were identified to EPA on June 16, 2003. Final strategies are to be implemented no later than April 1, 2005. If the monitors in the nonattainment areas reflect attainment by December 31, 2007, the area will be designated as attainment and no additional requirements will be imposed (i.e., Transportation Conformity and nonattainment New Source Review).

Ozone Forecasting – Spare The Air

The South Carolina Spare the Air campaign was created by the Department's Bureau of Air Quality to educate citizens about air quality and its relationship to their health. This program provides information to the public about their air quality and warns them when levels of ozone are expected to be elevated so that they can better protect their health as well as allow them the opportunity to take actions to reduce emissions from their own activities. During the period of May 1 through September 30, the Bureau of Air Quality staff meteorologists produce daily ozone forecasts for the Upstate, Midlands, Pee Dee, and Central Savannah River area. The forecasts are provided utilizing the Air Quality Index (AQI) color scale to indicate levels of ozone in the air. Each category in the AQI is represented by a color and includes a cautionary statement for air quality conditions and the appropriate citizen response. Green represents the level being good, yellow for moderate conditions, orange for unhealthy to sensitive groups, and red for unhealthy to everyone.

Currently, the Department provides ozone forecasts to 26 of the 46 counties in the state (see Figure 6). These forecasts are aimed at 61.44% of the population of South Carolina. Due to limited resources, citizens in the Catawba area (Chester, Lancaster, and York counties) are referred to the North Carolina Department of Environment and Natural Resources (NC DENR) Charlotte area forecast. The Department recognizes that the Catawba area is not always similar to the Charlotte area forecast but additional resources are needed to provide a separate specific forecast.

The forecasts are broadcast on local television and radio stations during the daily weather forecasts, distributed by email or fax to over 300 businesses, industries, organizations, and individuals, and through an agency-created website (www.scdhec.net/baq/ozone). In the high traffic areas surrounding Columbia and Greenville, warnings are also posted on Department of Transportation's message boards along the major interstates. To promote the efforts, Governor Mark Sanford declared the first week of May, 2003, "Ozone Awareness Week." The Department also hosts official "Ozone Season Kick-Off Events" around the state to annually review the warning system and ozone reduction opportunities within South Carolina.

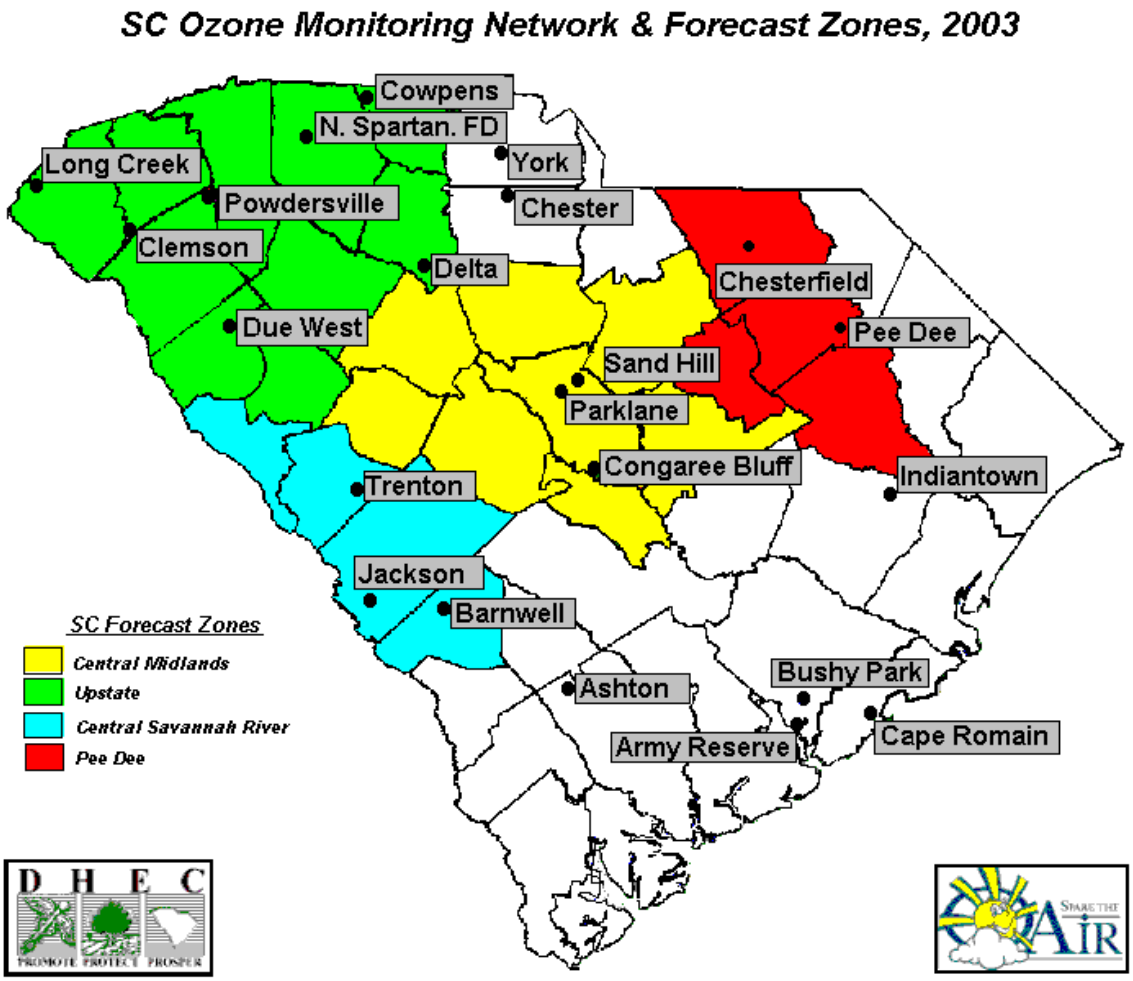


Figure 6: Ozone Forecasting Map

Ozone Education and Outreach

Additionally, other elements that fall under the "Spare the Air" initiative involve education and outreach to school-aged youth and persons with chronic respiratory conditions. In cooperation with the

Department's Bureau of Land and Waste Management, air quality training in the environmental curriculum titled "Action for a Cleaner Tomorrow" is provided to teachers across the state. To assist Department efforts in preventing future air pollution, the Bureau of Air Quality staff work with teachers and students through classroom resources such as prepared special lesson plans, presentations, and exhibits. Teachers are also encouraged to participate in the "Ozone Action Classroom" initiative to educate students on the dangers of ground-level ozone. Additional partners in the "Ozone Action Classroom" include the South Carolina Asthma Planning Alliance and the South Carolina Public Health Association. These groups are together, and individually, working to promote awareness of the link between ground-level ozone and air quality conditions that can trigger asthma attacks in persons with respiratory conditions.

State VOC LAER and RACT

The Department has the authority to require controls on any source that impacts the ambient air quality and will pursue any necessary additional controls on industry and transportation. South Carolina currently has two separate standards that regulate VOC emissions. South Carolina Regulation 61-62.5, Standard 5.1, Lowest Achievable Emission Rate (LAER) applies to all new, modified, or altered sources that would increase VOC emissions. LAER is applied to new construction or modifications when the net VOC emissions increase exceeds 100 tons per year. In addition, Regulation 61-62.5, Standard 5, is applicable to existing sources and outlines the Reasonably Available Control Technology (RACT) for VOC.

Permitting Program

In South Carolina anyone who plans to construct, add to, or alter a source of air contaminants must first submit an application for a permit. Once a construction permit is issued (or construction approved), the applicant may then begin construction after waiting the required time period. Once construction has been completed, the applicant then requests a permit to operate. An operating permit can take several different forms based upon the quantity of the pollutant(s) to be emitted. In South Carolina permits are not only required for "major" sources (sources with emissions exceeding federal thresholds); they are also required for facilities emitting smaller quantities as well. This comprehensive permitting process allows more control over sources of emissions within South Carolina.

Smoke Management Program

South Carolina has a Smoke Management Program (SMP) that is certified in accordance with EPA's *Interim Air Quality Policy on Wildland and Prescribed Fires (April 23, 1998).* The SMP involves coordination between the Department and the South Carolina Forestry Commission when addressing the impact of smoke on air quality by following guidelines that define smoke sensitive areas, amounts of vegetative debris that may be burned, and atmospheric conditions suitable for burning. The SMP can be used as a management tool for reducing ozone levels.

Government Fleets

In 1992 the U.S. Congress passed legislation to promote the use of alternative fuel vehicles (AFVs). This legislation was passed to improve air quality and reduce the nation's dependence on foreign oil. The new legislation became known as the Energy Policy Act (EPAct). This Act requires that all Federal and State fleets, as well as private sector fuel providers such as utilities, begin purchasing AFVs by 1994. Over a period of seven years, EPAct required a gradual phase-in of the purchase of AFVs. By 2001 EPAct required that 75% of Federal and State fleets be composed of AFVs. To date, South Carolina is in compliance with all EPAct requirements because of a cooperative effort within the State agencies and the

operation of a unified State plan. [4]

On October 18, 2001, former Governor Hodges signed an Executive Order in strong support of the use of alternative fuels. The Order states that whenever practical and economically feasible, State agencies use alternative fuels when operating alternative fuel vehicles (See attachment: Executive Order No. 2001-35).

Currently, the State operates 1,370 alternative fuel vehicles. The types of alternative fuel vehicles that the State operates include the Bi-fuel Ford F-150, Flex Fuel Taurus, Dodge Caravan, and Chevrolet S-10 Pick-up. By purchasing alternative fuel vehicles, the State is making a viable effort to reduce mobile source emissions in South Carolina. An ethanol pump has been installed in the Columbia area so that the flex fuel vehicles can provide the designed benefits. The State fleet also operates hybrid vehicles such as the Honda Insight and Toyota Prius.

K. Regional/National Emission Reductions

In addition to the initiatives and regulations that have been implemented to reduce the level of VOC emissions, standards to reduce NO_x levels have also been supported on the national level. These final and proposed new national standards will provide tremendous air quality benefits, particularly those that will address pollution from mobile sources. As noted in the pie chart for statewide NO_x emissions (Figure 4), mobile sources significantly contribute to air pollution in South Carolina. Strong national programs are the only way to adequately, economically, equitably, and reasonably address pollution from this source sector. The Department believes that the implementation of these regulations and reduction efforts will provide significant assistance towards statewide compliance with the air quality standards, especially in the areas where it is needed the most, our urbanized areas.

Standards For Tailpipe Emissions

Tier 2 is a tailpipe emissions rule that sets new and more stringent exhaust standards. This standard focuses on reducing emissions of ozone-forming gases (NO_x and PM) and applies to new passenger cars and light-duty trucks. The phase-in of the tailpipe emissions standards will begin in 2004 for passenger cars and light-duty trucks. This standard will be completely phased-in by 2007. The phase-in period for heavy-duty light trucks (HDLTs) and medium-duty passenger vehicles (MDPVs) begins in 2008. The standard will be completely phased-in for this group by 2009. Tier 2 standards will reduce new vehicle NO_x levels to an average of 0.07 grams/mile. [5]

Gasoline Sulfur Standards

The gasoline sulfur standards focus on reducing average sulfur level in gasoline to 30 ppm. Refiners and importers will be required to meet a corporate average gasoline standard of 120 ppm and a cap of 300 ppm beginning in 2004. This standard will then be reduced to 30 ppm with a cap of 80 ppm. Implementation of these standards will be the equivalent of taking 164 million cars off the road. [5]

Standards For Heavy-Duty Engines

The new standard for heavy-duty engines will also help to reduce mobile source emissions. This

[4] South Carolina State Budget and Control Board, General Services Division, Office of State Fleet Management
[5] U.S. EPA Office of Transportation and Air Quality

standard will become 100% effective for diesels beginning in the 2007 model year. Included in this standard is a reduction for NO_x and non-methane hydrocarbons. The reduction requires a reduction of 0.20 gram/brake horse-power-hour (g/bhp-hr). The phase-in period for this requirement will be between 2007 and 2010 for diesel engines.

Highway Diesel Fuel Sulfur Standards

On June 1, 2006, refiners will be required to start producing diesel for use in highway vehicles with a sulfur content of no more than 15 ppm. Highway diesel fuel sold as low sulfur fuel at the terminals will be required to meet the 15 ppm sulfur standard by July 15, 2006. Highway diesel fuel sold as low sulfur fuel by retail station and fleets must meet the 15 ppm sulfur standard by September 1, 2006. By mid 2006, this standard will reduce sulfur levels in diesel by 97 percent.

Non-Road Diesel Engines and Fuel

EPA recently proposed emissions reductions from off-road diesel engines and low-sulfur fuel requirements for these same engines. By 2014 emissions should be reduced by more than 90 percent and when fully phased in, NO_x emissions from this equipment would be reduced by 825,000 tons. Beginning in 2007, the sulfur content in the diesel fuel used in these off-road engines would be reduced from an uncontrolled 3,400 parts per million to 500 ppm in 2007 and then to 15 ppm in 2010. As non-road engines make up 5.21% of the NO_x inventory in South Carolina, emission reductions from this sector will be a tremendous benefit to our air quality.

NO_x SIP Call

The NO_x State Implementation Plan (SIP) Call is the common name given to a final rule that EPA published on October 27, 1998 (63 FR 57355). The rule requires South Carolina and numerous other states to reduce their summertime emissions of NO_x in order to reduce the interstate transport of ozone and its precursors.

To facilitate these reductions, the rule establishes a NO_x budget trading program in which each applicable state is given a summertime NO_x budget which they cannot exceed. The budget for each state assumes certain reductions on specific types of units. The units involved in the trading program are units that serve a generator with a nameplate capacity greater than 25 MWe, referred to as electrical generating units (EGUs); and large boilers that have a maximum design heat input greater than 250 mm Btu/hr, referred to as non-EGUs. The budget for EGUs is based upon 85 percent reductions from uncontrolled levels while the budget for the non-EGU category is based on 60 percent reductions from uncontrolled levels. The rule also calls for controls on cement kilns and large internal combustion engines, but these units are not part of the trading program.

South Carolina's NO_x budget for sources subject to the NO_x SIP Call was reduced from a baseline of 156,137 tons to 128,524 tons. This reflects a drop in overall, summertime NO_x emissions of 18 percent.

The rule allows the regulated community a great deal of flexibility. Rather than dictate the types and levels of controls, sources subject to the rule have the ability to determine where it is most cost effective to apply pollution controls. As a result, there is less certainty for states in terms of predicting where NO_x reductions may occur. So for instance, sources may choose to install pollution control equipment and sell their surplus NO_x allowance or they may choose not to install controls and simply buy the NO_x allowances they need. One significant constraint is that from May 1 to September 30 of each year, units subject to the requirements of the NO_x SIP Call must have an allowance of NO_x for every ton of NO_x that they emit.

Table 3
South Carolina's NO_x Budget for Sources Subject to the NO_x SIP Call

		NO_X BEFORE SIP CALL	NO_x ALLOCATION
FACILITY	**COUNTY**	**tons/ozone season**	**tons/ozone season**
Electric Generating Units (EGUs)			
CP&L - Robinson	Darlington	2,088	723
Duke - Lee Steam Plant	Anderson	1,482	705
Santee Cooper - Cross	Berkeley	5,017	2,847
Santee Cooper - Grainger	Horry	1,309	398
Santee Cooper - Hilton Head	Beaufort	68	12
Santee Cooper - Winyah	Georgetown	9,454	2,908
Santee Cooper - Jeffries	Berkeley	3,514	848
Santee Cooper - Myrtle Beach	Horry	64	8
SCE&G - Canadys	Colleton	1,230	978
SCE&G - Cope	Orangeburg	1,635	1,181
SCE&G - Hagood	Charleston	57	51
SCE&G - McMeekin	Lexington	1,594	704
SCE&G - Urquhart	Aiken	1,761	643
SCE&G - Wateree	Richland	4,320	1,674
SCE&G - Williams	Berkeley	5,010	1,714
Non-EGUs *			
Bowater	York	529	546
Voridian	Calhoun	589	594
Celanese Acetate	York	1,039	960
Dupont - May Plant	Kershaw	553	584
IP - Eastover	Richland	771	912
Sonoco - Hartsville	Darlington	418	458
Springs Ind. - Grace Plant	Lancaster	501	426
Stone Container	Florence	1,220	1,366
Cogen South	Charleston	560	748
Willamette	Marlboro	371	385

** As not all units in a non-EGU are subject to the NO_x SIP Call, ozone season emissions have been estimated for purposes of this table.*

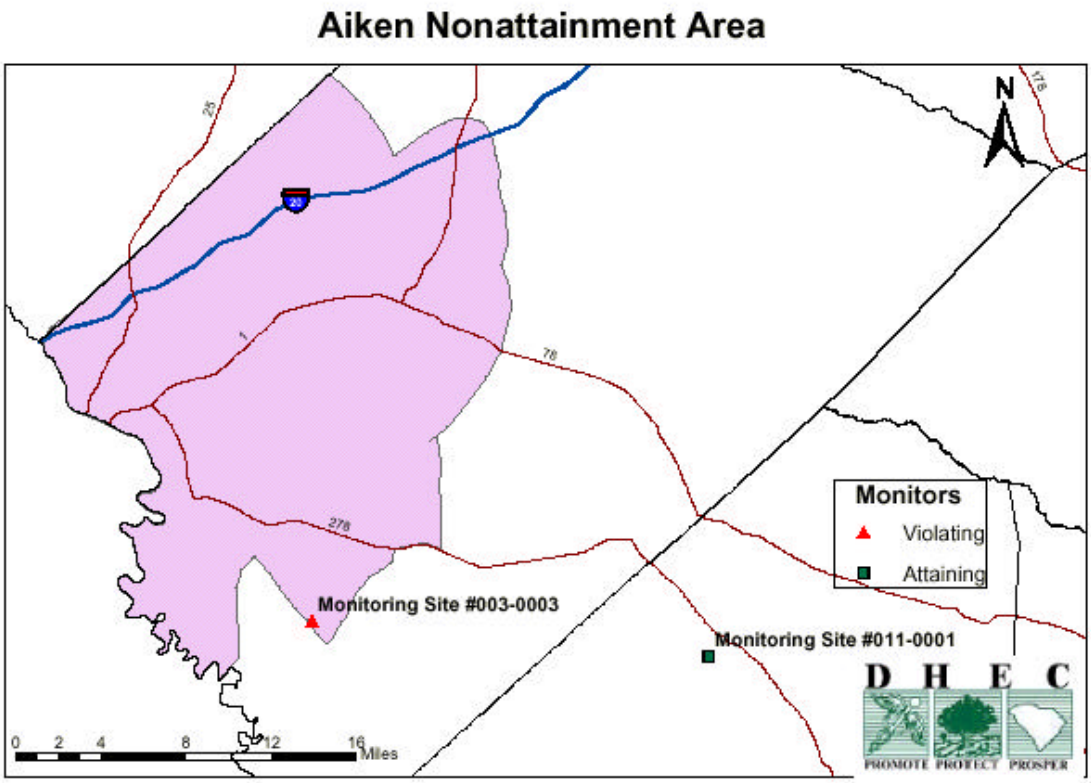


Figure 1: Aiken Nonattainment Area Map

The South Carolina Department of Health and Environmental Control (Department) recommends that the area encompassed by the boundaries of the Aiken Metropolitan Planning Organization (MPO) and the contiguous area encompassing the monitor site at Jackson Middle School, Aiken County be designated a nonattainment area for violating the 8-hour ozone National Ambient Air Quality Standard (air quality standard) based on 2000 through 2002 monitoring data. The recommended area will be referred to as the Aiken Nonattainment Area throughout the rest of this document.

The Department recommends designation of separate nonattainment areas to address the Augusta - Aiken, Georgia – South Carolina Metropolitan Statistical Area (MSA) and its adjacent counties. The designation of separate nonattainment areas would lead to greater efficiency in the development and implementation of control measures. Designation of the entire MSA and adjacent areas would lead to some neighboring areas having to implement control measures that may not provide any significant emission reductions to help ensure attainment and/or maintenance of the air quality standard in the MSA. The requirements of the State Implementation Plan (SIP) developed for each nonattainment area should be flexible enough to address each area's unique situation.

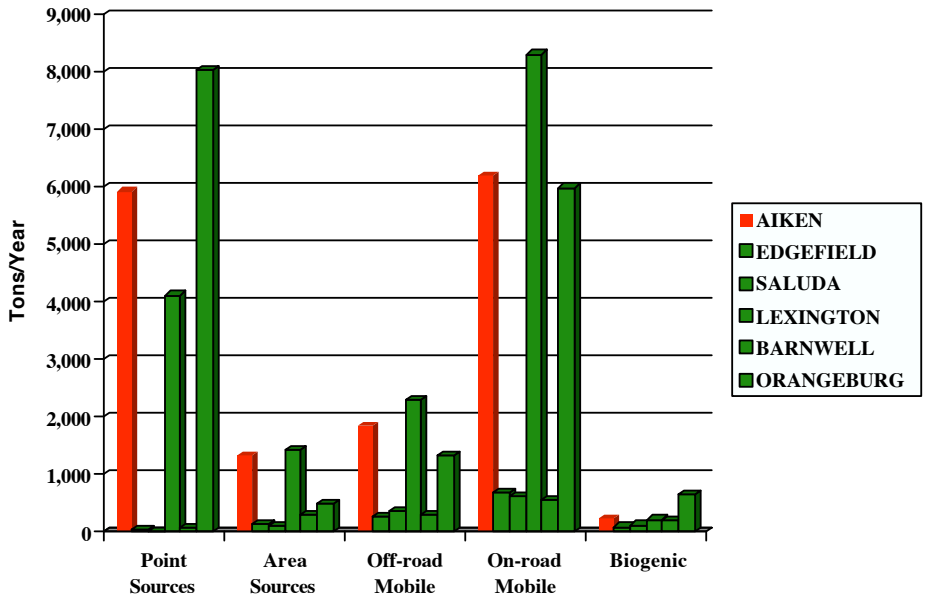
Aiken County is the fourth largest county in the state at 1,073 square miles. The population in the county in 2000 was 142,552 and about 81.3% of the population resides in the recommended boundary. There are 22 NO_x point sources in the county and 21 of these are in the recommended boundary, accounting for 95.5% of the point source NO_x emissions. The largest point source of NO_x in the proposed

boundary is subject to the NO_x SIP Call and has a 2004 ozone season NO_x budget of 643 tons. There are 27 VOC point sources in the county and 26 of these are in the recommended boundary, accounting for 98.1% of the point source VOC emissions. The proposed boundary accounts for 68.4% of the 2001 daily vehicle miles traveled and the 2025 projections estimate that 94.02% of the daily vehicle miles traveled will be within this boundary. There is currently one monitor in Aiken County exceeding the 8-hour ozone standard. However, between 2000 and 2002, the Department operated an ozone monitor in eastern Aiken County to assess conditions between Aiken and Columbia, South Carolina. This monitor indicated attainment of the ozone standard and thus supports the recommendation of the proposed boundary. Two additional monitors are located in the South Carolina counties bordering Aiken County, one to the northeast and one to the southeast. Both of these monitors indicate attainment with the 8-hour ozone standard.

The Department is submitting this document to provide detailed information pertaining to the factors which EPA suggested be addressed in support of any nonattainment area designation recommendations.

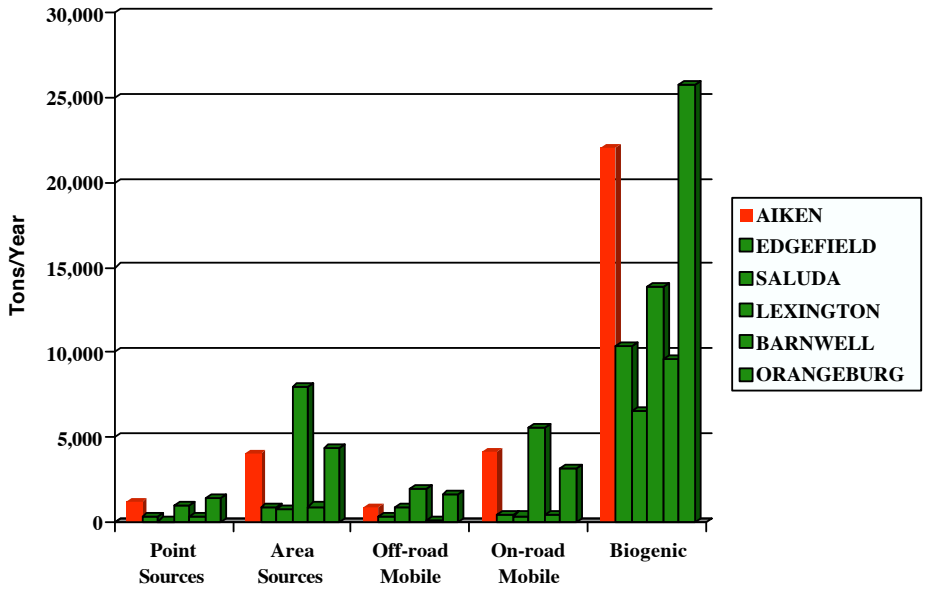
A. Emissions and Air Quality in Adjacent Areas (Including Adjacent MSAs)

Figure A-1: NOx Sources for Aiken and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

Figure A-2: VOC Sources for Aiken and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

To evaluate the emissions in Aiken County and the adjacent areas, South Carolina utilized the estimated annual 1999 oxides of nitrogen (NO_x) and volatile organic compounds (VOC) emissions. The types of NO_x and VOC emission sources that were evaluated include point, area, biogenic, and on-road and off-road mobile sources. Figures A-1 and A-2 show the percentage of emissions from each source category for Aiken and surrounding South Carolina Counties. Additional emissions inventory information is provided in Section D.

The Department had two ozone-monitoring sites in Aiken County with three years of data; one monitor indicated a violation of the standard while the second demonstrated attainment of the air quality standard. Aiken County is a part of the Augusta – Aiken, Georgia – South Carolina MSA. Air quality information is provided in Section C.

B. Population Density and Degree of Urbanization Including Commercial Development (Significant Difference from Surrounding Areas)

According to the US Census, urban is defined as all territory, population, and housing units in urbanized areas and urban clusters. An urbanized area is defined as a densely settled area that has a census population of at least 50,000, and an urban cluster is defined as a densely settled area that has a census population of 2,500 to 49,999. An urban area is a generic term that refers to both urbanized areas and urban clusters. Rural is defined as all territory, population, and housing units located outside of urbanized areas and urban clusters.

The Aiken Nonattainment Area contains the urbanized areas in Aiken County and the towns of Aiken, Jackson, and New Ellenton. Based on the population of the urbanized portion of Aiken County, the

populations of Jackson and New Ellenton and an assumed population outside of town boundaries, the population of the Aiken Nonattainment Area is estimated to be about 115,894, which is 81.3% of the county population. The land area of the recommended area is estimated to be about 434.9 square miles, based on the rural and urban populations densities for Aiken County. Using the estimated population and land area of the Aiken Nonattainment Area, the population density of the recommended area is calculated to be 266.5 persons per square mile, which is 2 times the county population density.

Table B-1 contains population data for both Aiken County and the recommended Aiken Nonattainment Area.

	Table B-1: Total Population, Land Area, and Urban/Rural Population, 2000	
	Aiken County	Recommended Area
Population[1]	142,552	115,894
Land Area (Square Miles) [1]	1073	434.9
Persons per Square Mile [1]	132.9	266.5
Urban Population [2]	86,786	Unknown at this time
% Urban Population[2]	60.9%	Unknown at this time
Rural Population [2]	55,766	Unknown at this time
% Rural Population [2]	39.1%	Unknown at this time
* The data for the recommended area is based on assumptions and is only estimates. The actual data may be greater than or less than the data provided.		

[1] Data provided by US Census:2000. Portions of the data for the recommended area were obtained from the SCDOT.
[2] Data provided by SC Office of Research and Statistics.

Figure B-1: Population Density, 2000
(Persons per Square Mile)

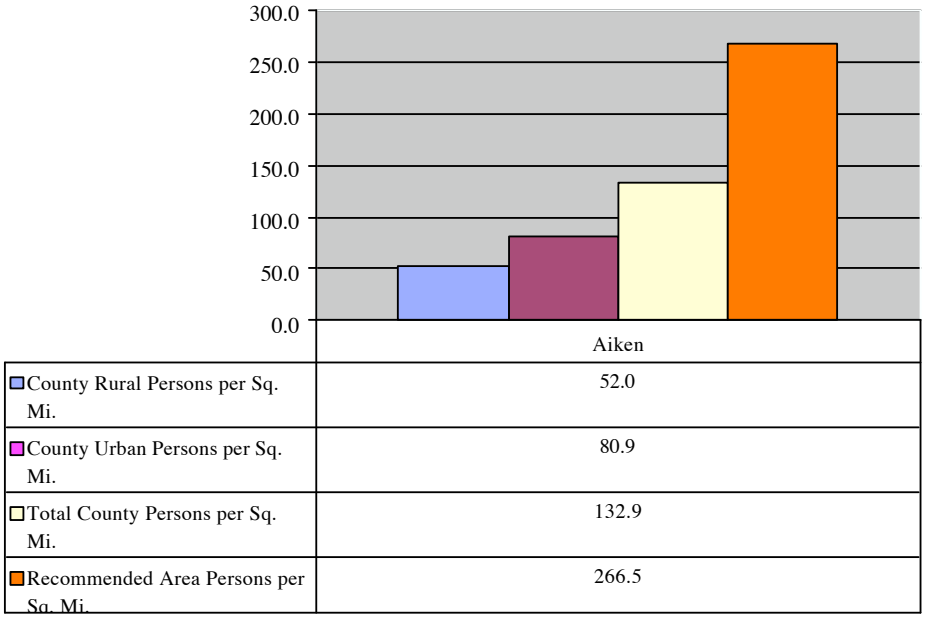


Figure B-2: Population Distribution
Relative to Recommended Area Boundaries, 2000

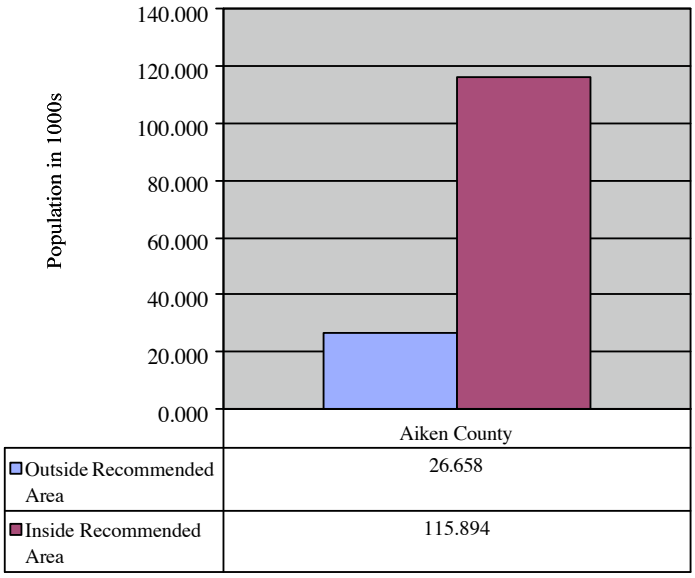
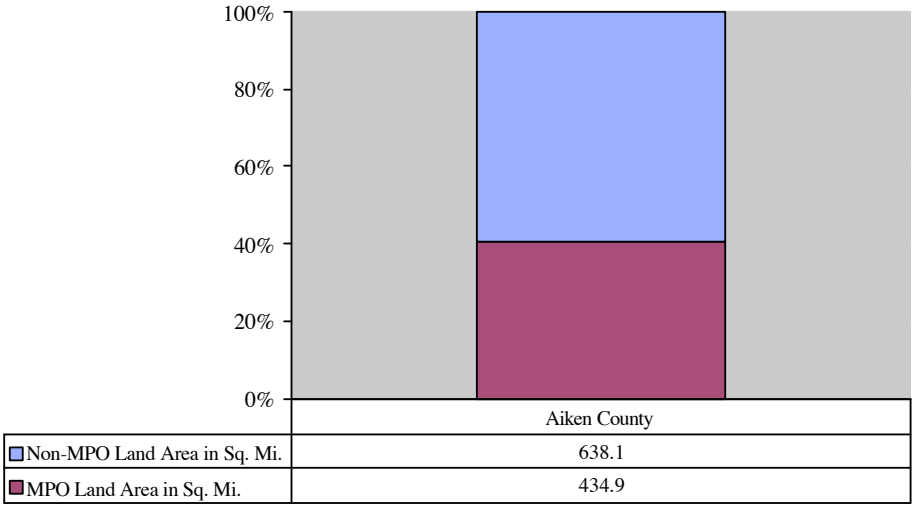


Figure B-3: Land Area Distribution According to Recommended Area Boundaries, 2000



Figures B-1, B-2, and B-3 show the population density distribution, land area distribution, and population distribution, respectively, for Aiken County relative to the Aiken Nonattainment Area.

According to the US Census, manufacturing is defined as the mechanical, physical, or chemical transformation of materials or substances into new products. The assembly of components into new products is also considered manufacturing, except when it is appropriately classified as construction. Establishments in the manufacturing sector are often described as plants, factories, or mills and typically use power-driven machines and materials-handling equipment. Also included in the manufacturing sector are some establishments that make products by hand, like custom tailors and the makers of custom draperies. While manufacturers typically do not sell to the public, some establishments like bakeries and candy stores that make products on the premises may be included. The retail trade sector comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.

The Aiken Nonattainment Area contains a fair portion of the economic development in Aiken County. Almost 44% of the manufacturing employees in Aiken County work inside the boundary, and 79 of the 82 manufacturing establishments in Aiken County, or 96.3%, are located inside the boundary. A total of 524 retail trade establishments are located in the county and employ 6,853 persons. It is reasonable to assume that the boundary contains a large portion of the retail business, particularly since the metropolitan area of Aiken County is in the boundary.

Tables B-2 and B-3 contain the manufacturing and retail trade data for Aiken County and the Aiken Nonattainment Area.

	Table B-2: Manufacturing Employees and Establishments in Aiken County, 2000[3]		
	In Recommended Area	In County Boundary	Percent in Recommended Area
Number of Employees	10,004	22,342	44.78%
Number of Establishments	79	82	96.34%

Table B-3: Retail Trade Patterns, 2000[4]		
	Number of Employees	Number of Establishments
Aiken County	6,853	524

Figure B-4:
Distribution of Manufacturing Employees, 2000

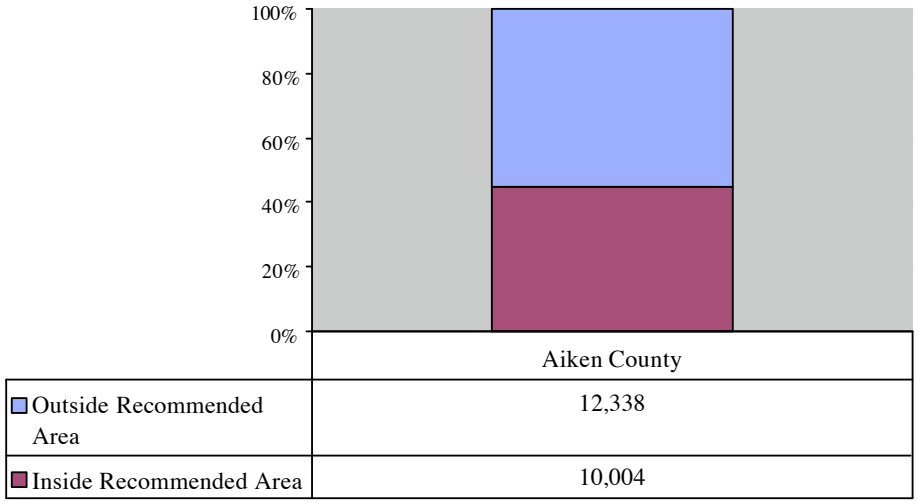


Figure B-4 shows the distribution of manufacturing employees relative to the recommended nonattainment boundaries.

C. Monitoring Data Representing Ozone Concentrations in Local Areas and Larger Areas (urban or regional scale)

The Aiken Nonattainment Area Map (Figure 1) shows the ozone monitoring stations in the Aiken

[3] Data from Bureau of Air Quality file entitled "SC Company File1.xls," based on 2001.
[4] Data provided by US Census: 2000.

Nonattainment Area. Aiken, Barnwell and Edgefield Counties have one ozone-monitoring station in each county. Aiken County did have two monitoring stations during the 2000-2002 time period. The Jackson Middle School (45-003-0003) site is located inside the portion of the Aiken Nonattainment Area boundary and is the only monitor violating the 8-hour ozone standard in that area. Established in 1985, this site is located on Highway 125, and the surrounding area is residential. It sits 91 meters above sea level. According to the South Carolina Department of Transportation (SCDOT), traffic count data for 1993, shows three thousand (3,000) vehicles per day access the road. The monitoring objective for this site is to measure ozone concentrations for source oriented emissions.

The Edgefield County (Trenton 45-037-0001) air monitoring station is located in a rural area. The site was established in 1980 and has continuously run since April of that year. This site is located off of US Highway 25 and is surrounded by agricultural land. It is seated approximately 177 meters above sea level. SCDOT traffic count data for 1991, shows one thousand (1,000) vehicles per day access the road. The monitoring objective for this site is to measure ozone concentrations for upwind background. The monitor indicates attainment of the 8-hour ozone standard.

The Barnwell County (Barnwell CMS 45-011-0001) air monitoring station is located in a rural area. The site was established in 1985 and has continuously run since November of that year. This site is located off of Road S-6-21 and SCDOT traffic count data for 1993, shows three hundred (300) vehicles per day access the road. The site is located in forest setting and is approximately 91 meters above sea level. The monitoring objective for this site is to measure ozone concentrations for source oriented emissions. The monitor indicates attainment of the 8-hour ozone standard.

The second ozone monitoring site in Aiken County (Wagener SCDOT 45-003-0004) was a short-term special study to show the gradient difference between Richland County and Aiken County. This site, located on Washington Road at the SCDOT building, was established in August, 2000, and operated until November, 2002. It was surrounded by agricultural land and sat approximately 138 meters above sea level. SCDOT traffic count data for 2000 shows one hundred (100) vehicles per day access the road. The monitoring objective for this site was to measure the ozone concentrations for general background. The monitor indicated attainment of the 8-hour ozone standard.

Table C-1 presents the 2000 through 2002 8-hour ozone monitoring data for Aiken, Barnwell, and Edgefield Counties. The design value is the annual fourth-highest daily maximum 8-hour ozone concentration, expressed in parts per million (ppm), averaged over three consecutive years. Since the 2002 ozone design value for the Jackson Middle School monitoring site is 0.088ppm, the site is marginally exceeding the 8-hour ozone standard.

Table C-1:
Aiken and Surrounding Area Ozone Monitoring Data

County	Site ID	Site Name	4th Maximum 8-Hour			Design Value
			2000	2001	2002	
Aiken	45-003-0003	Jackson Middle School	0.093	0.081	0.092	0.088
	45-003-0004	Wagener DOT	0.075	0.079	0.089	0.081
Barnwell	45-011-0001	Barnwell CMS	0.090	0.074	0.086	0.083
Edgefield	45-037-0001	Trenton	0.079	0.077	0.094	0.083

Table C-2 contains the previous three years daily maximum ozone concentration above 0.084 ppm. A

period indicates that no exceedance occurred on the same day at that location. For the past three years, Jackson Middle School site has had more exceedances than the other nearby ozone monitoring stations. The design value for Wagener SCDOT, Barnwell CMS, and Trenton ozone monitors have been below the air quality standard.

Table C-2:
Jackson Middle School, Wagener DOT, Barnwell CMS, and Trenton Sites

Date of Exceedance	Aiken Jackson Middle School Daily Maximum 8-hour Average ppm	Aiken Wagener DOT Daily Maximum 8-hour Average ppm	Barnwell Barnwell CMS Daily Maximum 8-hour Average ppm	Edgefield Trenton Daily Maximum 8-hour Average ppm
05/11/2000	0.088	.	0.086	.
06/01/2000	0.104	.	0.093	.
06/02/2000	0.092	.	0.09	0.085
06/03/2000	0.094	.	.	0.087
07/13/2000	0.085	.	.	.
07/18/2000	0.086	.	.	.
07/19/2000	0.097	.	0.099	.
07/21/2000	0.089	.	.	.
07/22/2000	.	.	0.087	.
08/15/2000	0.089	.	.	.
08/17/2000	0.093	.	.	.
08/18/2000	.	.	0.091	.
2000 Total Hits	**10**	**0**	**6**	**2**
05/17/2001	.	0.089	.	.
05/31/2001	0.104	0.085	0.098	.
07/19/2001	0.091	.	0.089	.
2001 Total Hits	**2**	**2**	**2**	**0**
05/24/2002	.	.	0.09	.
05/25/2002	.	.	0.086	.
06/03/2002	.	0.089	.	0.086
06/10/2002	.	0.089	0.086	.
06/11/2002	.	0.089	.	.
06/13/2002	0.095	0.099	0.089	0.101
07/03/2002	.	.	.	0.086
07/05/2002	0.093	.	.	.
07/08/2002	.	0.085	.	0.095
07/17/2002	0.093	0.091	0.086	0.089
08/10/2002	.	.	.	0.086
09/06/2002	.	.	.	0.094
09/11/2002	0.092	0.092	0.091	0.095
2002 Total Hits	**4**	**7**	**6**	**8**

D. Location of Emission Sources

Table D-1 lists the NO_x point sources that are in operation in Aiken County based on the 1999 NO_x and VOC emissions inventory i-Steps data. The county of Aiken has 22 NO_x point sources in operation

and 21 of these point sources are located within the nonattainment area. Facilities in Red are within the proposed boundary; facilities in Black are outside the proposed boundary.

Table D-1: Aiken County Point Source NO2 Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-NO2 (Tons Per Year)**
Aiken	Advanced Glassfiber Yarns	0080-0117	NO2	764.29
Aiken	Avondale Mills: Gregg	0080-0061	NO2	62.83
Aiken	Avondale Mills: Horse Creek	0080-0098	NO2	18.20
Aiken	Avondale Mills: Stevens	0080-0001	NO2	220.63
Aiken	Avondale Mills: Swint	0080-0005	NO2	5.77
Aiken	Avondale Mills: Warren	0080-0039	NO2	5.62
Aiken	Avondale Mills: Woodhead	0080-0027	NO2	0.01
Aiken	Bridgestone/Firestone	0080-0114	NO2	10.53
Aiken	Dixie Clay Co	0080-0029	NO2	3.25
Aiken	Grace: National Kaolin	0080-0004	NO2	7.21
Aiken	Kentucky-Tennessee: Langley	0080-0003	NO2	8.02
Aiken	Kimberly-Clark	0080-0009	NO2	150.97
Aiken	Metso USA Inc	0080-0104	NO2	2.19
Aiken	Owens Corning: Aiken	0080-0028	NO2	86.79
Aiken	Satterfield Const Co Inc: Graniteville	9900-0130	NO2	7.48
Aiken	Satterfield Construction: # 1	9900-0046	NO2	13.23
Aiken	SC Pipeline: Warrenville	0080-0107	NO2	40.87
Aiken	SCE&G: Urquhart	0080-0011	NO2	4,225.68
Aiken	Shaw Industries: Aiken	0080-0101	NO2	10.71
Aiken	Southeastern Clay Co	0080-0030	NO2	4.16
Aiken	UCB Chemicals Corp: Radcure	0080-0088	NO2	9.37
Aiken	Westinghouse: Savannah River Site	0080-0041	NO2	262.93
	1999 Aiken County Total			**5,920.74**
	Emissions in Nonattainment Area-Total			**5,657.81**
	Emissions in Nonattainment Area-Percent			**95.5%**

SCE&G: Urquhart is subject to the NO_x SIP Call and has a 2004 ozone season NO_x budget of 643 tons.

Table D-2 lists the VOC point sources that are in operation in Aiken County based on the 1999 NO_x and VOC emissions inventory i-Steps data. The county has 27 VOC point sources in operation and 26 of these point sources are located within the nonattainment area.

Table D-2: Aiken County Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-VOC (Tons Per Year)**
Aiken	Advanced Glassfiber Yarns	0080-0117	VOC	62.09
Aiken	Avondale Mills: Gregg	0080-0061	VOC	144.16
Aiken	Avondale Mills: Horse Creek	0080-0098	VOC	43.01

Table D-2: Aiken County Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-VOC (Tons Per Year)**
Aiken	Avondale Mills: Stevens	0080-0001	VOC	26.21
Aiken	Avondale Mills: Swint	0080-0005	VOC	26.51
Aiken	Avondale Mills: Townsend	0080-0006	VOC	7.00
Aiken	Avondale Mills: Warren	0080-0039	VOC	13.89
Aiken	Avondale Mills: Woodhead	0080-0027	VOC	254.19
Aiken	Bridgestone/Firestone	0080-0114	VOC	29.00
Aiken	Charter-Triad Terminals LLC	0080-0051	VOC	39.56
Aiken	Dixie Clay Co	0080-0029	VOC	0.12
Aiken	Grace: National Kaolin	0080-0004	VOC	0.40
Aiken	Kentucky-Tennessee: Langley	0080-0003	VOC	13.94
Aiken	Kimberly-Clark	0080-0009	VOC	79.91
Aiken	Metso USA Inc	0080-0104	VOC	10.78
Aiken	Owens corning: Aiken	0080-0028	VOC	18.21
Aiken	Pactiv Corporation	0080-0057	VOC	255.71
Aiken	Satterfield Const Co Inc: Graniteville	9900-0130	VOC	0.01
Aiken	Satterfield Construction: # 1	9900-0046	VOC	3.50
Aiken	SC Pipeline: Warrenville	0080-0107	VOC	0.27
Aiken	SCE&G: Urquhart	0080-0011	VOC	16.72
Aiken	Shaw Industries: Aiken	0080-0101	VOC	34.13
Aiken	Southeastern Clay Co	0080-0030	VOC	0.13
Aiken	Three Rivers Solid Waste-Landfill	0080-0112	VOC	1.03
Aiken	TTX-Hamburg	0080-0076	VOC	67.48
Aiken	UCB Chemicals Corp: Radcure	0080-0088	VOC	0.64
Aiken	Westinghouse: Savannah River Site	0080-0041	VOC	22.74
	1999 Aiken Co Total			**1,171.34**
	Emissions in Nonattainment Area-Total			**1,148.6**
	Emissions in Nonattainment Area-Percent			**98.1%**

Table D-3 lists the NO_x on-road emissions for Aiken County.

Table D- 3: Aiken County On-road NO_x Emissions			
County	**Tier 1**	**Tier 2**	**Highway NO_2 (Tons Per Year)**
Aiken	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	2,096.00
Aiken	11-Highway Vehicles	02-Light-Duty Gas Trucks	1,154.00
Aiken	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	303.00
Aiken	11-Highway Vehicles	04-Diesels	2,628.00
	1999 Aiken Co Total		**6,181.00**

Table D-4 lists the VOC on-road emissions for Aiken County.

Table D-4: Aiken County On-road VOC Emissions			
County	**Tier 1**	**Tier 2**	**Highway VOC (Tons Per Year)**
Aiken	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	2,319.00
Aiken	11-Highway Vehicles	02-Light-Duty Gas Trucks	1,313.00
Aiken	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	310.00
Aiken	11-Highway Vehicles	04-Diesels	170.00
	Aiken Co Total		**4,112.00**

E. Traffic and Commuting Patterns

Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the South Carolina Department of Transportation (SCDOT). SCDOT determines current DVMT by multiplying traffic volume (through traffic counts) and lane miles (determined by the Highway Performance Monitoring System) for each particular area. The South Carolina Department of Public Safety, Division of Motor Vehicles, provided motor vehicle registration data. All other data in this section was obtained from the US Census Bureau. All data is based on the year 2000.

Table E-1 shows that the 2000 and 2025 DVMT data for Aiken County and the Aiken Nonattainment Area.

Table E-1: DVMT for Aiken Nonattainment Area.[5]				
County	**2001 DVMT**	**2025 DVMT**	**DVMT Change (2000-2025)**	**Projected % Annual Change**
Aiken	4,264,957	6,260,607	1,995,650	1.95
Aiken Nonattainment Area Total[6]	2,917,095	5,795,944	2,878,849	4.11
%DVMT Captured Inside Nonattainment Area	68.40	92.58		

Figure 1 shows the Interstates that are located within the Aiken Nonattainment Area. There is one interstate (I-20). I-20 is the major corridor of travel between Aiken and Florence, South Carolina. Additionally, there are four other major routes of travel through Aiken County. They include US Highways 1, 278, 78 and 25. There are also numerous State and secondary roads in the area that connect the larger towns.

[5] Data provided by SCDOT.
[6] Aiken Nonattainment Area Totals based on MPO figures and may reflect an underestimation of the total percent captured by the boundary.

Table E-2[7] presents the breakdown by road classifications of DVMT traveled in the Aiken County from 2000 and projected through 2025.

	Table E-2: DVMT Data for Aiken County			
	2000	**Projected 2007**	**Projected 2012**	**Projected 2025**
Aiken County				
Rural Interstate (01)	737,266	781,561	813,200	895,461
Rural Principal Arterial (02)	219,591	240,765	255,890	295,214
Rural Minor Arterial (03)	578,094	633,838	673,655	777,179
Rural Major Collector (04)	514,823	564,466	599,925	692,119
Rural Minor Collector (05)	48,223	52,873	56,194	64,830
Rural Local (09)	265,344	290,931	309,207	356,724
Rural Total	*2,363,342*	*2,564,434*	*2,708,071*	*3,081,528*
Urban Interstate (11)	271,671	454,155	584,500	923,399
Urban Freeway/Expressway (12)	13,608	14,920	15,857	18,294
Urban Principal Arterial (13)	631,507	692,401	735,897	848,987
Urban Minor Arterial (14)	716,737	785,850	835,216	963,568
Urban Collector (15)	169,183	185,497	197,150	227,447
Urban Local (18)	146,822	160,979	171,092	197,384
Urban Total	*1,949,528*	*2,293,802*	*2,539,712*	*3,179,079*
Grand Total DVMT	**4,312,869**	**4,858,236**	**5,247,783**	**6,260,607**

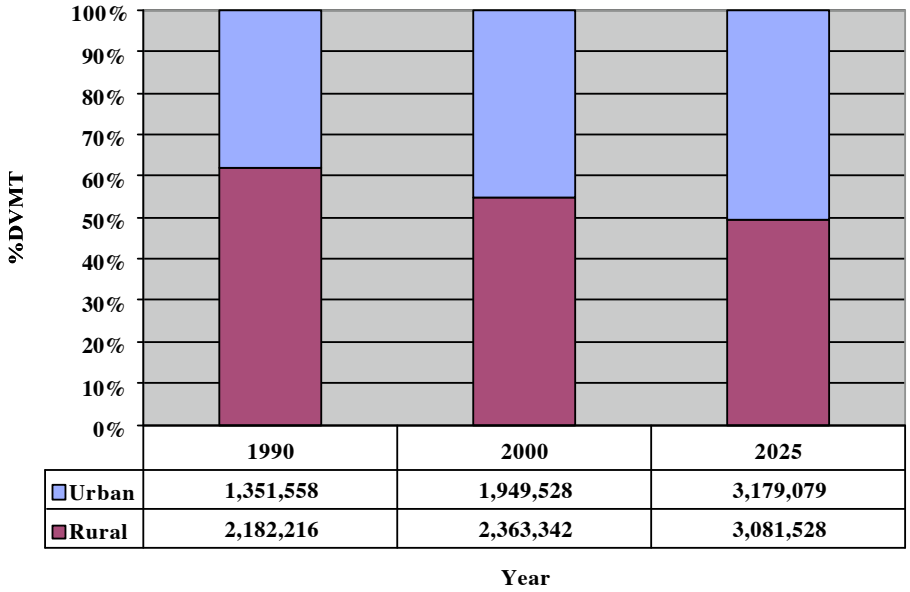
Table E-3[8] presents the 2000 worker flow data from each of the counties. Some counties that are listed on this table are not being considered for boundary recommendations and are being included on this chart to account for all workers in each county. This table shows that approximately 70% of workers that live in Aiken County work inside the county. Approximately 69% of the workers that do not work in Aiken County commute out of state. From the above table it is possible to see that approximately 18% of all workers in Aiken County reside outside of South Carolina.

	Table E-3: Where People Work Who Live in SC				
	County of Residence				
County Worked In	Aiken	Other States	Columbia Co., GA	Richmond Co. GA	Grand Total
Grand Total	62,802	781	3,844	5,051	72,478
Abbeville	3				3
Aiken	44,243	781	3,844	5,051	53,919
Allendale	50				50
Anderson	10				10
Bamberg	37				37
Barnwell	912				912
Beaufort	45				45
Berkeley	19				19

[7] Data provided by SCDOT.
[8] Data provided by US Census: 2000.

	Table E-3: Where People Work Who Live in SC				
	County of Residence				
County Worked In	Aiken	Other States	Columbia Co., GA	Richmond Co. GA	Grand Total
Calhoun	16				16
Charleston	107				107
Colleton	8				8
Columbia Co. GA	1,522				1,522
Darlington	5				5
Dorchester	22				22
Edgefield	1,339				1,339
Fairfield	15				15
Georgetown	36				36
Greenville	39				39
Greenwood	26				26
Kershaw	7				7
Lancaster	3				3
Laurens	21				21
Lee	16				16
Lexington	1,428				1,428
McCormick	25				25
Newberry	31				31
Oconee	11				11
Orangeburg	107				107
Other States	1,027				1,027
Pickens	9				9
Richland	1,073				1,073
Richmond Co. GA	10,262				10,262
Saluda	266				266
Spartanburg	13				13
Sumter	11				11
York	38				38

Figure E-1: Urban vs. Rural DVMT for Aiken County



	1990	2000	2025
Urban	1,351,558	1,949,528	3,179,079
Rural	2,182,216	2,363,342	3,081,528

Figure E-1[9] presents urban and rural DVMT driven in Aiken County.

[9] Data provided by US Census: 2000.

Figure E-2: 2000 Motor Vehicle Registration for Aiken County

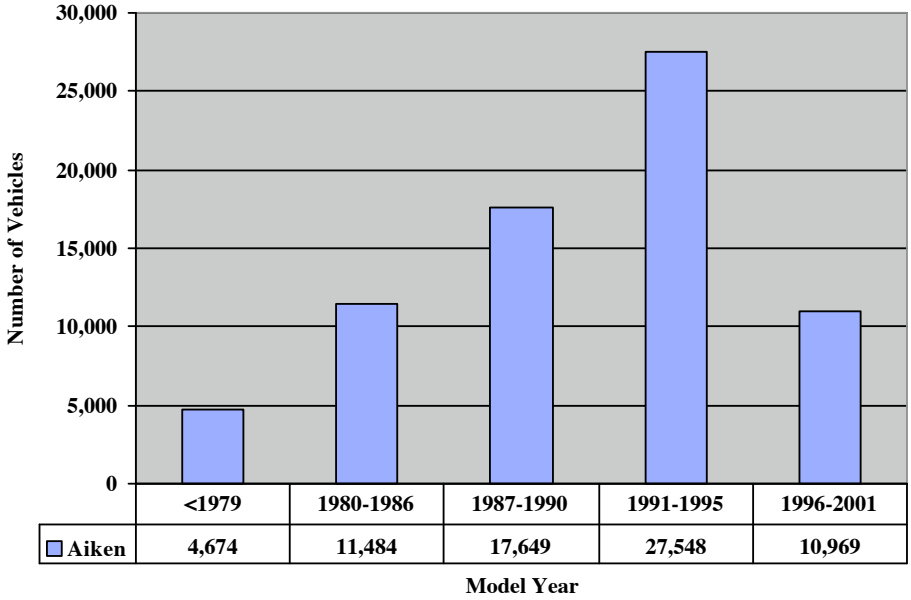


Figure E-2[10] presents the motor vehicle registration data for Aiken County. Only a small portion of the vehicles are pre-1981 model years. In 1981 new cars were outfitted with three-way catalysts, on-board computers, and oxygen sensors to help increase the efficiency of the catalytic converters. This figure shows that the majority of cars registered are model years 1991-1995. In 1991 the EPA established lower tailpipe standards for hydrocarbons and nitrogen oxides beginning with 1994 model year vehicles.

This data reflects 2000 registration figures, and many vehicle owners will elect to replace vehicles with newer vehicles in the coming years. These vehicle turnovers, combined with future national low sulfur fuel standards, the use of Onboard Diagnostic (OBD) systems, and Onboard Refueling Vapor Recovery (ORVR) systems will help to offset any potential impacts from the increased emissions from mobile sources in this area.

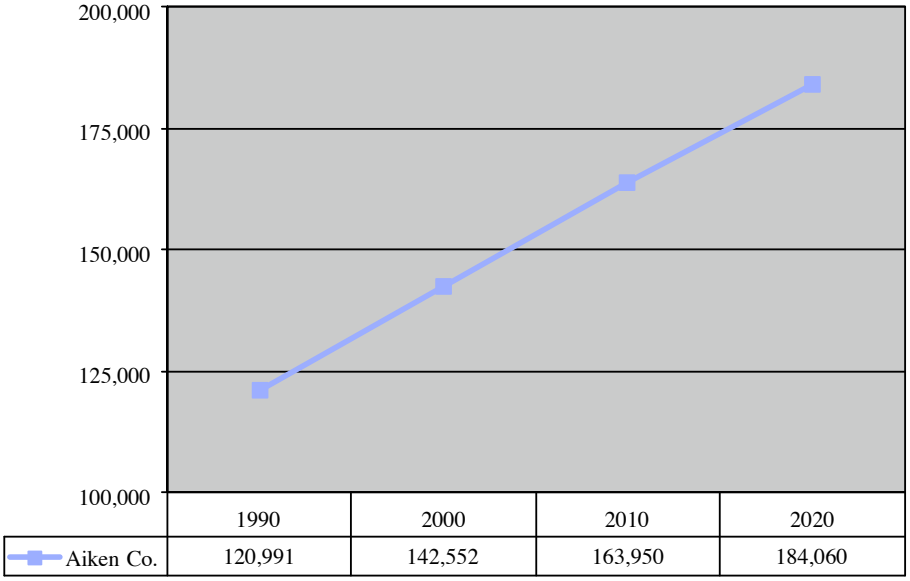
F. Expected Growth (Including Extent, Pattern, and Rate of Growth)

Limited data is available in assessing expected growth for Aiken County, and there is no known data for assessing growth inside the recommended area boundary. Conclusions were drawn based on historical data from 1990, current data from 2000, and population projections for 2020 as contained in Table F-1. Economic growth, relative to population growth, is even harder to predict. No knowledge of major economic expansions is available. While it is certain that population counts will grow, it is only assumed that current economic factors will remain stable or that some economic growth will occur. It is reasonable to expect the majority of that growth to be located inside, or at least near, the Aiken Nonattainment Area boundary.

[10] Data provided by SC Department of Public Safety, Division of Motor Vehicles.

Table F-1: Historical and Projected Population and Population Density per County	
	Aiken Co.
Population, 1990[11]	120,991
Population, 2000[12]	142,552
Projected Population, 2020[13]	184,060
Population. Growth Rate, 1990 – 2000 (Persons per 5 Years)	10,780.5
Projected Population Growth Rate, 2000 – 2020 (Persons per 5 Years)	10,377
Land Area (Sq. Miles)	1073
Persons per Sq. Mile, 2000	132.9
Projected Persons per Sq. Mile, 2020	171.6
Urban Population, 2000	86,786
% Urban Population, 2000	60.9%
Rural Population, 2000	55,766
% Rural Population, 2000	39.1%

Figure F-1:
Population Growth by County, 1990 - 2020

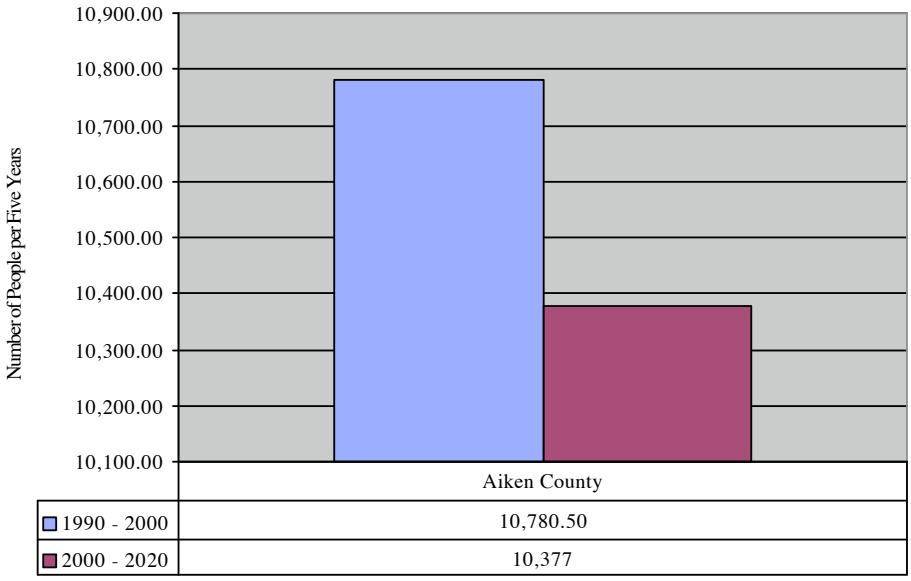


[11] Data provided by US Census: 2000.
[12] Data provided by US Census: 2000.
[13] Data provided by EPA.

It should be noted that trends are based on projected data for 2020. The population will grow in each county; however, comparing the population increase per five years over the last ten years (1990 – 2000) to the projected population increase per five years over the next twenty years (2000 – 2020) shows that the rate of growth slows for Aiken County. Since the recommended area includes the urbanized portion of Aiken County, it is assumed that the recommended area will encompass the majority of expected population growth.

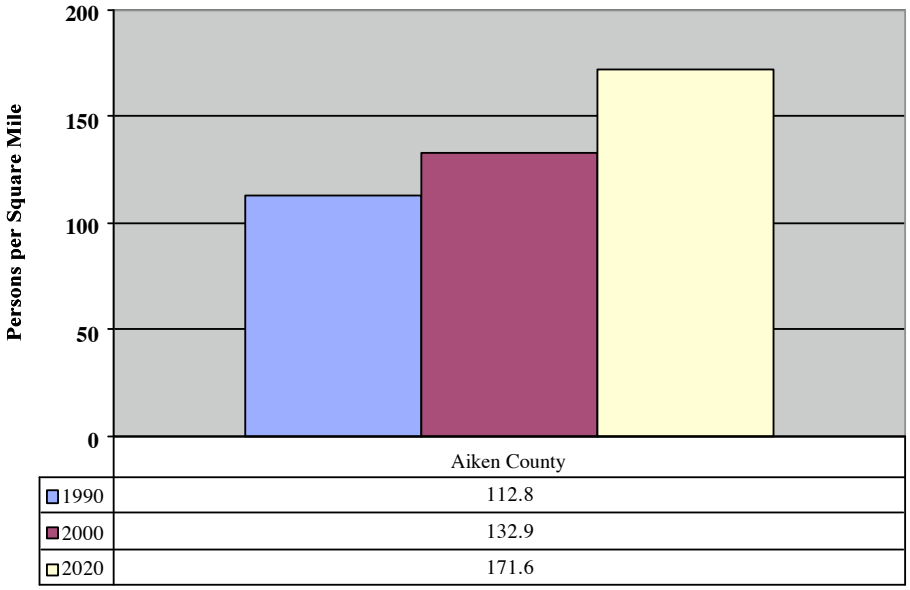
Manufacturing is the largest employment sector in Aiken County.[14] The second and third largest sectors are retail trade and health care and social assistance, respectively.

Figure F-2
Population Growth, 1990 - 2020



[14] Data provided by US Census: 2000.

Figure F-3
Historical and Projected Population Density



Figures F-1, F-2, and F-3 show historical and projected data for total population, rate of growth, and population density, respectively, for Aiken County. Since the Aiken Nonattainment Area captures the area's urban population and contains portions of the manufacturing and retail trade, it is reasonable to conclude that the recommended area boundary at least approximates, if not contains, the expected population growth, and hence the economic growth, for the area in the coming years.

G. Meteorology

See Section V - G of Introduction.

H. Topography

See Section V - H of Introduction.

I. Jurisdictional Boundaries

The Aiken Nonattainment Area boundary includes all portions of the Aiken MPO and an additional (contiguous) portion around the Jackson Middle School ozone monitoring site.

Starting point is on the Savannah River at the Georgia - South Carolina State Line on the Aiken - Edgefield County Line.

Follows the Aiken - Edgefield County Line northeast for 18.4 miles to Shaw Creek / Luke Bridge Road (S-1020).

Follows Shaw Creek southwest for 5.0 miles to Boggy Branch.
Follows Boggy Creek northeast for 1.7 miles to Hamelin Road (S-1925).
Follows Hamelin Road (S-1925) north for 1.7 miles to Reedy Fork Road.
Follows Reedy Fork Road east for 1.3 miles to Morris Road (S-1469).
Follows Morris Road (S-1469) southeast for 1.1 miles to US 1.
Follows US 1 southwest for 0.1 miles to Horned Owl Road.
Follows Horned Owl Road southeast for 0.3 miles to Screech Owl Trail.
Follows Screech Owl Trail south for 0.6 miles to Barn Owl Road.
Follows Barn Owl Road southeast for 0.7 miles to Old Camp Long Road.
Follows Old Camp Long Road east and north for 1.7 miles to Little Branch.
Follows Little Branch east for 1.0 mile to South Fork Edisto River.
Follows South Fork Edisto River south for 0.7 miles to Wire Road (S-49).
Follows Wire Road (S-49) west for 1.1 miles to Snipes Pond Road (S-1527).
Follows Snipes Pond Road (S-1527) south for 3.9 miles to Cooks Bridge Road (S-29).
Follows Cooks Bridge Road (S-29) west for 0.6 miles to Beaver Dam Road (S-207).
Follows Beaver Dam Road (S-207) northwest for 0.7 miles to Zane Trace Road.
Follows Zane Trace Road southwest for 0.4 miles to Cooks Bridge Road (S-29).
Follows Cooks Bridge Road (S-29) west for 1.0 mile to Joyce Branch Road.
Follows Joyce Branch Road south for 1.4 miles to New Bridge Road (S-206).
Follows New Bridge Road (S-206) west for 0.3 miles to Joyce Branch.
Follows Joyce Branch south for 1.2 miles to Redds Branch / Shaws Branch.
Follows Redds Branch / Shaws Branch south for 0.5 miles to Wrights Mill Road.
Follows Wrights Mill Road south for 1.2 miles to Wagener Road (SC 4 / SC 302).
Follows Wagener Road (SC 4 / SC 302) northeast for 0.1 miles to Martin Road (S-1017).
Follows Martin Road (S-1017) south for 0.4 miles to Montmorenci Road (S-77).
Follows Montmorenci Road (S-77) southwest for 2.7 miles to US 78.
Follows US 78 northwest for 0.4 miles to Old Dibble Road (S-507).
Follows Old Dibble Road (S-507) southwest for 3.4 miles to Banks Mill Road (S-79).
Follows Banks Mill Road (S-79) southeast for 1.0 mile to Talatha Church Road (S-729).
Follows Talatha Church Road (S-729) southwest and northwest for 1.9 miles to Crosby Road (S-1755) / Sizemore Road.
Follows Crosby Road (S-1755) west for 0.6 miles to Whiskey Road (SC 19) / Woodvine Road.
Follows Whiskey Road (SC 19) south to US 278.
Follows US 278 southwest to North Silverton Street (SC 62).
Follows North Silverton Street (SC 62) southwest to Atomic Road (SC 125).
Follows Atomic Road (SC 125) northwest to Silver Bluff Road (SC 302).
Follows Silver Bluff Road (S-302) southwest for 3.1 miles to Bluff Landing Road.
Follows Bluff Landing Road southwest for 1.0 mile to Savannah River.
Follows Savannah River northwest for 35.0 miles back to the starting point on the Georgia - South Carolina State Line at the Aiken - Edgefield County Line.

J. Level of Control of Emission Sources

Through its participation with the Early Action Compact, Aiken County is exploring local control strategies such as an air quality contact person to promote air quality awareness, alternative fuels, and low sulfur fuels.

K. Regional Emissions Reductions

See Section V of the Introduction.

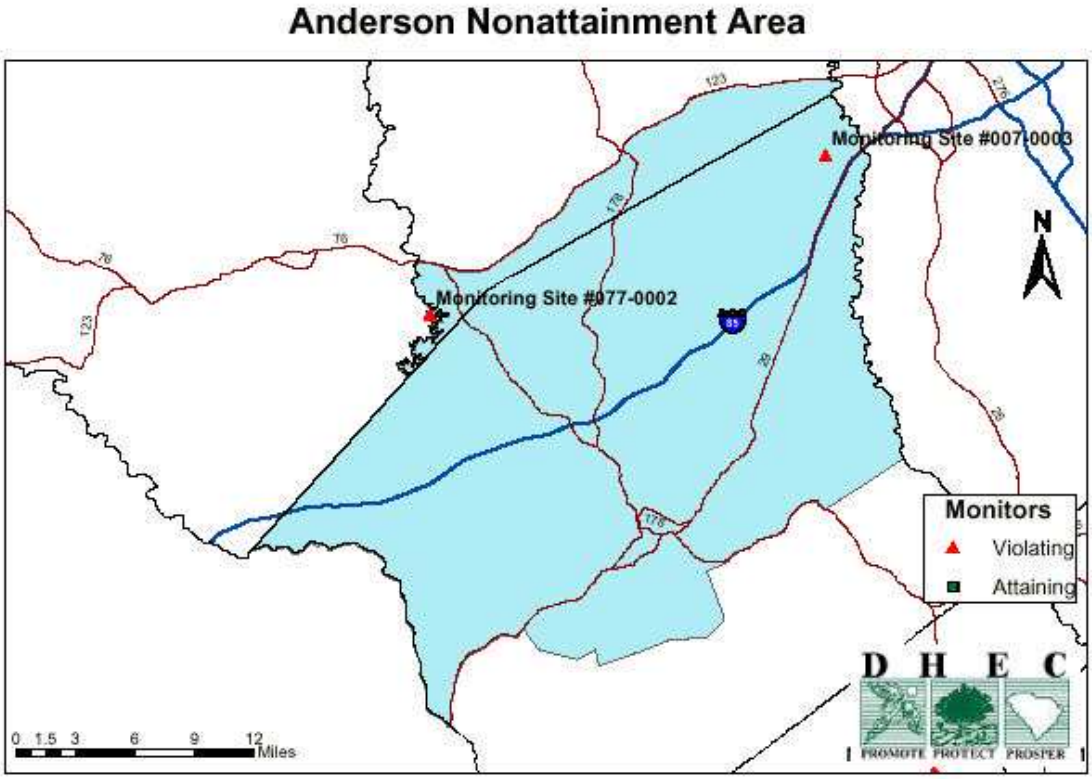


Figure 1: Anderson Nonattainment Area Map

The South Carolina Department of Health and Environmental Control (Department) recommends that the area encompassed by the boundaries of the Anderson Metropolitan Planning Organization (MPO) and the contiguous area encompassing the monitor site at Powdersville in Anderson County and a portion of Pickens County that encompasses the Clemson monitoring site be designated a nonattainment area for violating the 8-hour ozone National Ambient Air Quality Standards (air quality standard) based on 2000 through 2002 monitoring data. This recommended area will be referred to as the Anderson Nonattainment Area throughout the rest of this document.

The recommended boundary for the Anderson Nonattainment Area captures the most urbanized portions of Anderson County and a good portion of the urbanized area of Pickens County, as the boundary captures a major state road that connects urban clusters in Pickens County with those in Greenville County. The Anderson Nonattainment Area captures 97% of the NO_x point sources in the two counties and 90% of the VOC point sources. This boundary captures the second largest NO_x point source in the six (6) county Upstate (Oconee, Pickens, Anderson, Greenville, Spartanburg and Cherokee) of South Carolina. This facility is subject to the NO_x SIP Call and has a 2004 ozone season NO_x budget of 705 tons. The proposed boundary captures 66% of the 2001 daily vehicle miles traveled and in 2025 it is estimated that this will be 67%. There is one monitor in Anderson County and one monitor in Pickens County. Both of these monitors are captured within the recommended boundary and both indicate nonattainment with the 8-hour ozone standard.

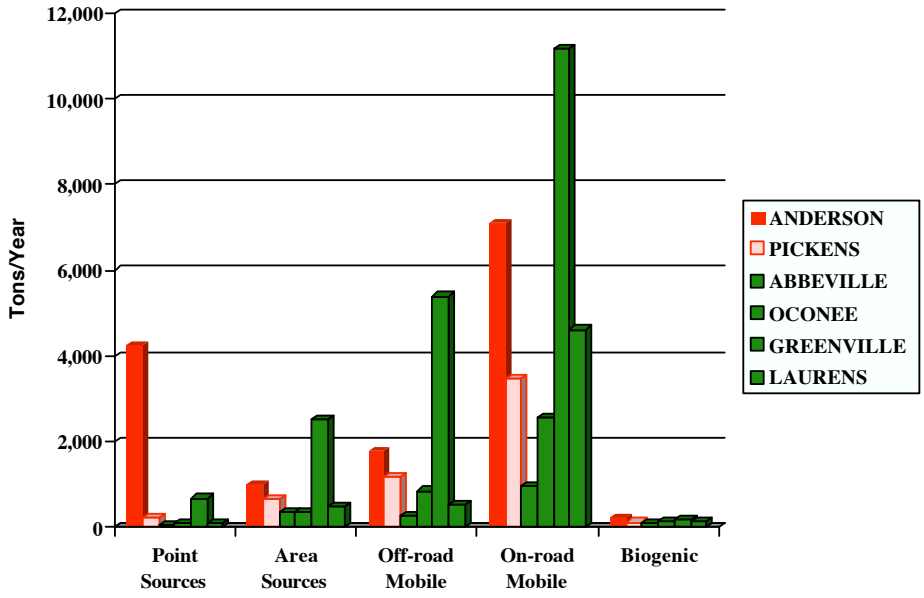
The Department is submitting this document to provide detailed information pertaining to the factors

which EPA suggested be addressed in support of any nonattainment area designation recommendations.

A. Emissions and Air Quality in Adjacent Areas (Including Adjacent MSAs)

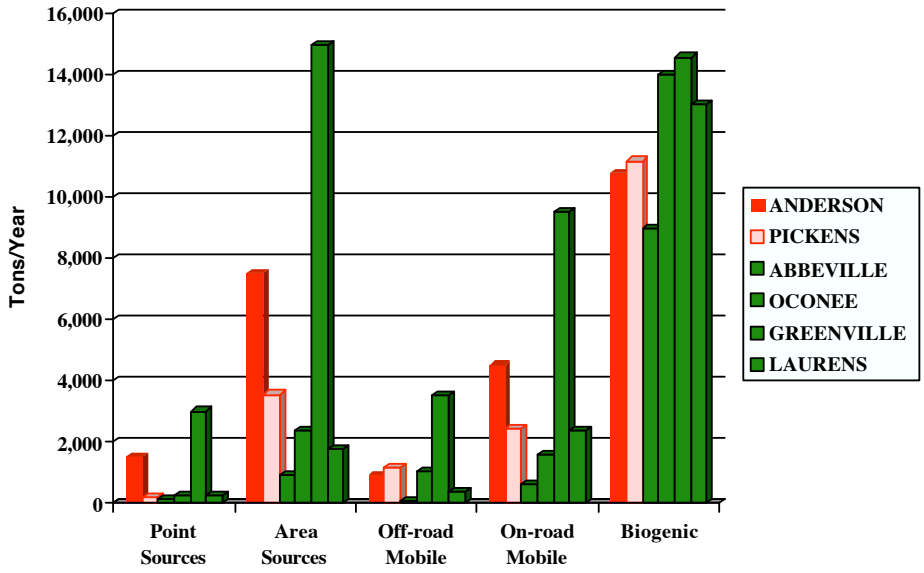
To evaluate the emissions in Anderson and Pickens Counties and the adjacent areas, South Carolina utilized the estimated annual 1999 oxides of nitrogen (NO_x) and volatile organic compounds (VOC) emissions. The types of NO_x and VOC emission sources that were evaluated include point, area, biogenic, and on-road and off-road mobile sources.

Figure A-1: NOx Sources for Anderson, Pickens and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

Figure A-2: VOC Sources for Anderson, Pickens and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

Figures A-1 and A-2 show the percentage of emissions from each source category for Anderson, Pickens and surrounding South Carolina Counties. Additional emissions inventory information is provided in Section D.

The Department has two ozone-monitoring sites in the Anderson Nonattainment Area with three years of data; both monitors indicate a violation of the air quality standard. Anderson and Pickens Counties are both part of the Greenville – Spartanburg - Anderson MSA. Air quality information is provided in Section C.

B. Population Density and Degree of Urbanization Including Commercial Development (Significant Difference from Surrounding Areas)

According to the US Census, urban is defined as all territory, population, and housing units in urbanized areas and urban clusters. An urbanized area is defined as a densely settled area that has a census population of at least 50,000, and an urban cluster is defined as a densely settled area that has a census population of 2,500 to 49,999. An urban area is a generic term that refers to both urbanized areas and urban clusters. Rural is defined as all territory, population, and housing units located outside of urbanized areas and urban clusters.

Anderson County is 718 square miles and had a population of 165,740 in 2000. The current population density is 230.8 persons per square mile. The county is more urban than rural, as 58.3 percent of the county's population, or 96,680 people, live inside of either urbanized areas or urban clusters.

Based on data provided by the SCDOT, the population of the towns in the boundary, and an

assumption about the rural population in the boundary, the population of the recommended area is estimated to be 98,475. Using similar assumptions, the land area of the recommended area is approximately 290.2 square miles. The population density of the Anderson County portion of the recommended area is calculated to be 339.3 persons per square mile.

Pickens County is 497 square miles and had a population of 110,757 in 2000. The population density is 222.9 persons per square mile. Although the county's population is urban, about 37% of the county's urban population lives in the less-densely populated urban clusters.

Population data for the recommended area in Pickens County is estimated, based on the population for cities contained inside the boundary (city of Clemson) and other population data for Pickens County. The population in the Pickens County portion of the recommended area is estimated to be 17,043. Using the scale of a map, the land area is calculated to be approximately 63 square miles, and the population density for the Pickens county portion of the Anderson Nonattainment Area is calculated to be 270.5 persons per square mile.

Table B-1 contains population data for Anderson and Pickens Counties and their portions of the Anderson Nonattainment Area.

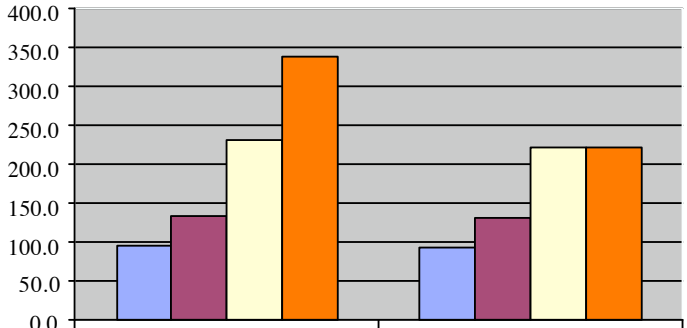
Table B-1:
Total Population, Land Area, and Urban/Rural Population, 2000

	Anderson County	Recommended Area in Anderson County	Pickens County	Recommended Area in Pickens County
Population[1]	165,740	98,475	110,757	13,928
Land Area (Square Miles)[1]	718	290.2	497	62.5
Persons per Square Mile[1]	230.8	339.3	222.9	222.8
Urban Population[2]	96,680	Unknown at this time	64,579	Unknown at this time
% Urban Population[2]	58.3%	Unknown at this time	58.3%	Unknown at this time
Rural Population[2]	69,060	Unknown at this time	46,178	Unknown at this time
% Rural Population[2]	41.7%	Unknown at this time	41.7%	Unknown at this time

* The data for the recommended area of Anderson County is based on assumptions and is only estimates. The actual data may be greater than or less than the data provided.

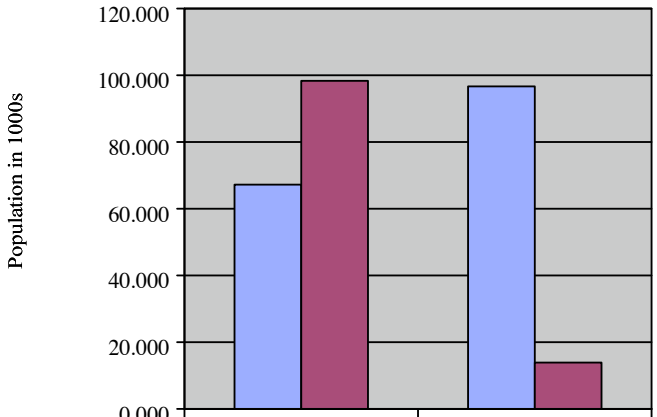
[1] Data provided by the US Census: 2000. Portions of the data for the recommended area were obtained from the SCDOT.
[2] Data provided by the SC Office of Research and Statistics.

Figure B-1: Population Density, 2000
(Persons per Square Mile)



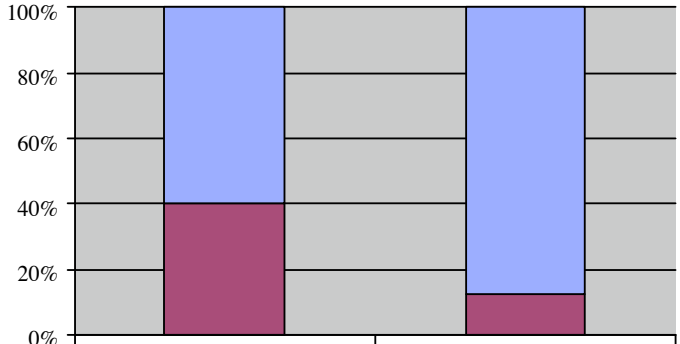
	Anderson County	Pickens County
County Rural Persons per Sq. Mi.	96.2	92.9
County Urban Persons per Sq. Mi.	134.6	130.0
Total County Persons per Sq. Mi.	230.8	222.9
Recommended Area Persons per Sq. Mi.	339.3	222.8

Figure B-2:
Population Distribution
Relative to recommended Area Boundaries, 2000



	Anderson County	Pickens County
Outside Recommended Area	67.265	96.829
Inside Recommended Area	98.475	13.928

Figure B-3: Land Area Distribution According to Recommended Area, 2000



	Anderson County	Pickens County
Non-Recommended Area Land Area in Sq. Mi.	427.8	434.5
Recommended Area Land Area in Sq. Mi.	290.2	62.5

Figures B-1, B-2, and B-3 show the population density distribution, land area distribution, and population distribution, respectively, for Anderson and Pickens Counties relative to the Anderson Nonattainment Area boundaries.

According to the US Census, manufacturing is defined as the mechanical, physical, or chemical transformation of materials or substances into new products. The assembly of components into new products is also considered manufacturing, except when it is appropriately classified as construction. Establishments in the manufacturing sector are often described as plants, factories, or mills and typically use power-driven machines and materials-handling equipment. Also included in the manufacturing sector are some establishments that make products by hand, like custom tailors and the makers of custom draperies. While manufacturers typically do not sell to the public, some establishments like bakeries and candy stores that make products on the premises may be included. The retail trade sector comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.

Anderson County has various industry and businesses located throughout it. Manufacturing is the county's largest employment sector as some 22,513 persons are employed at 185 manufacturing establishments throughout the county. Over 92% of the manufacturing employees, or 20,883 employees, and almost 91% of the manufacturing establishments, or 168 establishments, are contained inside of the recommended area. Retail trade is the county's second largest sector of employment as some 9,049 persons work at some 749 retail businesses throughout the county. Being the urban area in the county, the Anderson recommended area is assumed to contain the majority - both employees and establishments - of the manufacturing, retail, and other business in the county.

Pickens County, like Anderson County, has various industry and businesses located in the county, but

manufacturing is the largest employer. There are 9,621 manufacturing employees at some 98 manufacturing establishments in the county. Twenty of those employees and 3 of those establishments are contained inside the Pickens County portion of the recommended area.

Tables B-2, B-3, and B-4 contain the manufacturing and retail trade data for Anderson and Pickens Counties and the Anderson Nonattainment Area.

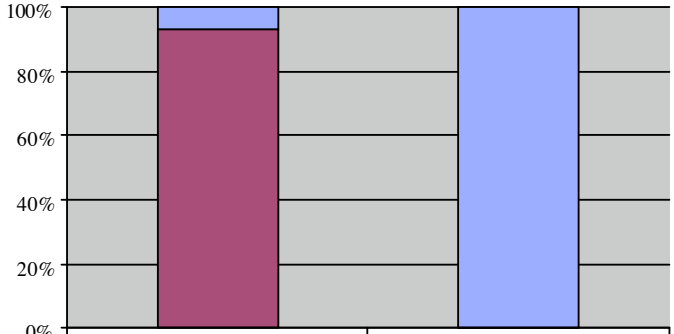
	Table B-2: Manufacturing Employees and Establishments in Anderson County, 2000[3]		
	In recommended area Boundary	In County Boundary	Percent in recommended area Boundary
Number of Employees	20,883	22,513	92.76%
Number of Establishments	168	185	90.81%

	Table B-3: Manufacturing Employees and Establishments in Pickens County, 2000[4]		
	In recommended area Boundary	In County Boundary	Percent in recommended area Boundary
Number of Employees	20	9,621	0.21%
Number of Establishments	3	98	3.06%

	Table B-4: Retail Trade Patterns, 2000[5]	
	Number of Employees	Number of Establishments
Anderson County	9,049	749
Pickens County	4,627	364
Total	13,676	1,113

[3] Data from Bureau of Air Quality file entitled "SC Company File1.xls," based on 2001.
[4] Data from Bureau of Air Quality file entitled "SC Company File1.xls," based on 2001.
[5] Data based on US Census: 2000.

Figure B-4:
Distribution of Manufacturing Employees, 2000



	Anderson County	Pickens County
Outside Recommended Area	1,630	9,601
Inside Recommended Area	20,883	20

Figure B-4 shows the distribution of manufacturing employees relative to the recommended nonattainment boundaries.

C. Monitoring Data Representing Ozone Concentrations in Local Areas and Larger Areas (urban or regional scale)

The Anderson Area Nonattainment Map (Figure 1) shows the ozone monitoring stations in the Anderson Nonattainment Area. Anderson, Pickens and Abbeville Counties have one ozone monitoring station each. The Anderson County air-monitoring station (Powdersville 45-007-0003) is located off Route 81, approximately 300 meters above sea level. The area surrounding the monitoring site is agricultural. According to the South Carolina Department of Transportation (SCDOT), traffic counts for the 1993 show six hundred (600) vehicles per day accessed the road. The site has been in operation since 1991 and measurement of ozone concentrations runs mid-March through mid-November. The monitoring objective for this site is to measure the maximum ozone concentrations.

The Pickens County air-monitoring station (Clemson CMS 45-007-0002) is inside the Anderson Nonattainment Area. The site was established in 1979 and measures ozone concentrations mid-March through mid-November each year. This site is located off of Hopewell Road and according to SCDOT traffic count data for the year 1993 shows one hundred (100) vehicles per day access the road. The surrounding area is agricultural and approximately 216 meters above sea level. The monitoring objective for this site is to measure ozone concentrations for general background

The Oconee County air-monitoring station (Longcreek 45-073-0001) was established in 1983 and measures ozone concentrations continuously (year round). The area surrounding the monitoring station is forest and is approximately 658 meters above sea level. The monitor objective for this site is to measure ozone concentrations for regional transport purposes.

Table C-1 presents the 2000 through 2002 8-hour ozone monitoring data for Anderson, Pickens, and Oconee Counties. Monitoring data for Abbeville County can be found in the Due West Monitoring Site Nonattainment Area document. The design value is the annual fourth-highest daily maximum 8-hour ozone concentration, expressed in parts per million (ppm), averaged over three consecutive years. Since the 2002 ozone design value for the Powdersville and Clemson CMS monitoring sites are 0.088ppm and 0.085ppm respectively, both sites are marginally exceeding the 8-hour ozone standard. The Oconee County monitor indicates attainment of the 8-hour ozone standard.

Table C-1:
Anderson and Surrounding Area Ozone Monitoring Data

County	Site ID	Site Name	4th Maximum 8-Hour			Design Value
			2000	2001	2002	
Anderson	45-007-0003	Powdersville	0.084	0.088	0.093	0.088
Pickens	45-007-0002	Clemson CMS	0.081	0.088	0.088	0.085
Oconee	45-073-0001	Longcreek	0.082	0.078	0.094	0.084

Table C-2 contains the previous three years daily maximum ozone concentrations above 0.084 ppm. A period indicates that no exceedance occurred on the same day at that location.

Table C-2:
Powdersville, Longcreek, and Clemson CMS Site

Date of Exceedance	Anderson Daily Maximum 8-hour Average ppm	Oconee Daily Maximum 8-hour Average ppm	Pickens Daily Maximum 8-hour Average ppm
03/08/2000	.	0.086	.
06/09/2000	0.086	.	.
06/10/2000	.	0.085	0.088
08/16/2000	.	0.085	.
08/17/2000	0.102	.	0.095
08/25/2000	0.087	.	.
2000 Total Hits	**3**	**3**	**2**
05/05/2001	0.092	.	0.085
05/06/2001	0.085	.	0.085
06/18/2001	0.088	0.085	0.088
06/20/2001	0.086	.	.
06/21/2001	.	.	0.088

Table C-2: Powdersville, Longcreek, and Clemson CMS Site			
Date of Exceedance	Anderson Daily Maximum 8-hour Average ppm	Oconee Daily Maximum 8-hour Average ppm	Pickens Daily Maximum 8-hour Average ppm
07/12/2001	0.098	.	0.097
07/17/2001	0.086	.	0.087
08/23/2001	0.089	.	.
09/13/2001	0.088	.	0.09
2001 Total Hits	**8**	**1**	**7**
05/25/2002	0.085	.	.
06/10/2002	0.093	0.094	0.088
06/11/2002	0.09	.	.
06/13/2002	0.093	.	0.086
06/20/2002	0.085	.	0.088
06/21/2002	.	0.086	0.086
06/30/2002	0.085	.	.
07/03/2002	0.095	.	.
07/04/2002	0.086	.	.
08/01/2002	0.087	.	0.086
08/02/2002	0.089	.	0.088
08/08/2002	0.089	.	0.085
08/09/2002	0.086	.	.
08/10/2002	0.089	.	.
08/11/2002	0.089	.	.
08/12/2002	.	.	0.087
08/21/2002	0.099	.	0.09
08/22/2002	0.086	.	.
09/04/2002	0.086	.	.
09/05/2002	0.103	0.097	0.1
09/06/2002	0.091	0.094	0.093

Table C-2: Powdersville, Longcreek, and Clemson CMS Site			
Date of Exceedance	Anderson Daily Maximum 8-hour Average ppm	Oconee Daily Maximum 8-hour Average ppm	Pickens Daily Maximum 8-hour Average ppm
09/10/2002	.	0.094	.
09/11/2002	.	0.091	.
2002 Total Hits	**19**	**6**	**11**

For the past three years, the Longcreek monitoring site had fewer hits than the Powdersville and Clemson CMS sites. In 2002, the Powdersville site had 19 hits and the Clemson CMS site had 11 hits compared with only 6 hits at the Longcreek site.

D. Location of Emission Sources

Table D-1 lists the NO_x point sources that are in operation Anderson and Pickens Counties based on the 1999 NO_x and VOC emissions inventory i-Steps data. Anderson County has 34 NO_x point sources in operation and 32 of these point sources are located within the nonattainment area. Pickens County has 14 NO_x point sources in operation and one of these sources is located within the nonattainment area. Facilities in Red are within the proposed boundary; facilities in Black are outside the proposed boundary.

Table D-1: Anderson County Point Source NO2 Emissions

County	Plant Name	Permit Number	Pollutant	Point Source-NO2 (Tons Per Year)
Anderson	Anderson Medical Center	0200-0061	NO2	10.73
Anderson	Apache Products: Anderson	0200-0048	NO2	2.12
Anderson	Ashmore:#2	9900-0045	NO2	4.83
Anderson	BASF: Anderson	0200-0005	NO2	9.71
Anderson	Blair Mills LP	0200-0034	NO2	6.69
Anderson	Chiquola Industrial Products: Chiquola	0200-0047	NO2	1.00
Anderson	Clemson University: ARF	0200-0096	NO2	0.01
Anderson	Duke Energy: Lee	0200-0004	NO2	3,556.57
Anderson	F & R Asphalt: Plant #2	9900-0107	NO2	4.02
Anderson	Fibertech Corp	0200-0095	NO2	0.13
Anderson	Frigidaire: Anderson	0200-0084	NO2	1.00
Anderson	Goodman Conveyor	0200-0093	NO2	0.55
Anderson	Griffin Thermal Products	0200-0147	NO2	0.18
Anderson	Hexcel Schwebel Inc	0200-0036	NO2	11.33
Anderson	Hydro Aluminum North America	0200-0127	NO2	4.65
Anderson	Isola Laminate Systems Pendleton	0200-0058	NO2	44.74
Anderson	LaFrance: Mt Vernon	0200-0009	NO2	5.67
Anderson	Maxxim Medical	0200-0033	NO2	3.37

Table D-1: Anderson County Point Source NO2 Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-NO2 (Tons Per Year)**
Anderson	Metromont: Belton	0200-0102	NO2	0.10
Anderson	Michelin: Sandy Spring	0200-0018	NO2	50.79
Anderson	Milliken: Cushman	0200-0032	NO2	15.12
Anderson	Milliken: Pendleton	0200-0011	NO2	69.28
Anderson	Mount Vernon Mills: Williamston	0200-0045	NO2	2.91
Anderson	Owens Corning: Anderson	0200-0031	NO2	302.91
Anderson	Pickens Construction Inc	9900-0041	NO2	5.96
Anderson	Plastic Omnium	0200-0117	NO2	3.32
Anderson	Ryobi Technologies Inc	0200-0043	NO2	0.59
Anderson	Sloan construction: Anderson	9900-0113	NO2	9.27
Anderson	Springs Industries: Wamsutta	0200-0014	NO2	9.83
Anderson	Taylor Pallets Inc	0200-0153	NO2	0.40
Anderson	Thomas Concrete: Anderson	9900-0332	NO2	0.01
Anderson	Transmontaigne: Belton-SE	0200-0056	NO2	2.02
Anderson	Vytech	0200-0050	NO2	17.64
Anderson	Zupan & Smith: Powderville	0200-0081	NO2	0.00
	1999 Anderson Co Total			**4,157.45**
	Emissions in Nonattainment Area-Total			**4,153.08**
	Emissions in Nonattainment Area-Percent			**99.9%**
Pickens	Alice Manufacturing: Arial	1880-0018	NO2	3.67
Pickens	Alice Manufacturing: Ellison	1880-0019	NO2	3.83
Pickens	Alice Manufacturing: Elljean	1880-0020	NO2	3.63
Pickens	Alice Manufacturing: Foster	1880-0021	NO2	2.10
Pickens	BASF: Clemson	1880-0007	NO2	73.56
Pickens	Clemson University	1880-0010	NO2	80.32
Pickens	Cornell Dubilier Marketing	1880-0001	NO2	0.00
Pickens	Easley Combined Utilities: Utility Street	1880-0051	NO2	7.01
Pickens	Flexiwall:208 Carolina Drive	1880-0040	NO2	0.02
Pickens	Hollingsworth Saco Lowell	1880-0011	NO2	2.36
Pickens	Liberty Denim LLC	1880-0005	NO2	16.36
Pickens	McKechnie: Highway 93 Plant	1880-0052	NO2	0.65
Pickens	One World Industries :Pickens	1880-0006	NO2	1.14
Pickens	Sloan Construction: Liberty	9900-0098	NO2	5.70
	Pickens Co Total			**200.35**
	Emissions in Nonattainment Area-Total			**80.32**
	Emissions in Nonattainment Area-Percent			**40.1%**

Duke Energy: Lee is subject to the NO_x SIP Call and has a 2004 ozone season NO_x budget of 705 tons.

Table D-2 lists the VOC point sources that are in operation in Anderson and Pickens Counties based on the 1999 NO_x and VOC emissions inventory iSteps data. Anderson County has 38 VOC point sources in operation and 36 of these point sources are located within the nonattainment area. Pickens County has 14 VOC point sources and one of these sources is located within the nonattainment area.

Table D-2: Anderson County Point Source VOC Emissions

County	Plant Name	Permit Number	Pollutant	Point Source-VOC (Tons Per Year)
Anderson	Anderson Medical Center	0200-0061	VOC	0.29
Anderson	Apache Products: Anderson	0200-0048	VOC	50.75
Anderson	Ashmore: #2	9900-0045	VOC	0.13
Anderson	BASF: Anderson	0200-0005	VOC	76.05
Anderson	Blair Mills LP	0200-0034	VOC	3.37
Anderson	Chiquola Industrial Products: Chiquola	0200-0047	VOC	0.33
Anderson	Clemson University: ARF	0200-0096	VOC	3.04
Anderson	Darby Metalworks	0200-0129	VOC	2.04
Anderson	Duke Energy: Lee	0200-0004	VOC	14.40
Anderson	F & R Asphalt: Plant #2	9900-0107	VOC	0.02
Anderson	Fibertech Corp	0200-0095	VOC	7.58
Anderson	Frigidaire: Anderson	0200-0084	VOC	1.05
Anderson	Goodman Conveyor	0200-0093	VOC	46.95
Anderson	Griffin Thermal Products	0200-0147	VOC	6.96
Anderson	Hexcel Schwebel Inc	0200-0036	VOC	42.89
Anderson	Hydro Aluminum North America	0200-0127	VOC	81.37
Anderson	Isola Laminate Systems Pendleton	0200-0058	VOC	113.32
Anderson	LaFrance: Mt Vernon	0200-0009	VOC	0.11
Anderson	Marathon Ashland: Belton	0200-0052	VOC	33.16
Anderson	Maxxim Medical	0200-0033	VOC	0.19
Anderson	Metromont: Belton	0200-0102	VOC	0.00
Anderson	Michelin: Sandy Spring	0200-0018	VOC	133.06
Anderson	Milliken: Cushman	0200-0032	VOC	2.73
Anderson	Milliken: Pendleton	0200-0011	VOC	58.14
Anderson	Mount Vernon Mills: Williamston	0200-0045	VOC	0.05
Anderson	Owens Corning: Anderson	0200-0031	VOC	175.05
Anderson	Pickens Construction Inc	9900-0041	VOC	0.46
Anderson	Plastic Omnium	0200-0117	VOC	216.89
Anderson	Rockwell Automation/Dodge	0200-0119	VOC	4.56
Anderson	Ryobi Technologies Inc	0200-0043	VOC	25.86
Anderson	Sloan Construction: Anderson	9900-0113	VOC	0.04
Anderson	Springs Industries: Wamsutta	0200-0014	VOC	9.20
Anderson	Taylor Pallets Inc	0200-0153	VOC	0.00
Anderson	Thomas Concrete: Anderson	9900-0332	VOC	0.00
Anderson	Transmontaigne: Belton-PD	0200-0057	VOC	40.93
Anderson	Transmontaigne: Belton-SE	0200-0056	VOC	18.51

Table D-2: Anderson County Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-VOC (Tons Per Year)**
Anderson	Vytech	0200-0050	VOC	136.83
Anderson	Zupan & Smith:Powdersville	0200-0081	VOC	0.00
	1999 Anderson Co Total			**1,306.31**
	Emissions in Nonattainment Area-Total			**1,305.79**
	Emissions in Nonattainment Area-Percent			**100.0%**
Pickens	Alice Manufacturing: Arial	1880-0018	VOC	2.04
Pickens	Alice Manufacturing: Ellison	1880-0019	VOC	2.43
Pickens	Alice Manufacturing: Elljean	1880-0020	VOC	2.81
Pickens	Alice Manufacturing: Foster	1880-0021	VOC	2.02
Pickens	BASF: Clemson	1880-0007	VOC	39.87
Pickens	Clemson University	1880-0010	VOC	0.57
Pickens	Cornell Dubilier Marketing	1880-0001	VOC	0.00
Pickens	Easley Combined Utilities: Utility Street	1880-0051	VOC	0.18
Pickens	Flexiwall:208 Carolina Drive	1880-0040	VOC	18.58
Pickens	Hollingsworth Saco Lowell	1880-0011	VOC	8.57
Pickens	Liberty Denim LLC	1880-0005	VOC	14.12
Pickens	McKechnie: Highway 93 Plant	1880-0052	VOC	42.38
Pickens	One World Industries: Pickens	1880-0006	VOC	22.71
Pickens	Sloan Construction: Liberty	9900-0098	VOC	0.03
	1999 Pickens Co. Total			**156.31**
	Emissions in Nonattainment Area-Total			**0.57**
	Emissions in Nonattainment Area-Percent			**0.4%**

Table D-3 lists the NO_x on-road emissions for Anderson and Table D-4 lists the VOC on-road emissions for this area.

Table D- 3: Anderson County On-road NO_x Emissions			
County	**Tier 1**	**Tier 2**	**Highway NO_x (Tons Per Year)**
Anderson	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	2,316.00
Anderson	11-Highway Vehicles	02-Light-Duty Gas Trucks	1,283.00
Anderson	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	341.00
Anderson	11-Highway Vehicles	04-Diesels	3,178.00
	1999 Anderson Co Total		**7,118.00**

Table D-4: Anderson County On-road VOC Emissions			
County	**Tier 1**	**Tier 2**	**Highway VOC (Tons Per Year)**
Anderson	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	2,521.00
Anderson	11-Highway Vehicles	02-Light-Duty Gas Trucks	1,437.00
Anderson	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	345.00
Anderson	11-Highway Vehicles	04-Diesels	206.00
	1999 Anderson Co Total		**4,509.00**

E. Traffic and Commuting Patterns

Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the South Carolina Department of Transportation (SCDOT). SCDOT determines current DVMT by multiplying traffic volume (through traffic counts) and lane miles (determined by the Highway Performance Monitoring System) for each particular area. The South Carolina Department of Public Safety, Division of Motor Vehicles, provided motor vehicle registration data. All other data in this section was obtained from the US Census Bureau. All data is based on the year 2000.

Table E-1 shows that the 2000 and 2025 DVMT data for Anderson and Pickens Counties and the Anderson Nonattainment Area.

Table E-1: DVMT for Anderson Nonattainment Area				
County	**2000 DVMT**	**2025 DVMT**	**DVMT Change (2000-2025)**	**Projected % Annual Change**
Anderson	5,207,194	8,687,689	3,480,495	2.67
Pickens	2,224,743	3,613,182	1,388,439	2.49
County Total	7,431,937	12,300,871	4,868,934	2.62
Anderson Nonattainment Total[6]	1,509,963	2,364,286	854,323	2.26
%DVMT Captured Inside Nonattainment Area	20.32	19.46		

Figure 1 shows the Interstates that are located within the Anderson Nonattainment Area. There is one interstate (I-85). I-85 is the major corridor of travel between Spartanburg and Anderson, South Carolina. Additionally, there are three other major routes of travel through Anderson and Pickens Counties. They include US Highways 29, 76/178 and 123. There are also numerous state and secondary roads that connect the larger towns.

[6] Anderson Nonattainment Area totals based on MPO figures and may reflect an underestimation of the total percent captured by the boundary.

Table E-2 presents the breakdown by road classifications of DVMT traveled in the Anderson Nonattainment Area boundary counties from 2000 and projected through 2025.

	Table E-2: DVMT Data for Anderson Nonattainment Area Counties			
	2000	Projected 2007	Projected 2012	Projected 2025
Anderson County				
Rural Interstate (01)	1,600,864	1,968,809	2,231,627	2,914,954
Rural Principal Arterial (02)	292,648	341,872	377,032	468,448
Rural Minor Arterial (03)	706,739	825,614	910,524	1,131,293
Rural Major Collector (04)	1,030,719	1,204,088	1,327,924	1,649,895
Rural Minor Collector (05)	70,663	82,549	91,039	113,113
Rural Local (09)	306,263	357,777	394,573	490,242
Rural Total	4,007,896	4,780,709	5,332,719	6,767,945
Urban Interstate (11)	-	-	-	-
Urban Freeway/Expressway (12)	-	-	-	-
Urban Principal Arterial (13)	607,982	710,246	783,292	973,211
Urban Minor Arterial (14)	320,296	374,170	412,652	512,704
Urban Collector (15)	193,409	225,941	249,178	309,595
Urban Local (18)	77,612	90,666	99,991	124,235
Urban Total	1,199,298	1,401,023	1,545,113	1,919,745
Grand Total DVMT	**5,207,194**	**6,181,733**	**6,877,832**	**8,687,689**
Pickens County				
Rural Interstate (01)	-	-	-	-
Rural Principal Arterial (02)	303,647	358,369	388,825	493,150
Rural Minor Arterial (03)	449,827	530,892	576,011	730,559
Rural Major Collector (04)	465,085	548,900	595,549	755,340
Rural Minor Collector (05)	46,606	55,006	59,680	75,693
Rural Local (09)	214,650	253,333	274,863	348,610
Rural Total	*1,479,815*	*1,746,499*	*1,894,928*	*2,403,353*
Urban Interstate (11)	-	-	-	-
Urban Freeway/Expressway (12)	44,814	52,890	57,385	72,782
Urban Principal Arterial (13)	286,329	337,930	366,649	465,024
Urban Minor Arterial (14)	255,655	301,728	327,370	415,207
Urban Collector (15)	106,750	125,988	136,695	173,371
Urban Local (18)	51,380	60,639	65,793	83,445
Urban Total	*744,928*	*879,174*	*953,892*	*1,209,829*
Grand Total DVMT	**2,224,743**	**2,625,674**	**2,848,820**	**3,613,182**

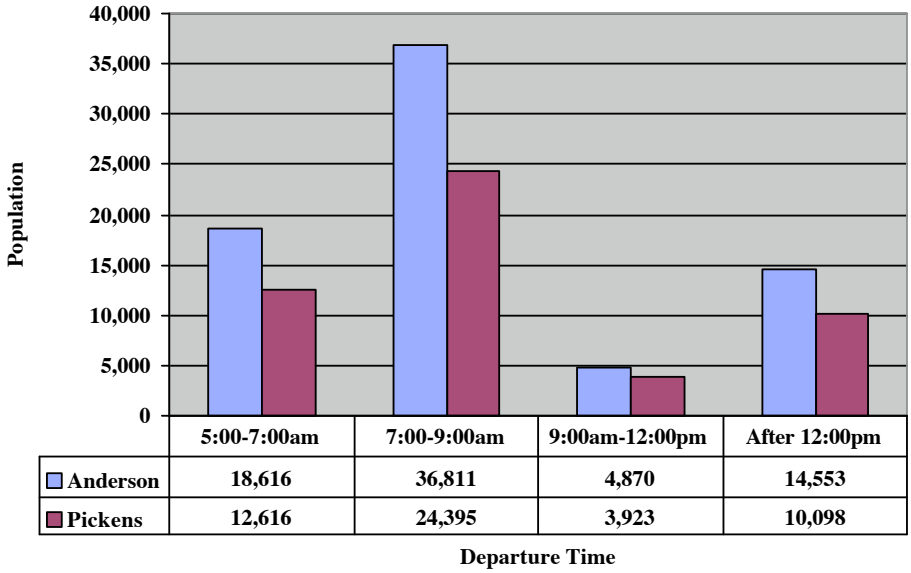
Table E-3[7] presents the 2000 worker flow data from each of the counties. Some counties that are listed on this table are not being considered for boundary recommendations, and are being included on this chart to account for all workers in each county. This table shows that approximately 69% of workers

[7] Data provided from US Census: 2000.

that live in Anderson County work inside the county. Approximately 85% of the workers that work outside the county commute to the neighboring counties of Pickens, Oconee, Spartanburg, or Greenville. This table also shows that approximately 58% of workers that live in Pickens County work inside the county. Approximately 91% of the workers that work outside the county commute to the neighboring counties of Oconee, Anderson, or Greenville.

	Table E-3: Where People Work Who Live in SC			
	County of Residence			
County Worked In	Anderson	Pickens	Out of state	Grand Total
Grand Total	69,224	44,483	1,326	115,033
Abbeville	483	23		506
Aiken	37	32		69
Anderson	51,126	2,046	923	54,095
Beaufort		14		14
Berkeley	39			39
Charleston	55	79		134
Cherokee	16	32		48
Chester	2			2
Dorchester		7		7
Fairfield		17		17
Florence		10		10
Georgetown	27			27
Greenville	10,794	10,698		21,492
Greenwood	256	39		295
Horry	19	4		23
Kershaw	12			12
Lancaster	13			13
Laurens	152	54		206
Lexington	9	17		26
Marlboro	13	5		18
McCormick	43	11		54
Newberry	10			10
Oconee	944	2,100		3,044
Orangeburg	34	13		47
Out of state	928	556		1,484
Pickens	3,712	28,131	403	32,246
Richland	47	102		149
Spartanburg	428	441		869
Sumter	5	5		10
Union	7	14		21
York	13	33		46

Figure E-1: Anderson and Pickens Counties: Time Leaving Home to Go to Work

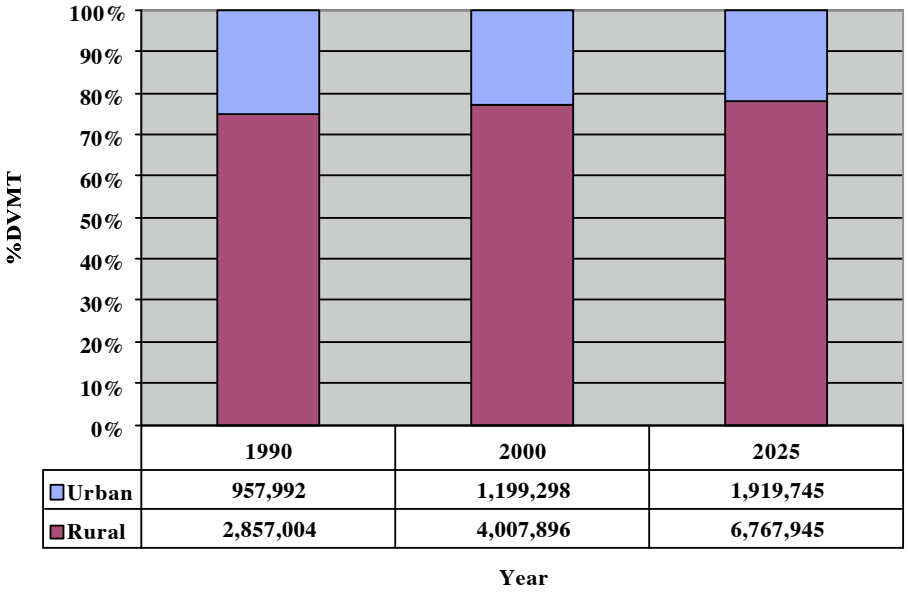


	5:00-7:00am	7:00-9:00am	9:00am-12:00pm	After 12:00pm
Anderson	18,616	36,811	4,870	14,553
Pickens	12,616	24,395	3,923	10,098

Figure E-1[8] presents the departure times for workers in Anderson and Pickens Counties. The figure shows that the largest amount of traffic occurs between 7:00 am to 9:00 am. It should be noted that ozone formation is believed to begin formation in this area during the morning hours and continuing throughout the day until sunset. This is important (since the majority of the traffic is contributed from Anderson County and this traffic occurs during the typical start of ozone formation) because it suggests that the mobile source emissions of NO_x and VOC that help contribute to the ozone formation is mainly from the commuters that reside inside the Anderson Nonattainment Area.

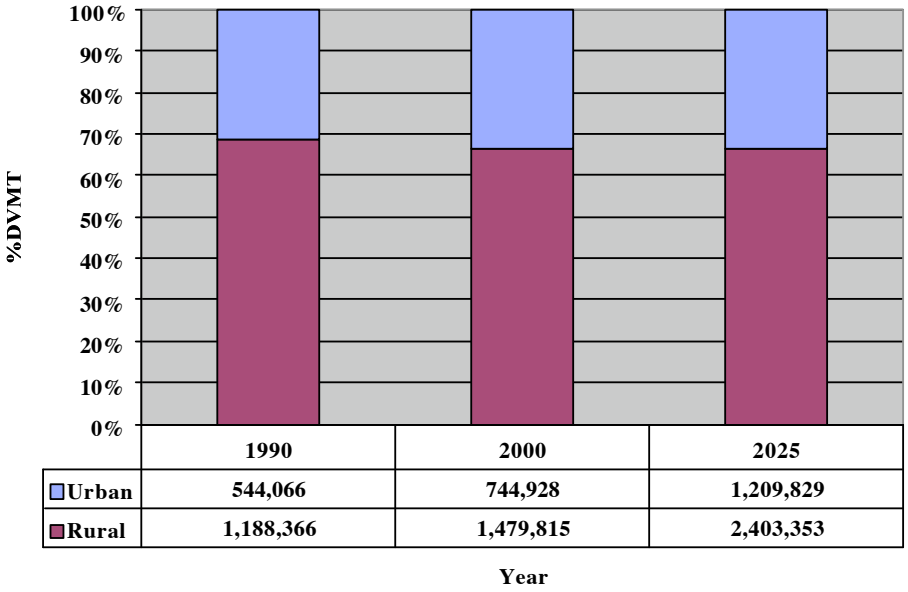
[8] Data provided from US Census: 2000.

Figure E-2: Urban vs. Rural VMT for Anderson County



	1990	2000	2025
Urban	957,992	1,199,298	1,919,745
Rural	2,857,004	4,007,896	6,767,945

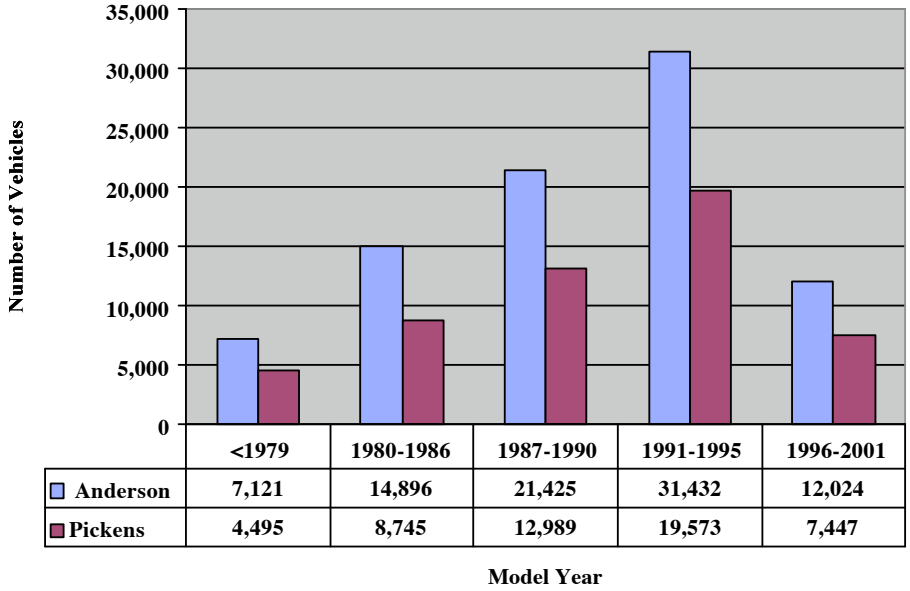
Figure E-3: Urban vs. Rural VMT for Pickens County



	1990	2000	2025
Urban	544,066	744,928	1,209,829
Rural	1,188,366	1,479,815	2,403,353

Figures E-2 and E-3[9] show that there is very little urban DVMT in either Anderson or Pickens Counties. This supports the inclusion of only a small portion of Pickens County inside the Anderson Nonattainment Area.

Figure E-4: 2000 Motor Vehicle Data for Anderson and Pickens Counties



	<1979	1980-1986	1987-1990	1991-1995	1996-2001
Anderson	7,121	14,896	21,425	31,432	12,024
Pickens	4,495	8,745	12,989	19,573	7,447

Figure E-4[10] presents the motor vehicle registration data for Anderson and Pickens Counties. Only a small portion of the vehicles are pre-1981 model years. In 1981 new cars were outfitted with three-way catalysts, on-board computers, and oxygen sensors to help increase the efficiency of the catalytic converters. This figure shows that the majority of cars registered are model years 1991-1995. In 1991 the EPA established lower tailpipe standards for hydrocarbons and nitrogen oxides beginning with 1994 model year vehicles.

This data reflects 2000 registration figures, and many vehicle owners will elect to replace vehicles with newer vehicles in the coming years. These vehicle turnovers, combined with future national low sulfur fuel standards, the use of Onboard Diagnostic (OBD) systems and Onboard Refueling Vapor Recovery (ORVR) systems will help to offset any potential impacts from the increased emissions from mobile sources in this area.

F. Expected Growth (Including Extent, Pattern, and Rate of Growth)

Limited data is available in assessing expected growth for Anderson and Pickens Counties. There is

[9] Data provided from US Census: 2000.
[10] Data provided from SC Department of Public Safety, Division of Motor Vehicles.

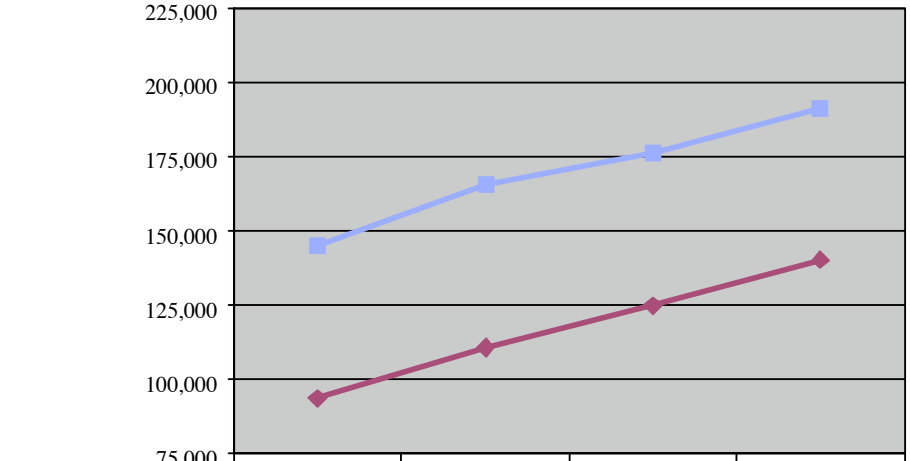
no data readily available for predicting growth inside of the recommended area. Conclusions were drawn based on historical data from 1990, current data from 2000, and population projections for 2020 as contained in Table F-1. Economic growth, relative to population growth, is even harder to predict. No knowledge of major economic expansions is available. While it is certain that population counts will grow, it is only assumed that current economic factors will remain stable or that some economic growth will occur. It is reasonable to expect the majority of that growth to be located inside, or at least near, the Anderson Nonattainment Area.

Table F-1:
Historical and Projected Population and Population Density per County

	Anderson County	Pickens County
Population, 1990[11]	145,177	93,896
Population, 2000 [12]	165,740	110,757
Projected Population, 2020[13]	191,100	140,300
Population. Growth Rate, 1990 – 2000 (Persons per 5 Years)	10,281.5	8,430.5
Projected Population Growth Rate, 2000 – 2020 (Persons per 5 Years)	6,340	7,385.75
Land Area (Sq. Miles)	718	497
Persons per Sq. Mile, 2000	230.8	222.9
Projected Persons per Sq. Mile, 2020	266.2	282.3
Urban Population, 2000	96,680	64,579
% Urban Population, 2000	58.3%	58.3%
Rural Population, 2000	69,060	46,178
% Rural Population, 2000	41.7%	41.7%

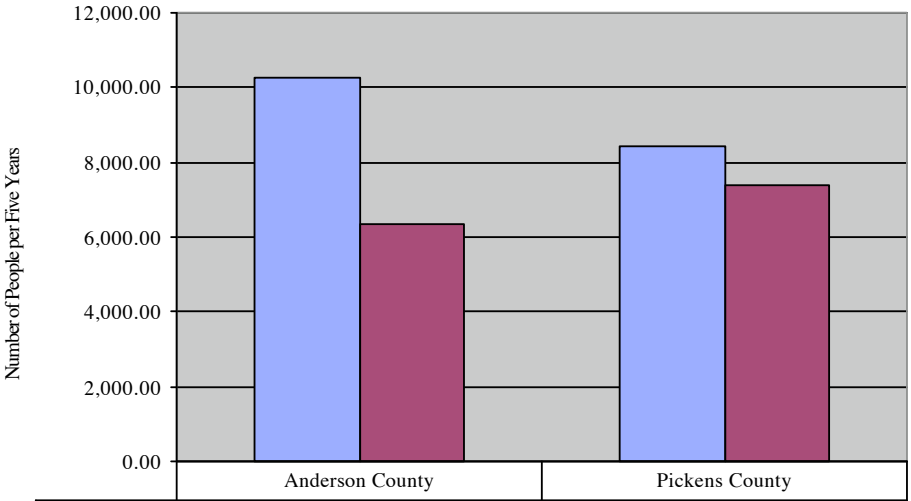
[11] Data provided by the US Census: 2000.
[12] Data provided by the US Census: 2000.
[13] Data provided by the EPA.

Figure F-1:
Population Growth by County, 1990 - 2020



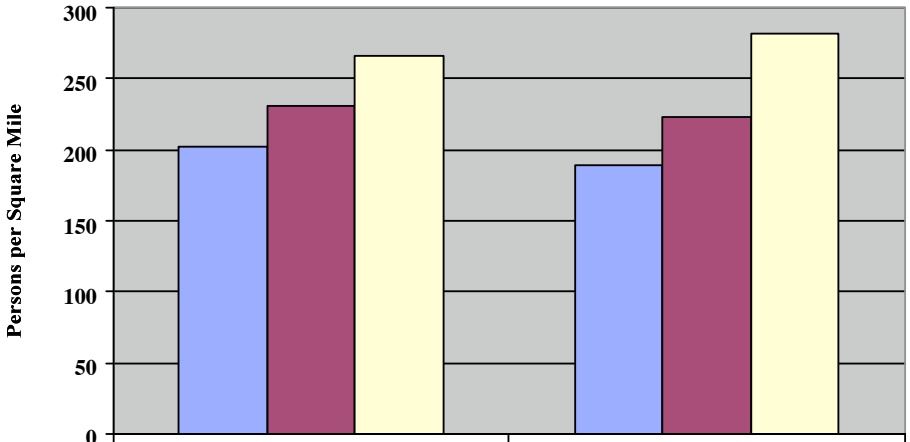
	1990	2000	2010	2020
Anderson County	145,177	165,740	176,400	191,100
Pickens County	93,896	110,757	125,000	140,300

Figure F-2:
Population Growth, 1990 - 2020



	Anderson County	Pickens County
1990 - 2000	10,281.50	8,431
2000 - 2020	6,340	7,385.75

Figure F-3
Historical and Projected Population Density



	Anderson County	Pickens County
1990	202.2	188.9
2000	230.8	222.9
2020	266.2	282.3

Figures F-1, F-2, and F-3 show historical and projected data for total population, rate of growth, and population density, respectively, for Anderson and Pickens Counties. Since the Anderson Nonattainment Area already captures the area's urban population and contains portions of the manufacturing and retail trade, it is reasonable to conclude that the Anderson Nonattainment Area at least approximates, if not contains, the expected population growth, and hence the economic growth, for the area in the coming years.

It should be noted that trends are based on projected data for 2020. The population will grow in each county; however, comparing the population increase per five years over the last ten years (1990 – 2000) to the projected population increase per five years over the next twenty years (2000 – 2020) shows that the rate of growth slows for both counties. Since the Anderson Nonattainment Area includes the urbanized portion of Anderson County and a fair portion of Pickens County, it is assumed that the Anderson Nonattainment Area will encompass the majority of expected population growth.

The largest and second-largest employment sectors in both Anderson and Pickens Counties are manufacturing and retail trade.[14] The third largest sector in Anderson County is the health care and social assistance while the third-largest sector in Pickens County is the accommodations and food services.

G. Meteorology

See Section V - G of Introduction.

[14] Data provided by US Census: 2000.

H. Topography

See Section V - H of Introduction.

I. Jurisdictional Boundaries

The Department's recommended nonattainment area boundary is composed of two partial counties, the developed portions of Anderson County located within the Anderson MPO and the contiguous area encompassing the monitor site at Powdersville and the monitor site at Clemson in Pickens County.

Starts at the intersection of US 123 and the Saluda River.
Follows the Saluda River south to SC 247.
Follows SC 247 southwest to Belton Highway (US 76 / 178).
Follows Belton Hwy (US76/178) eastto Shirley Store Road (S-627).
Follows Shirley Store Road (S-627) southeast for 0.6 miles to Neals Creek.
Follows Neals Creek south for 1.4 miles to Hart Road.
Follows Hart Road southwest for 0.3 miles to Broadway Lake Road.
Follows Broadway Lake Road east for 0.4 miles to Robertson Road (S-488).
Follows Robertson Road (S-488) southwest for 0.3 miles to Scott Road (S-435).
Follows Scott Road (S-435) southwest for 1.6 miles to SC 185.
Follows SC 185 northwest for 1.0 mile to SC 28.
Follows SC 28 south for 0.3 miles to Middleton Road (S-108).
Follows Middleton Road (S-108) southwest for 0.6 miles to Nesbit Creek.
Follows Nesbit Creek west for 1.5 miles to Hall Road.
Follows Hall Road southeast for 0.7 miles to Middleton Road (S-108).
Follows Middleton Road (S-108) west for 0.4 miles to Thompson Road.
Follows Thompson Road west for 0.9 miles to Flat Rock Road (S-49).
Follows Flat Rock Road (S-49) northwest for 1.1 miles to Hayes Road.
Follows Hayes Road west and north for 1.3 miles to SC81.
Follows SC 81 west for 0.5 miles to Chris de Lane (S-434).
Follows Chris de Lane (S-434) west for 1.2 miles to Unnamed Creek.
Follows Unnamed Creek southwest and west for 2.5 miles to Mountain Creek Church Road (S-104)
Follows Mountain Creek Church Road (S-104) southwest for 0.3 miles to S-157.
Follows S-157 west and south for 1.4 miles to S-158.
Follows S-158 northwest for 1.2 miles to US 29.
Follows US 29 to the Savannah River (South Carolina / Georgia state line).
Follows the Savannah River (South Carolina / Georgia state line) northwest to the Anderson County / Oconee County line.
Follows the Anderson County / Oconee County line northeast to the juncture with the Pickens County line.
Follows the Pickens County / Oconee County line northeast and then north to US 123.
Follows US 123 east to the Saluda River (Pickens County / Greenville County line).

J. Level of Control of Emission Sources

Through its participation with the Early Action Compact, Anderson County is exploring local control

strategies such an Ozone Action Coordinator, low sulfur fuels, congestion management and Intelligent Transportation Systems, alternative fuels, hybrid vehicles, higher efficiency engines for school buses, High Occupancy Vehicle (HOV) lanes, modified speed limits, efficient mass transit, and open burning restrictions during ozone season. Pickens County is exploring local control strategies such as an ozone public relations program, ozone advisory committee, participating in voluntary Heavy-Duty Diesel Retrofit Programs, park and ride program, contract specifications, carpooling programs, and a no idling policy for county fleets.

K. Regional Emissions Reductions

See Section V of the Introduction.

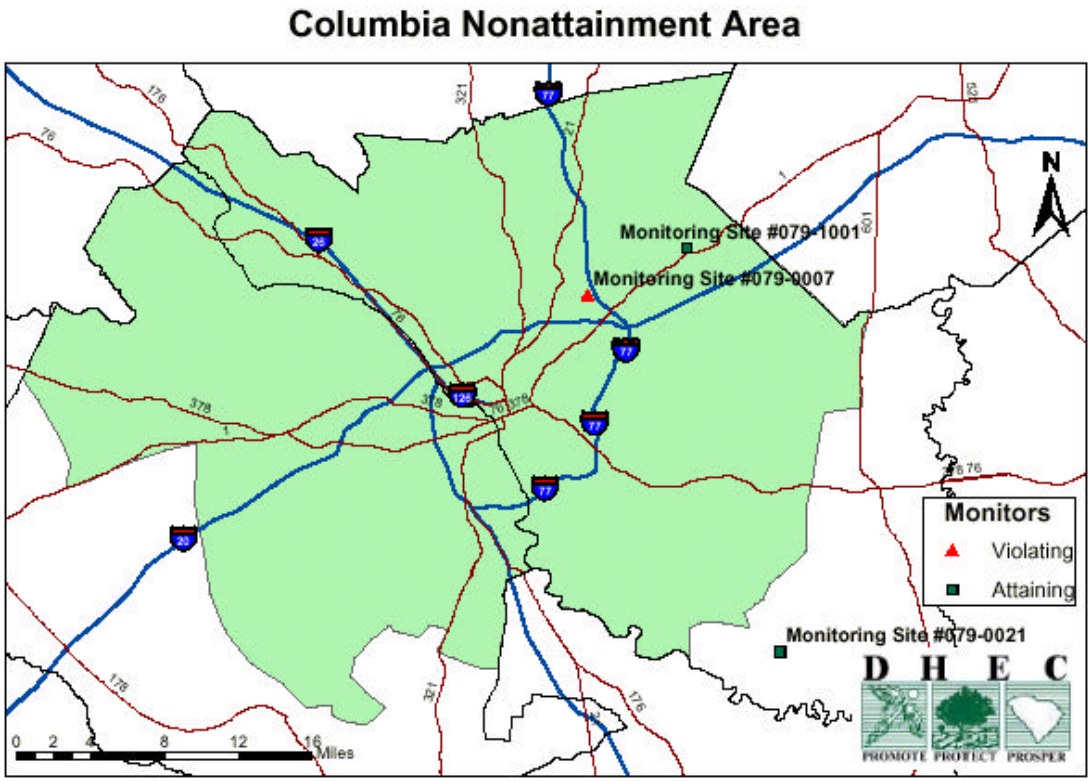


Figure 1: Columbia Nonattainment Area Map

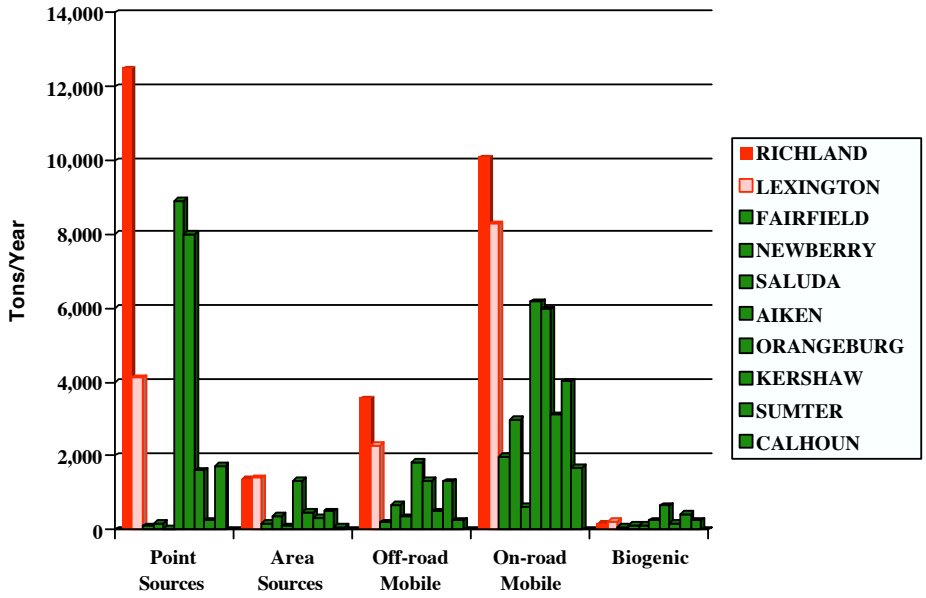
The South Carolina Department of Health and Environmental Control (Department) recommends that the area within Richland and Lexington Counties encompassed by the boundaries of the Columbia Metropolitan Planning Organization (MPO) be designated a nonattainment area for violating the 8-hour ozone National Ambient Air Quality Standard (air quality standard) based on 2000 through 2002 monitoring data. This recommended area will be referred to as the Columbia Nonattainment Area throughout the rest of this document.

The Columbia Nonattainment Area proposed boundary captures 92% of the population in Richland and Lexington Counties. The portions of these two counties not captured within the boundary are rural in nature. The recommended boundary captures 28% of the NO_x point source emissions and 84% of the VOC point source emissions. However, the two largest point sources in Richland County, which are located outside the recommended boundary, are subject to the NO_x SIP Call. One will have a 2004 ozone season NO_x budget of 1674 tons and the other an estimated 2004 ozone season emissions of 912 tons. The proposed boundary captures 96% of the daily vehicle miles traveled in the two counties and it is estimated that in 2025 the boundary will capture 93%. There are three monitors in Richland County, two of which are captured within the boundary. One of these monitors currently indicates nonattainment of the 8-hour ozone standard. The other has only two year of data. One monitor in Richland County indicates attainment with the standard and is not included in the recommended boundary. Also, between 2000 and 2002, the Department operated an ozone monitor in eastern Aiken County to assess conditions between Aiken and Columbia, South Carolina. This monitor was located approximately 20 miles from the Lexington County line. This monitor indicated attainment of the ozone standard and further supports the recommendation of the proposed boundary.

The Department is submitting this document to provide detailed information pertaining to the factors which EPA suggested be addressed in support of any nonattainment area designation recommendations.

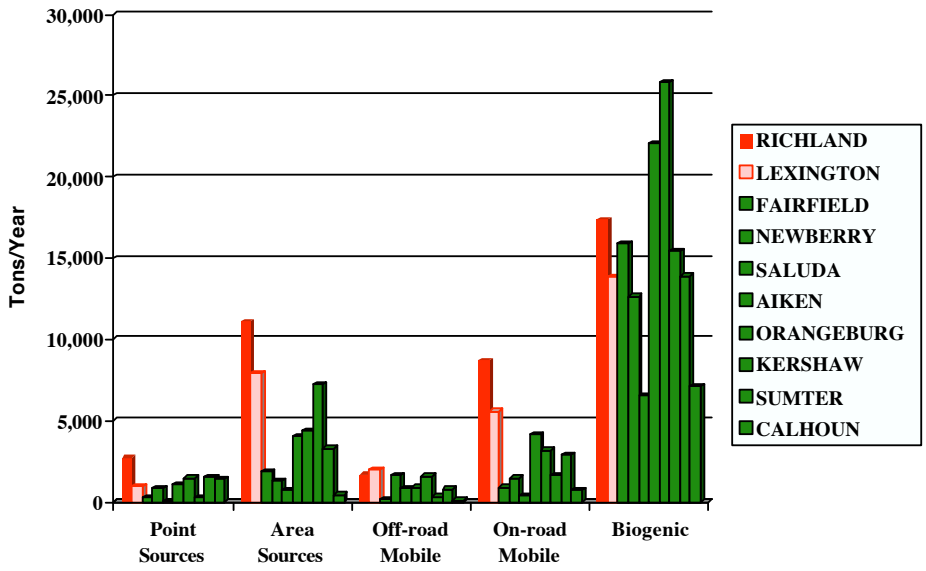
A. Emissions and Air Quality in Adjacent Areas (Including Adjacent MSAs)

Figure A-1: NOx Sources for Richland, Lexington and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

Figure A-2: VOC Sources for Richland, Lexington and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

To evaluate the emissions in Richland and Lexington Counties and the adjacent areas, South Carolina utilized the estimated annual 1999 oxides of nitrogen (NO_x) and volatile organic compounds (VOC) emissions. The types of NO_x and VOC emission sources that were evaluated include point, area, biogenic, and on-road and off-road mobile sources. Figures A-1 and A-2 show the percentage of emissions from each source category for Richland, Lexington, and surrounding South Carolina Counties. Additional emissions inventory information is provided in Section D.

The Department has two ozone monitoring sites in the Columbia Nonattainment Area with three years of data. Richland and Lexington Counties are both part of the Columbia MSA. Air quality information is provided in Section C.

B. Population Density and Degree of Urbanization Including Commercial Development (Significant Difference from Surrounding Areas)

According to the US Census, urban is defined as all territory, population, and housing units in urbanized areas and urban clusters. An urbanized area is defined as a densely settled area that has a census population of at least 50,000, and an urban cluster is defined as a densely settled area that has a census population of 2,500 to 49,999. An urban area is a generic term that refers to both urbanized areas and urban clusters. Rural is defined as all territory, population, and housing units located outside of urbanized areas and urban clusters.

Richland County is 756 square miles and had a population of 320,677 in 2000. The current population density is 424.2 persons per square mile. The majority of Richland County's population is urban as 87.2% of Richland County residents live in the urbanized area. The Richland County portion of the

Recommended Area is 581.2 square miles and has a population of 313,253 people, or 97% of the county total. The population density of the recommended area is 539.0 persons per square mile.

The Richland County portion of the Columbia Nonattainment Area is 581.2 square miles and has a population of 313,253 people, or 97% of the county total. The population density of the recommended area is 539.0 persons per square mile.

Lexington County is 699 square miles and had a population of 216,014 in 2000. The current population density is 309 persons per square mile, and 66.3% of Lexington County's population lives inside an urban area.

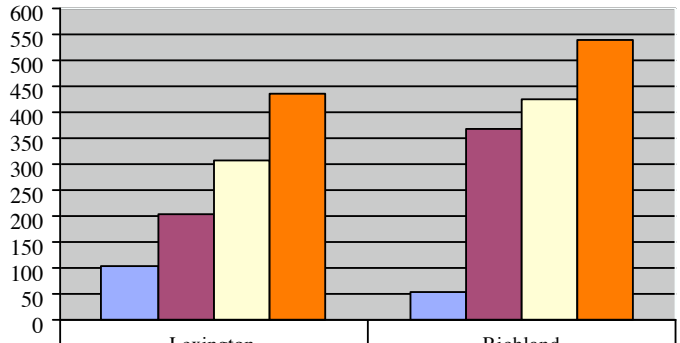
The Lexington County portion of the Columbia Nonattainment Area is 415 square miles, or 59.4% of the total county land area. The Lexington County portion of the boundary captures 84% of the total county population and has a population density of 437.2 persons per square mile.

Table B-1 contains population data for Lexington and Richland Counties and their portions of the Columbia Nonattainment Area.

	Table B-1: Total Population, Land Area, and Urban/Rural Population, 2000			
	Lexington		Richland	
	County	Recommended Portion	County	Recommended Portion
Population[1]	216,014	181,265	320,677	313,253
Land Area (Square Miles)[1]	699	414.6	756	581.2
Persons per Square Mile[1]	309.0	437.2	424.2	539.0
Urban Population[2]	143,177	Unknown at this time	279,512	Unknown at this time
% Urban Population[2]	66.3%	Unknown at this time	87.2%	Unknown at this time
Rural Population[2]	72,837	Unknown at this time	41,165	Unknown at this time
% Rural Population[2]	33.7%	Unknown at this time	12.8%	Unknown at this time

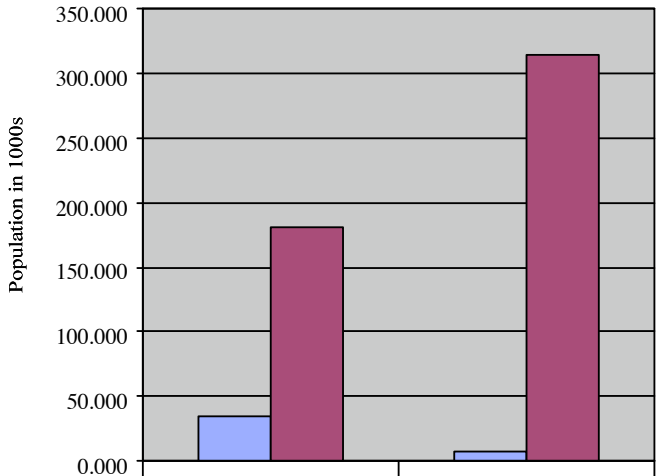
[1] Data provided by the US Census: 2000. Data for the recommended area was obtained from the SCDOT.
[2] Data provided by the SC Office of Research and Statistics.

Figure B-1: Population Density, 2000
(Persons per Square Mile)



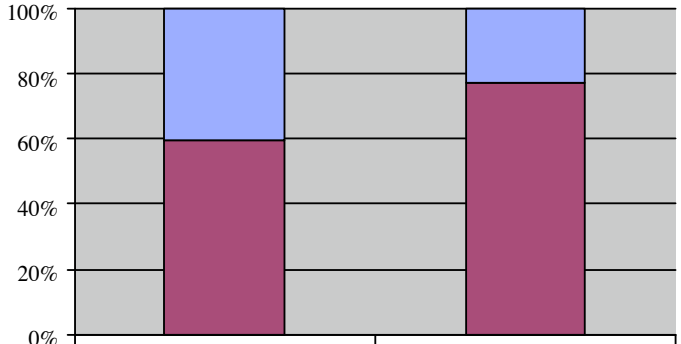
	Lexington	Richland
County Rural Persons per Sq. Mi.	104.1	54.3
County Urban Persons per Sq. Mi.	204.9	369.9
Total County Persons per Sq. Mi.	309.0	424.2
Recmmended Area Persons per Sq. Mi.	437.2	539.0

Figure B-2: Population Distribution
relative to Recommended Area Boundaries, 2000



	Lexington County	Richland County
Outside Boundary	34.749	7.424
Inside Boundary	181.265	313.677

Figure B-3: Land Area Distribution according to Recommended Area Boundaries, 2000



	Lexington County	Richland County
Non-Recommended Area Land Area in Sq. Mi.	284.4	174.8
Recommended Area Land Area in Sq. Mi.	414.6	581.2

Figures B-1, B-2, and B-3 show the population density distribution, land area distribution, and population distribution, respectively, for Lexington and Richland Counties relative to the Columbia Nonattainment Area.

According to the US Census, manufacturing is defined as the mechanical, physical, or chemical transformation of materials or substances into new products. The assembly of components into new products is also considered manufacturing, except when it is appropriately classified as construction. Establishments in the manufacturing sector are often described as plants, factories, or mills and typically use power-driven machines and materials-handling equipment. Also included in the manufacturing sector are some establishments that make products by hand, like custom tailors and the makers of custom draperies. While manufacturers typically do not sell to the public, some establishments like bakeries and candy stores that make products on the premises may be included. The retail trade sector comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.

The Columbia Nonattainment Area contains a large majority of the economic development in Lexington and Richland Counties. It is estimated that Richland and Lexington Counties have over 98% and 86% of its manufacturing establishments located inside the recommended area boundary, respectively. About 29,322 people work in manufacturing in the two-county area, and 26,696 of those people, or about 91.04%, work inside the recommended area boundary. The concentrated urban area also supports retail trade. The number of employees working in retail in the counties combined equals 34,192 at some 2,384 retail trade establishments throughout the two counties. It is reasonable to assume that the boundary contains the majority of the retail business, particularly since the metropolitan areas of Lexington and Richland County are captured and those areas assumedly compose an elevated extent of the retail employees and trade.

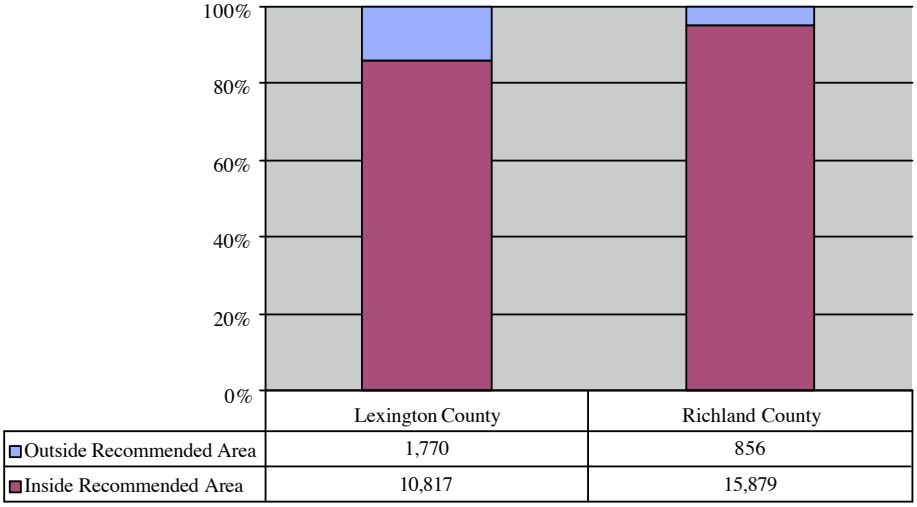
	Table B-2: Total Number of Manufacturing Employees, 2000[3]		
	In Recommended Area Boundary	In County Boundary	Percent in Recommended Area Boundary
Lexington	10,817	12,587	85.94%
Richland	15,879	16,735	94.88%
Total	**26,696**	**29,322**	**91.04%**

	Table B-3: Total Number of Manufacturing Establishments, 2000[3]		
	In Recommended Area Boundary	In County Boundary	Percent in Recommended Area Boundary
Lexington	154	179	86.03%
Richland	205	209	98.09%
Total	**359**	**388**	**92.53%**

	Table B-4: Retail Trade Patterns, 2000[4]	
	Number of Employees	Number of Establishments
Lexington County	11,354	843
Richland County	22,838	1,541
Total	**34,192**	**2,384**

[3] Data from Bureau of Air Quality "SC Company File1.xls," based on 2001.
[4] Data provided by US Census: 2000.

Figure B-4: Distribution of Manufacturing Employees, 2000



C. Monitoring Data Representing Ozone Concentrations in Local Areas and Larger Areas (urban or regional scale)

The Columbia Nonattainment Area Map (Figure 1) shows the ozone monitoring stations in the Columbia Nonattainment Area and vicinity. There are currently three ozone monitors in Richland County. Data from two of the monitors and a nearby monitor in Aiken County were used for this boundary determination. The first Richland County ozone monitoring station (Parklane 45-079-0007) is located within the Columbia Nonattainment Area. It is in a suburban area across a four-lane street from residential zoning. The site was established in 1980 and is approximately 110 meters above sea level. It is near to State Park Health Center and located in a field between Parklane Road and Counts Road, behind the SC Archives and History complex. The surrounding area has business parks, small businesses, housing, and apartment complexes. Parklane Road is heavily congested during business hours. This is due to its proximity of the intersections with Farrow Road (SC 555), Two Notch Road (US 1), and the SC-277 / I-77 interchange. The monitoring objective for Parklane site is to measure maximum ozone concentrations.

The second Richland County ozone monitoring station (Congaree Bluff 45-079-0021) has replaced the Congaree Swamp (45-079-1006) station. Congaree Bluff is located in a rural area off of South Cedar Creek Road within the Congaree Swamp National Monument. The Congaree Swamp National Monument is located within the Cedar Creek flood plain. The area surrounding the monitoring station is forest, and is approximately 100 meters within the Congaree Swamp National Monument boundary. This monitoring site is approximately 34 meters above sea level and has been relocated to this less frequently flooded area to ensure reliable access to the site. The monitoring objective for Congaree Bluff site is to measure ozone concentrations for general background. The monitor is not within the Columbia Nonattainment Area and it indicates attainment with the 8-hour ozone standard.

Another Richland County ozone monitoring station (Sandhill #2 45-079-1002) was located within the Columbia Nonattainment Area. It is in a rural setting on agricultural land. In early 2002 Sandhill #2 was replaced with the Sandhill Experiment Station (45-079-1001) air monitor. Due to its relocation during the current three year period, data gathered from the site cannot be considered when making boundary recommendations. It was moved approximately 715 meters from the old site and it is 134 meters above sea level. The surrounding area was recently developed to residential use with elementary and middle schools built within the community. The main roads that lead to the site are US 1 and Clemson Road. According to SCDOT traffic count data for the year 2000 shows that more than 13,000 vehicles per day use both of these roads. The area has recently become rather populated and Clemson Road has expanded from a two-lane road to a four-lane road. An overpass over US 1 was constructed to gain easier access to US 1 and I-20. The monitoring objective for Sandhill #2 was to measure ozone concentrations for upwind background. The monitoring objective for Sandhill Experimental Station is to measure ozone concentrations for upwind background.

The Aiken County ozone monitoring station (Wagener DOT 45-003-0004) was a short-term special study monitor to determine the gradient difference between Richland and Aiken Counties. The Wagener DOT was located in northern Aiken County approximately 20 miles from the Lexington County line. The monitor was established in August, 2000 and ran until November, 2002. It was surrounded by agricultural land and sat approximately 138 meters above sea level. According to SCDOT traffic count data for the year 2000 shows 100 vehicles per day access the road. The monitoring objective for this site was to measure ozone concentrations for general/background. The monitor indicated attainment with the 8-hour ozone standard and justifies the Department's recommendation of designating partial Lexington County.

Table C-1 presents the 2000 through 2002 8-hour ozone monitoring data for Richland and Aiken Counties. The design value is the annual fourth-highest daily maximum 8-hour ozone concentration, expressed in parts per million (ppm), averaged over three consecutive years. Since the 2002 ozone design value for the Parklane monitoring site is 0.087 ppm, the site is marginally exceeding the 8-hour ozone standard.

Table C-1:
Richland County and Surrounding Area Ozone Monitoring Data

County	Site ID	Site Name	4th Maximum 8-Hour			Design Value
			2000	2001	2002	
Richland	45-079-0007	Parklane - State Park Health Ctr	0.096	0.082	0.084	0.087
Richland	45-079-0021	Congaree Bluff	0.073	0.076	0.082	0.077
Richland	45-079-1001	Sandhills Experiment Station			0.093	N/A
Richland	45-079-1002	Sandhill #2	0.097	0.091		N/A
Richland	45-079-1006	Congaree Swamp	0.073			N/A
Aiken	45-003-0004	Wagener DOT	0.079	0.077	0.094	0.083

Table C-2 contains the previous three years daily maximum ozone concentrations above 0.084 ppm for Parklane, Congaree Bluff, and Wagener DOT. A period indicates that no exceedance occurred on the same day at that location.

Table C-2: Parklane, Congaree Bluff and Wagener DOT Sites			
Date of Exceedance	Richland Parklane Daily Maximum 8-hour Average ppm	Richland Congaree Bluff Daily Maximum 8-hour Average ppm	Aiken Wagener DOT Daily Maximum 8-hour Average ppm
05/11/2000	0.1	.	.
06/01/2000	0.088	.	.
06/02/2000	0.099	0.091	.
06/03/2000	0.096	.	.
07/01/2000	0.085	.	.
07/13/2000	.	.	.
07/18/2000	0.09	.	.
07/19/2000	0.096	.	.
07/21/2000	.	.	.
08/15/2000	.	.	.
08/17/2000	.	.	.
08/18/2000	0.096	.	.
2000 Total Hits	**8**	**1**	**0**
05/01/2001	.	.	.
05/05/2001	.	.	.
05/06/2001	.	.	.
05/16/2001	0.086	0.092	.
05/17/2001	.	.	0.089
05/31/2001	.	.	0.085
07/17/2001	0.09	.	.
07/19/2001	.	.	.
08/23/2001	0.091	.	.
09/18/2001	.	.	.
2001 Total Hits	**3**	**1**	**2**

Table C-2: Parklane, Congaree Bluff and Wagener DOT Sites			
Date of Exceedance	Richland Parklane Daily Maximum 8-hour Average ppm	Richland Congaree Bluff Daily Maximum 8-hour Average ppm	Aiken Wagener DOT Daily Maximum 8-hour Average ppm
05/25/2002	.	.	.
06/03/2002	.	.	0.089
06/04/2002	.	.	.
06/10/2002	.	.	0.089
06/11/2002	0.087	.	0.089
06/12/2002	.	.	.
06/13/2002	0.093	.	0.099
07/02/2002	.	.	.
07/03/2002	.	.	.
07/04/2002	.	.	.
07/05/2002	.	0.087	.
07/06/2002	.	.	.
07/08/2002	.	.	0.085
07/16/2002	.	.	.
07/17/2002	.	0.094	0.091
07/18/2002	.	.	.
08/02/2002	.	.	.
09/11/2002	0.086	0.086	0.092
2002 Total Hits	**3**	**3**	**7**

D. Location of Emission Sources

Table D-1 lists the NO_x point sources that are in operation Lexington and Richland Counties based on the 1999 NO_x and VOC emissions inventory i-Steps data. Lexington County has 22 NO_x point sources in operation and 19 are located within the nonattainment area. Richland County has 34 NO_x point sources in operation and 31 are located within the nonattainment area. Facilities in Red are within the proposed boundary; facilities in Black are outside the proposed boundary.

Table D- 1: Lexington & Richland Counties Point Source NO2 Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-NO2 (Tons Per Year)**
Lexington	BC Components	1560-0054	NO2	6.71
Lexington	Boral Bricks: Lexington	1560-0006	NO2	15.10
Lexington	Columbia Farms: Sunset Blvd	1560-0121	NO2	2.34
Lexington	Columbia Silica Sand	1560-0037	NO2	0.52
Lexington	Corley & Sons Sawmill	1560-0068	NO2	7.35
Lexington	Fosterdixiana: Quarry	1560-0038	NO2	3.02
Lexington	Hardaway: Plant #14	9900-0161	NO2	0.00
Lexington	Honeywell: Columbia	1560-0016	NO2	60.84
Lexington	Icon Identity Solutions	1560-0131	NO2	0.00
Lexington	KMS Inc	1560-0073	NO2	0.30
Lexington	Lanier Construction: Gaston Asphalt	9900-0035	NO2	1.20
Lexington	Lexington Medical Center: West Columbia	1560-0055	NO2	12.93
Lexington	Martin, JB	1560-0095	NO2	10.89
Lexington	Michelin: Lexington US5	1560-0042	NO2	44.41
Lexington	Nucor Building Systems	1560-0109	NO2	0.32
Lexington	Rea Construction: Plant 51	9900-0083	NO2	4.93
Lexington	Safety Kleen: Lexington	1560-0039	NO2	2.19
Lexington	SCE&G: McMeekin	1560-0003	NO2	3,825.87
Lexington	Sloan Construction: #16	9900-0060	NO2	2.93
Lexington	SMI Steel SC	1560-0087	NO2	127.04
Lexington	TCM Mfg USA Inc	1560-0086	NO2	0.85
Lexington	US Silica	1560-0005	NO2	4.30
	1999 Lexington Co Total			**4,134.04**
	Emissions in Nonattainment Area-Total			**4,121.63**
	Emissions in Nonattainment Area-Percent			**99.7%**
Richland	American Italian Pasta Co	1900-0130	NO2	3.90
Richland	American Spiralweld Pipe	1900-0179	NO2	0.14
Richland	Carolina Ceramics	1900-0007	NO2	10.35
Richland	Casco Impregnated Papers	1900-0093	NO2	5.05
Richland	Central Products Co DBA IPG Group	1900-0033	NO2	37.42
Richland	Circle Environmental: Columbia	1900-0164	NO2	0.05
Richland	Colprovia Asphalt #1	9900-0025	NO2	0.51
Richland	Columbia State Farmers Market	1900-0103	NO2	0.04
Richland	Consolidated Systems	1900-0040	NO2	9.44
Richland	Dimas North America	1900-0082	NO2	0.00
Richland	FN Manufacturing	1900-0052	NO2	1.02
Richland	Hueck Foils LLC	1900-0146	NO2	0.61
Richland	International Paper: Eastover	1900-0046	NO2	1,031.29
Richland	Jackson, CR:Asphalt	9900-0036	NO2	3.83
Richland	Palmetto Baptist Medical Center: Columbia	1900-0044	NO2	0.51
Richland	Palmetto Richland Memorial Hospital	1900-0062	NO2	10.14
Richland	Plasti-Line Columbia	1900-0169	NO2	0.33

Table D- 1: Lexington & Richland Counties Point Source NO2 Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-NO2 (Tons Per Year)**
Richland	Rea Construction: Plant 52	9900-0081	NO2	5.44
Richland	Ready Mixed Concrete: Columbia	1900-0098	NO2	0.00
Richland	Richland Landfill	1900-0148	NO2	13.40
Richland	Richtex Brick: Columbia	1900-0010	NO2	66.41
Richland	SC DMH: Bull St	1900-0055	NO2	12.22
Richland	SC General Services: Columbia Mills	1900-0161	NO2	1.80
Richland	SC General Services: Energy Facility	1900-0162	NO2	2.36
Richland	SC General Services: Haynes	1900-0109	NO2	1.24
Richland	SC General Services: Sims/Aycock	1900-0104	NO2	0.43
Richland	SCE&G: Coit	1900-0132	NO2	5.37
Richland	SCE&G: Wateree	1900-0013	NO2	10,368.25
Richland	Shakespeare: Columbia	1900-0036	NO2	2.87
Richland	Sloan Construction: # 7	9900-0055	NO2	8.22
Richland	Tyler Inc	1900-0133	NO2	0.07
Richland	US Army: Ft Jackson	1900-0016	NO2	22.31
Richland	US VA Hospital: Columbia	1900-0023	NO2	9.76
Richland	USC: Columbia Campus Energy Facility	1900-0143	NO2	33.76
	1999 Richland Co Total			**11,668.54**
	Emissions in Nonattainment Area-Total			**255.60**
	Emissions in Nonattainment Area-Percent			**2.2%**

There are two major NO_x sources in Richland County that are subject to the NO_x SIP Call, International Paper: Eastover and SCE&G: Wateree. International Paper: Eastover has an estimated 2004 ozone season NO_x budget of 912 tons. SCE&G: Wateree has a 2004 ozone season NO_x budget of 1674 tons. Lexington County has one major NO_x source that is subject to the NO_x SIP Call, SCE&G: McMeekin. It has a 2004 ozone season NO_x budget of 704 tons.

Table D-2 lists the VOC point sources that are in operation in Lexington and Richland Counties based on the 1999 NO_x and VOC emissions inventory iSteps data. Lexington County has 27 VOC point sources and 24 are located within the nonattainment area. Richland County has 36 VOC point sources in operation and 33 are located within the nonattainment area.

Table D- 1: Lexington & Richland Counties Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-VOC (Tons Per Year)**
Lexington	BC Components	1560-0054	VOC	8.87
Lexington	Boral Bricks: Lexington	1560-0006	VOC	2.33
Lexington	Columbia Farms: Sunset Blvd	1560-0121	VOC	0.12
Lexington	Columbia Silica Sand	1560-0037	VOC	0.01
Lexington	Corley & Sons Sawmill	1560-0068	VOC	6.14
Lexington	Eagle Aviation Inc	1560-0082	VOC	9.12
Lexington	Fosterdixiana: Quarry	1560-0038	VOC	0.05

Table D- 1: Lexington & Richland Counties Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-VOC (Tons Per Year)**
Lexington	Hardaway: Plant #14	9900-0161	VOC	0.00
Lexington	Honeywell: Columbia	1560-0016	VOC	93.23
Lexington	Icon Identity Solutions	1560-0131	VOC	6.58
Lexington	Kline Iron & Steel: Cayce	1560-0102	VOC	24.67
Lexington	KMS Inc	1560-0073	VOC	21.64
Lexington	Lanier Construction: Gaston Asphalt	9900-0035	VOC	0.03
Lexington	Lexington Medical Center: West Columbia	1560-0055	VOC	0.23
Lexington	Martin, JB	1560-0095	VOC	0.18
Lexington	Michelin: Lexington US5	1560-0042	VOC	418.72
Lexington	Michelin: Lexington US7	1560-0113	VOC	66.71
Lexington	Nucor Building Systems	1560-0109	VOC	20.12
Lexington	Rea Construction: Plant 51	9900-0083	VOC	0.06
Lexington	Safety Kleen: Lexington	1560-0039	VOC	13.15
Lexington	SCE&G: McMeekin	1560-0003	VOC	19.48
Lexington	Sea Hunt Boat	1560-0117	VOC	23.66
Lexington	Sloan Construction: #16	9900-0060	VOC	0.03
Lexington	SMI Joist: Cayce	1560-0116	VOC	163.99
Lexington	SMI Steel SC	1560-0087	VOC	58.71
Lexington	TCM Mfg USA Inc	1560-0086	VOC	17.33
Lexington	US Silica	1560-0005	VOC	0.23
	1999 Lexington Co Total			**975.39**
	Emissions in Nonattainment Area-Total			**955.06**
	Emissions in Nonattainment Area-Percent			**97.9%**
Richland	American Italian Pasta Co	1900-0130	VOC	0.07
Richland	American Spiralweld Pipe	1900-0179	VOC	4.70
Richland	Aratex Services	1900-0125	VOC	0.00
Richland	Ashland Chemical: Columbia	1900-0045	VOC	0.00
Richland	Carolina Ceramics	1900-0007	VOC	0.71
Richland	Casco Impregnated Papers	1900-0093	VOC	30.88
Richland	Central Products Co DBA IPG Group	1900-0033	VOC	1,148.94
Richland	Circle Environmental: Columbia	1900-0164	VOC	0.00
Richland	Colprovia Asphalt #1	9900-0025	VOC	0.01
Richland	Consolidated Systems	1900-0040	VOC	39.04
Richland	Dimas North America	1900-0082	VOC	10.51
Richland	FN Manufacturing	1900-0052	VOC	19.31
Richland	Hueck Foils LLC	1900-0146	VOC	7.38
Richland	International Paper: Eastover	1900-0046	VOC	359.56
Richland	Jackson, CR: Asphalt	9900-0036	VOC	0.09
Richland	Kline Iron & Steel: Columbia	1900-0038	VOC	23.47
Richland	Palmetto Baptist Medical Center: Columbia	1900-0044	VOC	0.03
Richland	Palmetto Richland Memorial Hospital	1900-0062	VOC	0.20
Richland	Plasti-Line Columbia	1900-0169	VOC	39.81
Richland	Rea Construction: Plant 52	9900-0081	VOC	0.03

Table D- 1: Lexington & Richland Counties Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-VOC (Tons Per Year)**
Richland	Ready Mixed Concrete: Columbia	1900-0098	VOC	0.00
Richland	Richland Landfill	1900-0148	VOC	3.79
Richland	Richtex Brick: Columbia	1900-0010	VOC	8.35
Richland	SC DMH: Bull St	1900-0055	VOC	0.24
Richland	SC General Services: Columbia Mills	1900-0161	VOC	0.10
Richland	SC General Services: Energy Facility	1900-0162	VOC	0.13
Richland	SC General Services: Haynes	1900-0109	VOC	0.07
Richland	SC General Services: Sims/Aycock	1900-0104	VOC	0.02
Richland	SCE&G: Coit	1900-0132	VOC	0.01
Richland	SCE&G: Wateree	1900-0013	VOC	53.46
Richland	Shakespeare: Columbia	1900-0036	VOC	8.84
Richland	Sloan Construction: # 7	9900-0055	VOC	0.06
Richland	SMI Joist: Eastover	1900-0150	VOC	56.77
Richland	Tyler Inc	1900-0133	VOC	6.88
Richland	US Army: Ft Jackson	1900-0016	VOC	4.56
Richland	US VA Hospital: Columbia	1900-0023	VOC	0.71
	1999 Richland Co Total			**1,829.40**
	Emissions in Nonattainment Area-Total			**1,411.92**
	Emissions in Nonattainment Area-Percent			**77.2%**

Table D-3 lists the NO_x on-road emissions for Lexington and Richland Counties and Table D-4 lists the VOC on-road emissions.

Table D-3: Lexington & Richland Counties On-road NO_x Emissions			
County	**Tier 1**	**Tier 2**	**Highway NO_x (Tons Per Year)**
Lexington	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	2,818.00
Lexington	11-Highway Vehicles	02-Light-Duty Gas Trucks	1,554.00
Lexington	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	409.00
Lexington	11-Highway Vehicles	04-Diesels	3,518.00
	1999 Lexington Co Total		**8,299.00**
Richland	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	3,776.00
Richland	11-Highway Vehicles	02-Light-Duty Gas Trucks	2,077.00
Richland	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	530.00
Richland	11-Highway Vehicles	04-Diesels	3,712.00
	1999 Richland Co Total		**10,095.00**

Table D-4: Lexington & Richland Counties On-road VOC Emissions			
County	**Tier 1**	**Tier 2**	**Highway VOC (Tons Per Year)**
Lexington	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	3,155.00
Lexington	11-Highway Vehicles	02-Light-Duty Gas Trucks	1,788.00
Lexington	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	422.00
Lexington	11-Highway Vehicles	04-Diesels	230.00
	1999 Lexington Co Total		**5,595.00**
Richland	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	5,003.00
Richland	11-Highway Vehicles	02-Light-Duty Gas Trucks	2,793.00
Richland	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	648.00
Richland	11-Highway Vehicles	04-Diesels	290.00
	1999 Richland Co Total		**8,734.00**

E. Traffic and Commuting Patterns

Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the South Carolina Department of Transportation (SCDOT). SCDOT determines current DVMT by multiplying traffic volume (through traffic counts) and lane miles (determined by the Highway Performance Monitoring System) for each particular area. The South Carolina Department of Public Safety, Division of Motor Vehicles, provided motor vehicle registration data. All other data in this section was obtained from the US Census Bureau. All data is based on the year 2000.

Table E-1 shows that the 2000 and 2025 DVMT data for Richland and Lexington Counties and the Columbia Nonattainment Area.

Table E-1: DVMT for Columbia Nonattainment Area				
County	**2000 Daily VMT**	**2025 Daily VMT**	**Daily VMT Change (2000-2025)**	**Projected % Annual Change**
Lexington	6,973,149	11,535,014	4,561,865	2.62
Richland	8,940,822	14,147,703	5,206,881	2.33
County Total	15,913,971	25,682,717	9,768,746	2.45
Columbia Nonattainment Total[5]	14,613,688	23,925,840	9,312,152	2.55
% VMT Captured inside Nonattainment Area	91.83	93.16		

Figure 1 shows the Interstates that are located within the Columbia Nonattainment Area. There are three interstates (I-20, I-26 and I-77). I-20 is the major corridor of travel between Aiken and Columbia,

[5] Columbia Nonattainment Area totals based on MPO figures and may reflect an overestimation of the total percent captured by the boundary.

South Carolina; I-26 is the major corridor of travel between Spartanburg and Charleston, South Carolina; and I-77 originates in Columbia, South Carolina, and is the major travel corridor to Rock Hill, South Carolina. Additionally, there are eight other major routes of travel through Lexington and Richland Counties. They include US Highways 601, 1, 76, 378, 176, 178, 321 and 21. There are also numerous State and secondary roads that connect the larger towns.

Table E-2 presents the breakdown by road classifications of DVMT traveled in the Spartanburg Nonattainment Area boundary counties from 2000 and projected through 2025.

	Table E-2: DVMT Data for Columbia Nonattainment Area Counties			
	2000	**Projected 2007**	**Projected 2012**	**Projected 2025**
Richland County				
Rural Interstate (01)	725,336	754,205	774,826	828,441
Rural Principal Arterial (02)	420,790	456,077	474,425	539,783
Rural Minor Arterial (03)	443,596	480,795	500,137	569,038
Rural Major Collector (04)	536,401	581,383	604,772	688,088
Rural Minor Collector (05)	40,569	43,971	45,740	52,041
Rural Local (09)	170,943	185,278	192,732	219,283
Rural Total	2,337,634	2,501,709	2,592,633	2,896,673
Urban Interstate (11)	2,774,170	3,772,385	4,485,395	6,339,223
Urban Freeway/Expressway (12)	288,218	312,388	324,955	369,722
Urban Principal Arterial (13)	1,266,937	1,373,181	1,428,424	1,625,207
Urban Minor Arterial (14)	1,378,322	1,493,906	1,554,006	1,768,090
Urban Collector (15)	591,700	641,320	667,120	759,024
Urban Local (18)	303,842	329,322	342,570	389,764
Urban Total	6,603,188	7,922,501	8,802,471	11,251,030
Grand Total DVMT	8,940,822	10,424,210	11,395,103	14,147,703
Lexington County				
Rural Interstate (01)	1,337,570	1,775,666	2,088,591	2,902,198
Rural Principal Arterial (02)	523,763	611,649	655,699	819,296
Rural Minor Arterial (03)	694,399	810,917	869,318	1,086,213
Rural Major Collector (04)	747,862	873,351	936,248	1,169,842
Rural Minor Collector (05)	73,744	86,118	92,320	115,354
Rural Local (09)	388,566	453,767	486,446	607,814
Rural Total	3,765,903	4,611,467	5,128,623	6,700,716
Urban Interstate (11)	1,277,794	1,428,535	1,536,207	1,816,154
Urban Freeway/Expressway (12)	38,982	45,523	48,802	60,978
Urban Principal Arterial (13)	627,562	732,865	785,645	981,663
Urban Minor Arterial (14)	651,297	760,582	815,358	1,018,790
Urban Collector (15)	338,872	395,733	424,234	530,080
Urban Local (18)	272,740	318,505	341,443	426,633
Urban Total	3,207,246	3,681,743	3,951,689	4,834,298
Grand Total DVMT	6,973,149	8,293,210	9,080,311	11,535,014

Table E-2[6] presents the breakdown by road classifications of DVMT traveled in the Columbia Nonattainment Area counties from 2000 and projected through 2025.

	Table E-3: Where People Work Who Live in South Carolina			
	County of Residence			
County Worked In	Lexington	Richland	Out of State	Grand Total
Grand Total	109,259	155,968	925	266,152
Abbeville	0	15		15
Aiken	613	118		731
Allendale	30	7		37
Anderson	15	10		25
Bamberg	60	55		115
Barnwell	32	9		41
Beaufort	69	72		141
Berkeley	62	36		98
Calhoun	233	121		354
Charleston	264	187		451
Cherokee	6	40		46
Chester	35	36		71
Chesterfield	0	36		36
Clarendon	11	27		38
Colleton	25	6		31
Darlington	31	74		105
Dillon	0	7		7
Dorchester	14	26		40
Edgefield	75	5		80
Fairfield	535	1,447		1,982
Florence	145	107		252
Georgetown	7	11		18
Greenville	131	220		351
Greenwood	98	65		163
Hampton	1	7		8
Horry	83	75		158
Kershaw	258	911		1,169
Lancaster	178	412		590
Laurens	42	37		79
Lee	8	81		89
Lexington	58,998	18,860	219	78,077
Marion	0	17		17
Marlboro	0	9		9
Newberry	606	694		1,300
Oconee	31	107		138
Orangeburg	520	411		931
Out of State	1,186	1,701		2,887
Pickens	15	20		35
Richland	44,237	129,047	706	173,990
Saluda	218	43		261

[6] Data provided by SCDOT.

	Table E-3: Where People Work Who Live in South Carolina			
	County of Residence			
County Worked In	Lexington	Richland	Out of State	Grand Total
Spartanburg	27	118		145
Sumter	200	546		746
Union	8	6		14
Williamsburg	6	10		16
York	146	119		265

Table E-3[7] presents the 2000 worker flow data from each of the counties. Some counties that are listed on this table are not being considered for boundary recommendations and are being included on this chart to account for all workers in each county. This table shows that approximately 54% of workers that live in Lexington County work inside the county. Approximately 88% of the workers that work outside the county commute to Richland County. This table also shows that approximately 83% of workers that live in Richland County work inside the county. Approximately 70% of the workers that work outside the county commute to Lexington County.

Figure E-1: Time Leaving Home to Go to Work for Lexington and Richland Counties

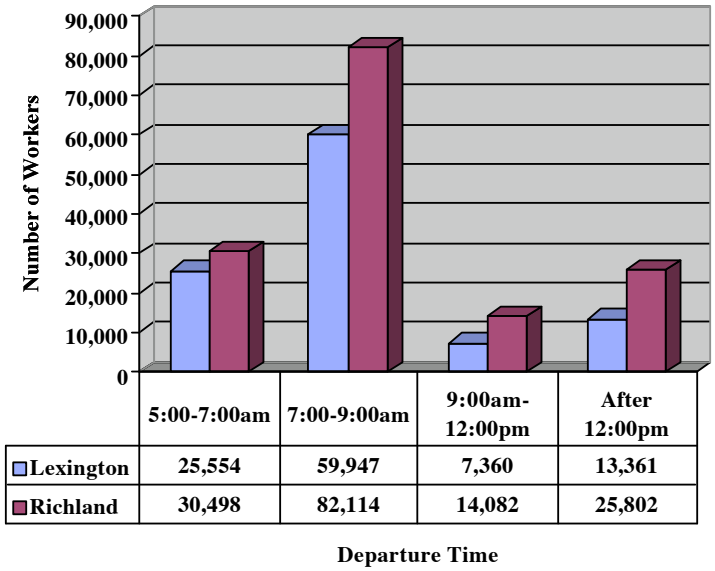
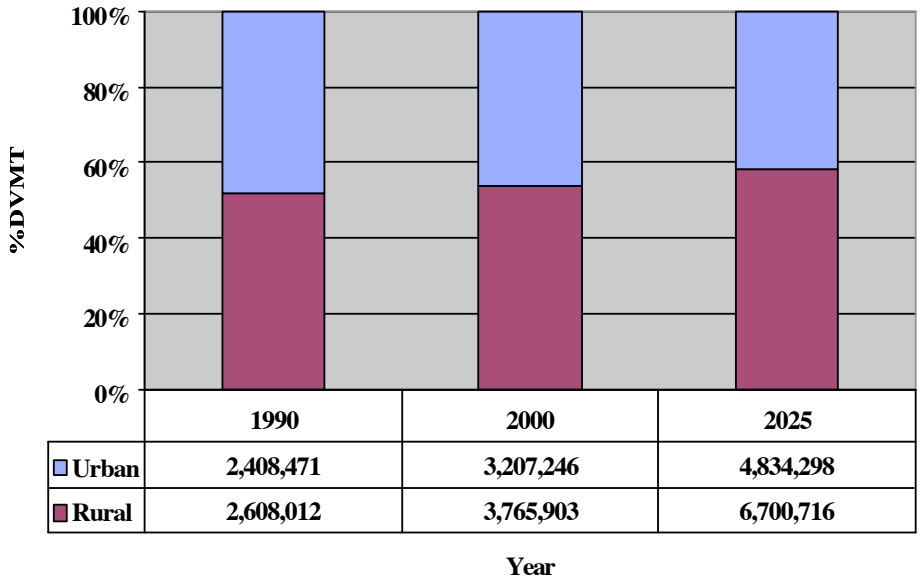


Figure E-1[8] presents the departure times for workers in Lexington and Richland Counties. The figure shows that the largest amount of traffic occurs between 7:00 am to 9:00 am. Note that Richland and Lexington Counties contribute the largest amount of traffic during these times and these two counties

[7] Data provided by US Census: 2000.
[8] Data provided by US Census: 2000.

make up the majority of the landmass of the Columbia Nonattainment Area. It should also be noted that ozone formation is believed to begin during the morning hours and continue throughout the day until sunset in this area. This is important (since the majority of the traffic is contributed from Lexington and Richland Counties and this traffic occurs during the typical start of ozone formation) because it suggests that the mobile source emissions of NO_x and VOC that help contribute to the ozone formation is mainly from the commuters that reside inside the Columbia Nonattainment Area.

Figure E-2: Urban vs. Rural DVMT for Lexington County

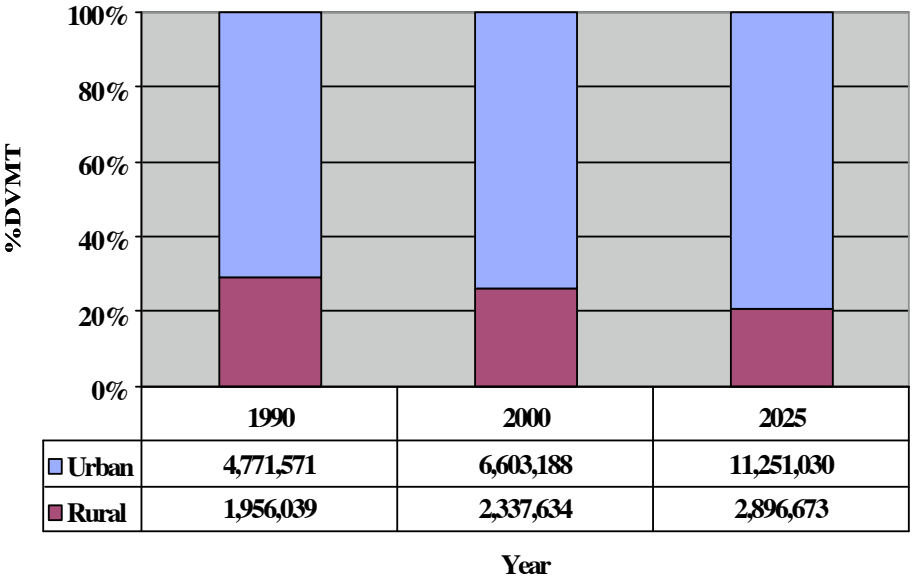


	1990	2000	2025
Urban	2,408,471	3,207,246	4,834,298
Rural	2,608,012	3,765,903	6,700,716

Figures E-2[9] and E-3 show that there is a substantial amount of urban DVMT within these counties.

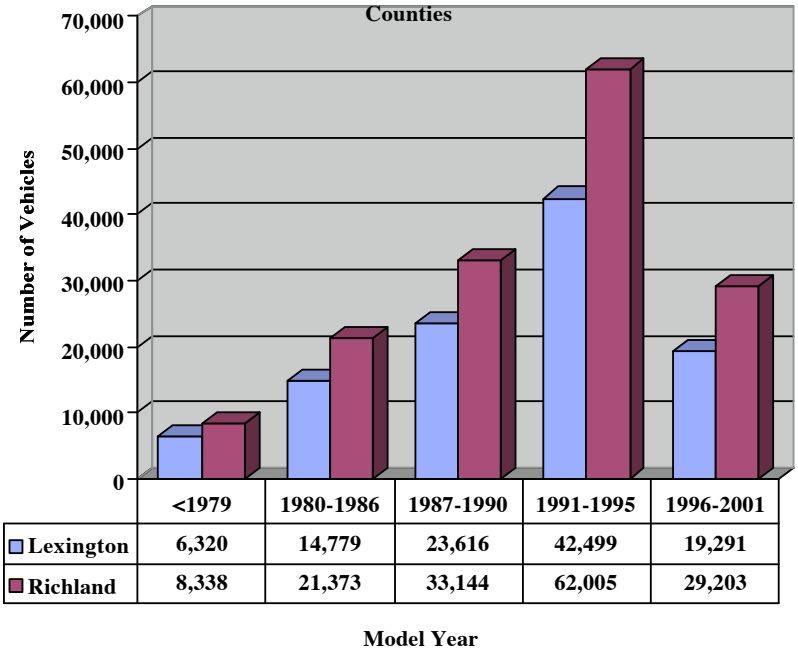
[9] Data provided by US Census: 2000.

Figure E-3: Urban vs. Rural DVMT for Richland County



	1990	2000	2025
Urban	4,771,571	6,603,188	11,251,030
Rural	1,956,039	2,337,634	2,896,673

Figure E-4: Motor Vehicle Registration for Lexington and Richland Counties



	<1979	1980-1986	1987-1990	1991-1995	1996-2001
Lexington	6,320	14,779	23,616	42,499	19,291
Richland	8,338	21,373	33,144	62,005	29,203

Figure E-4[10] presents the motor vehicle registration data for Lexington and Richland Counties. Only a small portion of the vehicles are pre-1981 model years. In 1981 new cars were outfitted with three-way catalysts, on-board computers, and oxygen sensors to help increase the efficiency of the catalytic converters. This figure shows that the majority of cars registered are model years 1991-1995. In 1991 the EPA established lower tailpipe standards for hydrocarbons and nitrogen oxides beginning with 1994 model year vehicles.

This data reflects 2000 registration figures, and many vehicle owners will elect to replace vehicles with newer vehicles in the coming years. These vehicle turnovers, combined with future national low sulfur fuel standards, the use of Onboard Diagnostic (OBD) systems, and Onboard Refueling Vapor Recovery (ORVR) systems will help to offset any potential impacts from the increased emissions from mobile sources in this area.

F. Expected Growth (Including Extent, Pattern, and Rate of Growth)

Limited data is available in assessing expected growth for the Columbia Nonattainment Area. Conclusions were drawn based on historical data from 1990, current data from 2000, and population projections for 2020 as contained in Table F-1. Economic growth, relative to population growth, is even harder to predict. No knowledge of major economic expansions is available. While it is certain that population counts will grow, it is only assumed that current economic factors will remain stable or that some economic growth will occur. It is reasonable to expect the majority of that growth to be located inside, or at least near, the Columbia Nonattainment Area.

	Table F-1: Historical and Projected Population and Population Density per County	
	Lexington County	Richland County
Population., 1990[11]	167,526	286,321
Population., 2000 [12]	216,014	320,677
Projected Population., 2020[13]	291,600	373,370
Population. Growth Rate, 1990 – 2000 (Persons per 5 Years)	24,244	17,178
Projected Population Growth Rate, 2000 - 2020 (Persons per 5 Years)	18,896.5	13,173.3
Land Area (Sq. Miles)	699	756
Persons per Sq. Mile, 2000	309.0	424.2
Projected Persons per Sq. Mile, 2020	417	493.6
Urban Population, 2000	143,177	279,512
% Urban Population, 2000	66.3%	87.2%
Rural Population, 2000	72,837	41,165
% Rural Population, 2000	33.7%	12.8%

[10] Data provided by South Carolina Department of Public Safety: Division of Motor Vehicles.
[11] Data provided by US Census: 2000.
[12] Data provided by US Census: 2000.
[13] Data provided by US Census: 2000.

Figure F-1:
Population Growth by County, 1990 - 2020

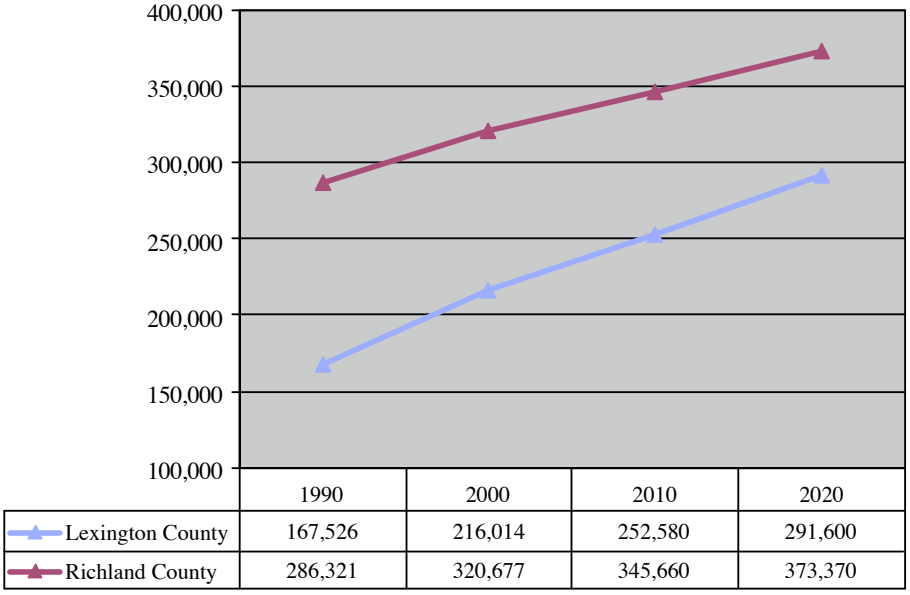


Figure F-2: Rate of
Population Growth, 1990 - 2020

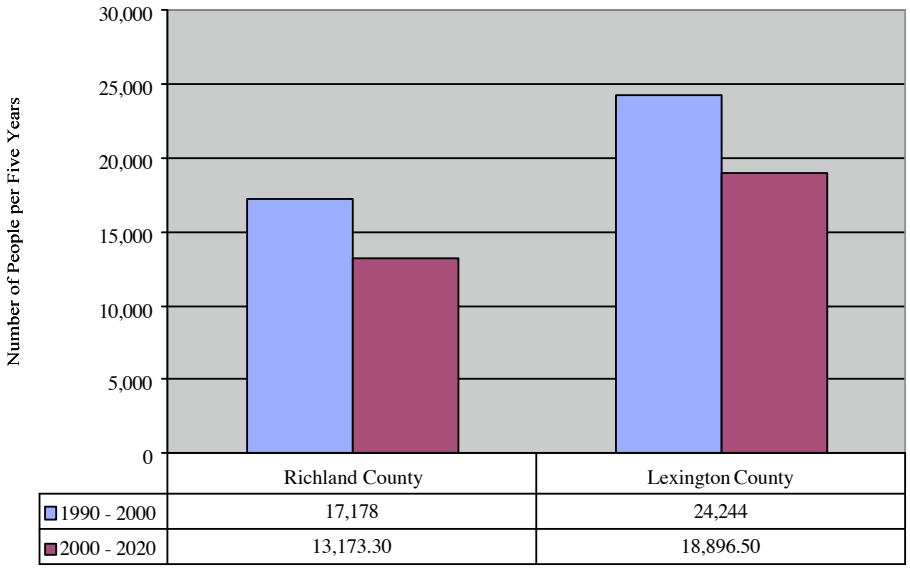
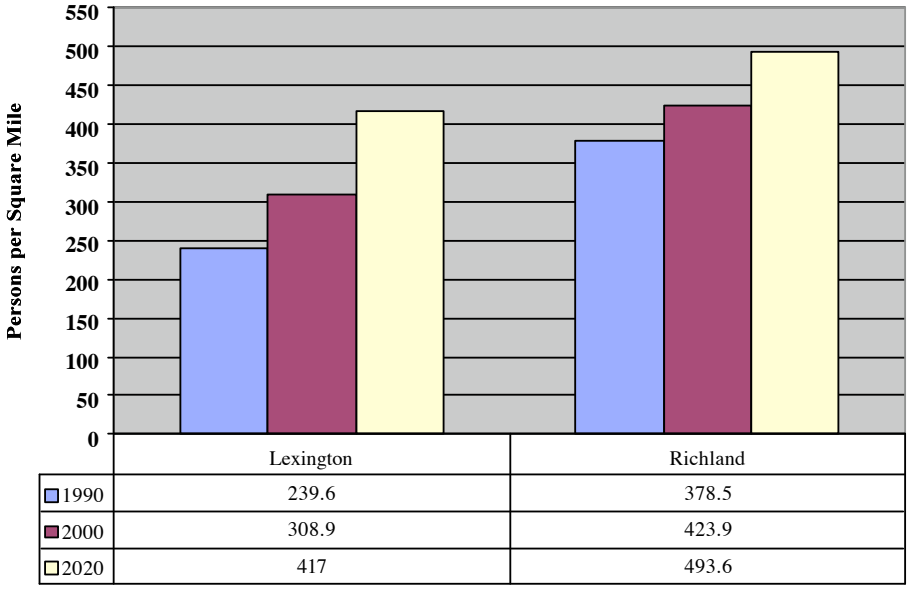


Figure F-3
Historical and Projected Population Density



Figures F-1, F-2, and F-3 show historical and projected data for total population, rate of growth, and population density, respectively, for the counties in the boundary. The expected growth is concentrated in both Lexington and Richland Counties. Since the recommended area includes the majority of Richland and Lexington Counties and already captures the area's urban population, it is reasonable to conclude that the recommended area boundary at least approximates, if not contains, the expected population growth, and hence the economic growth, for the area in the coming years.

It should be noted that trends are based on projected data for 2020. The population will grow in each county; however, comparing the population increase per five years over the last ten years (1990 – 2000) to the projected population increase per five years over the next twenty years (2000 – 2020) shows that the rate of growth slows for all the counties covered by the boundary.

The largest employment sector in Lexington County is retail trade.[14] The second and third largest in Lexington County are manufacturing and accommodations and food services, respectively. The largest employment sector in Richland County is health care and social assistance, and the second largest is the retail trade sector. Administration, support, waste management, and remediation services is the third largest in Richland County. Manufacturing does employ a number of people in Richland County, but it trails service-oriented businesses, such as finance and insurance and accommodations and food services, in the number of employees.

[14] Data provided by US Census: 2000.

G. Meteorology

See Section V - G of Introduction.

H. Topography

See Section V - H of Introduction.

I. Jurisdictional Boundaries

The Columbia Nonattainment Area boundary includes only that portion of the Columbia MPO that is within Richland and Lexington Counties.

Starting point at I-77 at the county line of Richland/Fairfield and follows county line northeast for 9.6 miles to intersection of Richland/Fairfield/Kershaw county lines.

Follows county line of Richland/Kershaw southwest for 6.0 miles and then turns southeast for 11 miles over I-20 and SC 12. Turns northeast for 1.5 miles to US 601 (McCords Ferry Rd).

Follows US 601(McCords Ferry Rd) south for 5.2 miles to SC 262 (Leesburg Rd).

Follows SC 262 (Leesburg Rd) west for 2.2 miles to S-40-69 (Congress Rd).

Follows S-40-69 (Congress Rd) south for 3.6 miles to Toms Creek.

Follows Toms Creek South across US 76/378 (Garners Ferry Rd) for 5.8 miles to S-40-67 Zeigler Rd).

Follows S-40-67 (Zeigler RD) west for 0.5 miles to SC-769 (Congaree Rd).

Follows SC-769 (Congaree Rd) northwest for 0.2 miles to Dry Branch.

Follows Dry Branch southwest for 3.6 miles, past SC 48 (Bluff Rd) and S-40-734 (Old Bluff Rd) to power lines.

Follows power lines west for 1.6 miles to S-40-734 (Old Bluff Rd).

Follows S-40-734 (Old Bluff Rd) west for 1.6 miles to Cedar Creek.

Follows Cedar Creek South 0.1 miles to Congaree Swamp National Monument boundary.

Follows Congaree Swamp National Monument boundary south for 2.0 miles to Congaree River.

Follows Congaree River north to Richland/Lexington/Calhoun County Line.

Follows Lexington/Calhoun county line to S-32-65 (Mack St) and S-32-32 and Pine Plain Rd.

Follows S-32-65 (Mack St) west for 3.0 miles to US 321 (Main St).

Follows US 321 (Main St) north for 1.5 miles to Woodtrail Dr. (S-32-663).

Follows Woodtrail Dr (S-32-663) west for 3.5 miles to Shalam Dr.

Follows Shalam Dr. northwest for 0.5 miles to end and then to Fish Hatchery Rd (S-32-73) at Placid Valley Rd.

Follows Fish Hatchery Rd (S-32-79) southwest for 2.7 miles to SC 6.

Follows SC 6 Southeast for 3.0 miles to W.E. Jeffcoat Rd (S-32-100).

Follows W.E. Jeffcoat Rd (S-32-100) southwest for 1.5 miles to Sharon Church Rd (S-32-342).

Follows Sharon Church Rd (S-32-342) northwest for 0.1 miles to Jeff Sharpe Rd.

Follows Jeff Sharpe Rd west for 1.5 miles to Cherry Blossom Rd.

Follows Cherry Blossom Rd north for 0.3 miles to Hilton Yonce Rd.

Follows Hilton Yonce Rd northwest for 0.7 miles to Pelion Rd (S-32-247).

Follows Pelion Rd (S-32-247) west for 1.4 miles to Old Charleston Rd (S-32-625).

Follows Old Charleston Rd (S-32-625) northwest for 6.5 mile past US 302 (Edmund Hwy) to Calks Ferry Rd (S-32-278).

Follows Calks Ferry Rd (S-32-278) north for 9.0 miles over I-20 to US 1 (Augusta Hwy).

Follows US 1 (Augusta Hwy) west for 7.0 miles to Old Field Rd (S-32-31).

Follows Old Field Rd (S-32-31) north for 1.8 to Cedar Grove Rd (S-32-54).

Follows Cedar Grove Rd (S-32-54) northwest for 3.0 miles to Ansel Caughman Rd (S-32-157).

Follows Ansel Caughman Rd (S-32-157) northwest for 1.5 miles to Lexington/Saluda county line.

Follows Lexington/Saluda county line northeast for 3.5 miles to intersection of Lexington/Saluda/Newberry county line.

Follows Lexington/Newberry county line east, northwest, northeast and east for 17 miles to Lexington/Newberry/Richland county line intersection.

Follows Richland/Newberry county line northeast for 3.0 miles to Broad River/ Richland/Fairfield county line.

Follows Richland/Fairfield county line southeast on Broad River for 9.0 miles, then north on Little River for 3.0 miles and east and northeast to I-77 for 10 miles and to starting point.

J. Level of Control of Emission Sources

Through its participation with the Early Action Compact, Lexington County is currently exploring local control strategies such as an ozone action coordinator, park and ride facilities, alternate work schedules, alternative fuels, and landfill methane reduction. Richland County is exploring local control strategies such as land-use planning, alternative fuels, alternative fuel vehicles, ozone awareness and education, compressed work weeks, carpool program, and mowing and open burning restrictions.

K. Regional Emissions Reductions

See Section V of the Introduction.

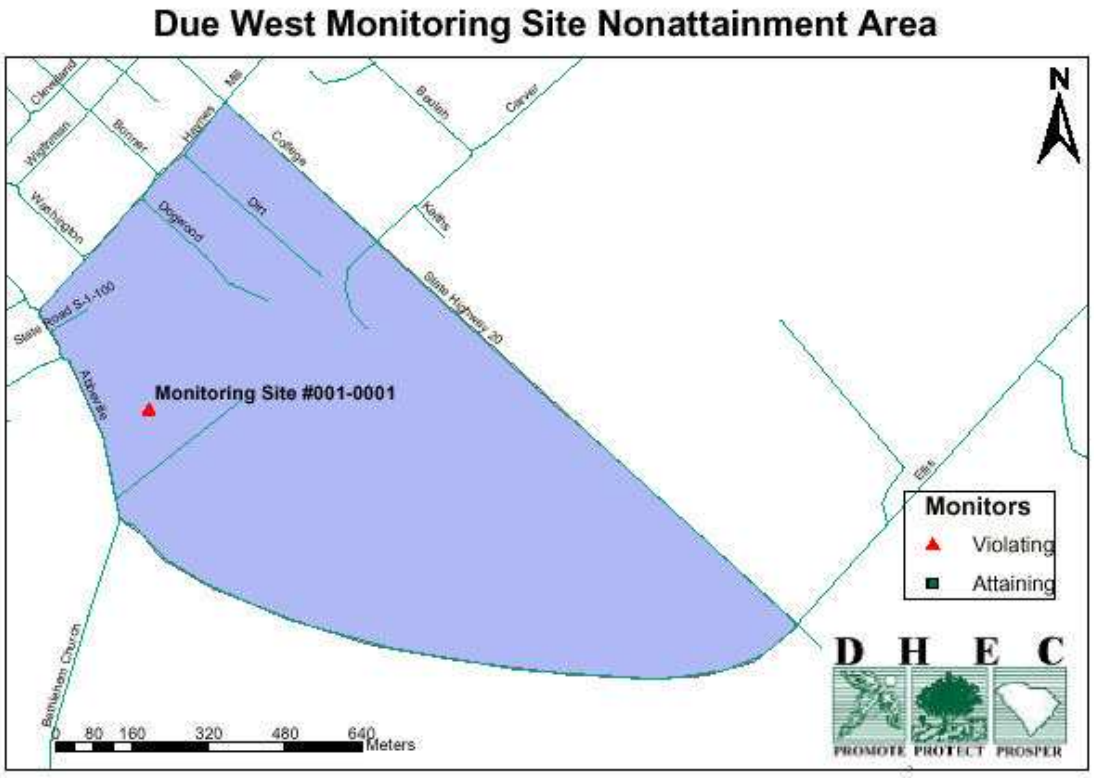


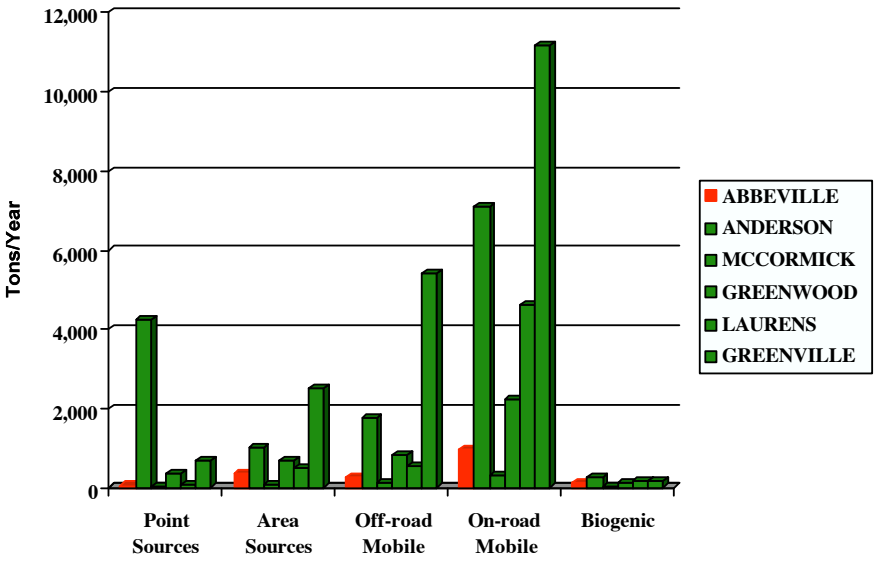
Figure 1: Due West Monitoring Site Nonattainment Area Map

The South Carolina Department of Health and Environmental Control (Department) recommends that the area encompassed by a boundary around the monitor site in Due West, Abbeville County, be designated a nonattainment area for the 8-hour ozone National Ambient Air Quality Standard (air quality standard) based on 2000 through 2002 monitoring data. This boundary is further described in Section I. The Department is also requesting that the United States Environmental Protection Agency (EPA) identify this area as a "rural transport area" in accordance with Section 182(h)(2) of the Clean Air Act (CAA), which states that the EPA may treat an ozone nonattainment area as a rural transport area if the Administrator finds that sources within the area do not make a significant contribution to the ozone concentrations measured in the area or in other areas. This recommended area will be referred to as the Due West Monitoring Site Nonattainment Area throughout the rest of this document.

Abbeville County is a rural county with a population in 2000 of 26,167. There are five (5) point sources accounting for 40 tons per year of NO_x and five (5) point sources accounting for 121 tons per year of VOCs in the county. Mobile source emissions are minor with 965 tons per year of NO_x and 625 tons per year of VOCs. As discussed later in this document, current meteorological information indicates that this area is influenced by transport from other areas. The monitor at Due West is marginally over the standard at 0.085 ppm and controls currently planned both regionally and nationally should lower the ozone concentrations at this location to below the standard. Therefore, a small boundary is recommended for nonattainment planning purposes. The Department is submitting this document to provide detailed information pertaining to the factors which EPA suggested be addressed in support of any nonattainment area designation recommendations.

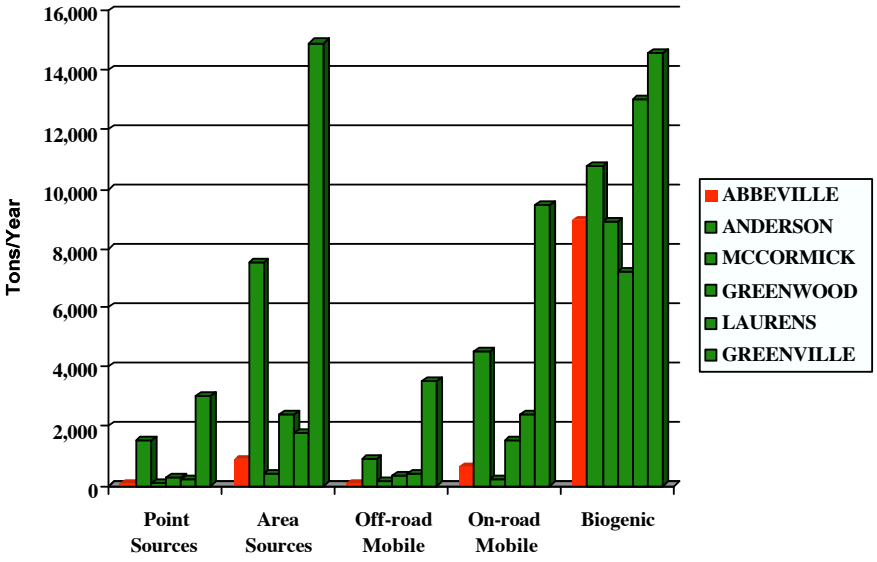
A. Emissions and Air Quality in Adjacent Areas (Including Adjacent MSAs)

Figure A-1: NOx Sources for Abbeville and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

Figure A-2: VOC Sources for Abbeville and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

To evaluate the emissions in Abbeville County and the adjacent areas, South Carolina utilized the estimated annual 1999 oxides of nitrogen (NO_x) and volatile organic compounds (VOC) emissions. The types of NO_x and VOC emission sources that were evaluated include point, area, biogenic, and on-road and off-road mobile sources. Figures A-1 and A-2 show the percentage of emissions from each source category for Greenville County and surrounding South Carolina Counties. Additional emissions inventory information is provided in Section D.

Abbeville County is not part of a Metropolitan Statistical Area (MSA). Air quality information is provided in Section C.

B. Population Density and Degree of Urbanization Including Commercial Development (Significant Difference from Surrounding Areas)

According to the US Census, urban is defined as all territory, population, and housing units in urbanized areas and urban clusters. An urbanized area is defined as a densely settled area that has a census population of at least 50,000, and an urban cluster is defined as a densely settled area that has a census population of 2,500 to 49,999. An urban area is a generic term that refers to both urbanized areas and urban clusters. Rural is defined as all territory, population, and housing units located outside of urbanized areas and urban clusters.

Based on these definitions, Abbeville County would be considered rural. Abbeville County is 508 square miles and had a population of 26,167 in 2000. The current population density is 51.5 persons per square mile and only 23.4 percent of the county's population, or 6,130 people live inside of urban clusters located in the town of Abbeville.

The recommended area covers a portion of the town of Due West, which has a population of 1,182 people. Assuming that the Due West Monitoring Site Nonattainment Area contains 20% of the population of Due West relative to the town limits and that the population of Due West is evenly distributed, the recommended nonattainment area is estimated to contain approximately 236 people. The Due West Monitoring Site Nonattainment Area is calculated to be 4.6 square miles.

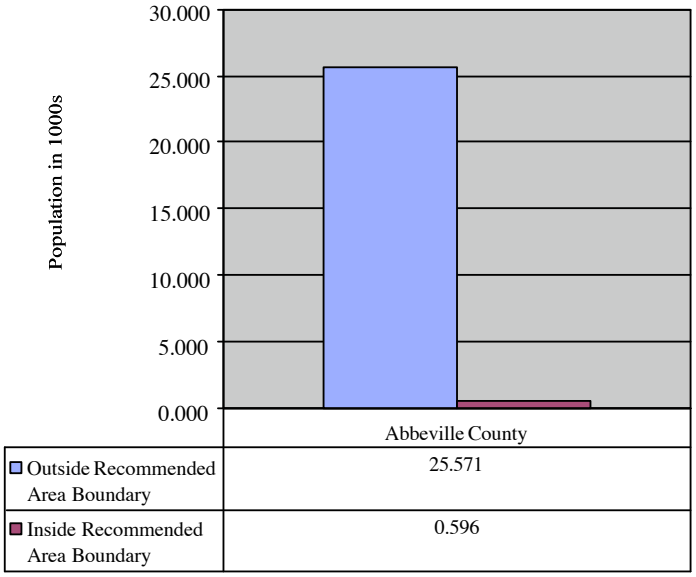
Table B-1 contains population data for both Abbeville County and the recommended Due West Monitoring Site Nonattainment Area.

	Table B-1: Total Population, Land Area, and Urban/Rural Population, 2000	
	Abbeville County	Recommended Area
Population[1]	26,167	236*
Land Area (Square Miles)[1]	508	4.6*
Persons per Square Mile[1]	51.5	51.5*
Urban Population[2]	6,130	236*
% Urban Population[2]	23.4%	0.0%
Rural Population[2]	20,037	296

[1] Data provided by US Census: 2000. Portions of the data for the recommended area were obtained from the SCDOT.
[2] Data provided by SC Office of Research and Statistics.

	Table B-1: Total Population, Land Area, and Urban/Rural Population, 2000	
	Abbeville County	Recommended Area
% Rural Population [2]	76.6%	100.0%
* The data for the recommended area is based on assumptions and is only estimates. The actual data may be greater than or less than the data provided.		

Figure B-1: Population Distribution
Relative to recommended Area Boundaries, 2000



Being predominantly rural, Abbeville County has various industry and businesses located throughout the county, but the largest business type in the county is manufacturing. In fact, manufacturing accounts for about 61.5 percent of the workforce in the county, although manufacturing establishments only total 38 establishments, or just over 11 percent of the county businesses. Retail trade is the second largest county employer as 541 persons work at some 64 retail businesses throughout the county. The unemployment rate for Abbeville County for 2002 was 8.7%.[3] The town of Abbeville, which is approximately less than 20 miles from the Due West monitoring site, appears to contain the majority - both employees and establishments - of the manufacturing and other business in the county. No manufacturing establishments, and hence no manufacturing employees, are located in the town of Due West or the recommended area, although there may be some retail trade establishments and employees in the recommended area.

C. Monitoring Data Representing Ozone Concentrations in Local Areas and Larger Areas (urban or regional scale)

[3] Data provided by the SC Employment Security Commission.

The Due West Monitoring Site Nonattainment Area Map (Figure 1) shows the ozone monitoring station in the Due West Monitoring Site Nonattainment Area. The Due West (45-001-0001) air-monitoring site is located in Abbeville County near the Dixie High School football field. The area surrounding the monitoring site is agricultural and it sits approximately 204 meters above sea level. The site has been in operation since 1991 and measurement of ozone concentrations occurs mid-March through mid-November. The monitoring objective for Due West site is to measure ozone concentrations for general background.

Table C-1 presents the 2000 through 2002 8-hour ozone monitoring data for Abbeville County. The design value is the annual fourth-highest daily maximum 8-hour ozone concentration, expressed in parts per million (ppm), averaged over three consecutive years. Since the 2002 ozone design value for the Due West monitoring site is 0.085 ppm, the site is marginally exceeding the 8-hour ozone standard.

Table C-1:
Due West Ozone Monitoring Data

County	Site ID	Site Name	4th Maximum 8-Hour			Design Value
			2000	2001	2002	
Abbeville	45-001-0001	Due West	0.085	0.082	0.088	0.085

Table C-2 contains the 2000 through 2002 daily maximum ozone concentrations above 0.084 ppm for the Due West monitoring site. The shaded box indicates the fourth-highest daily maximum 8-hour ozone concentration.

Table C-2:
Due West Site, Abbeville County

Year	Date of Exceedance	8-hour Average (ppm)
2000	06/02/2000	0.089
	08/09/2000	0.089
	06/01/2000	0.086
	05/19/2000	0.085
2001	05/18/2001	0.091
2002	06/13/2002	0.102
	09/10/2002	0.09
	07/06/2002	0.088
	09/05/2002	0.088
	09/11/2002	0.088
	07/05/2002	0.086

Table C-2: Due West Site, Abbeville County		
Year	Date of Exceedance	8-hour Average (ppm)
	08/08/2002	0.086
	08/21/2002	0.086
	06/18/2002	0.085
	07/17/2002	0.085

For the period from 2000 to 2002, only 16 of the 642 readings on the daily maximum 8-hour ozone average are greater than 0.084 ppm. If the projected annual fourth maximum 8-hour ozone average is less than or equal to 0.084 ppm in 2003, then the design value will be below the air quality standard. The Department requests that formal designations use the most current data available. As NO_x emissions are reduced at the national, regional, and urban area levels, it is expected that lower ozone levels will occur in this area.

D. Location of Emission Sources

Table D-1 lists the NO_x point sources that are in operation in Abbeville County based on the 1999 NO_x and VOC emissions inventory i-Steps data. The county has 5 NO_x point sources in operation. Abbeville County's NO_x point source emissions are 40.39 tons/year. There are not any point source emissions of NO_x in the Due West Monitoring Site Nonattainment Area.

Table D-1: Abbeville County Point Source NO2 Emissions

County	Plant Name	Permit Number	Pollutant	Point Source-NO2 (Tons Per Year)
Abbeville	Dura-Vent	0040-0013	NO2	0.06
Abbeville	Milliken:Abbeville	0040-0005	NO2	15.90
Abbeville	Mohawk:Calhoun Falls	0040-0001	NO2	16.43
Abbeville	Pirelli Power Cable:Abbeville	0040-0017	NO2	1.96
Abbeville	West Point Stevens:Calhoun	0040-0003	NO2	6.04
	1999 Abbeville Co Total			**40.39**
	Emissions in Nonattainment Area-Total			**0.00**
	Emissions in Nonattainment Area-Percent			**0.0%**

Table D-2 lists the VOC point sources that are in operation in Abbeville County based on the 1999 NO_x and VOC emissions inventory i-Steps data. The county has 5 VOC point sources in operation. Abbeville County's VOC point source emissions are 120.86 tons/year. There are not any point source emissions of VOC in the Due West Monitoring Site Nonattainment Area.

Table D-2: Abbeville County Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-VOC (Tons Per Year)**
Abbeville	Dura-Vent	0040-0013	VOC	43.48
Abbeville	Milliken:Abbeville	0040-0005	VOC	11.33
Abbeville	Mohawk:Calhoun Falls	0040-0001	VOC	1.79
Abbeville	Pirelli Power Cable:Abbeville	0040-0017	VOC	58.08
Abbeville	West Point Stevens:Calhoun	0040-0003	VOC	6.18
	1999 Abbeville Co Total			**120.86**
	Emissions in Nonattainment Area-Total			**0.00**
	Emissions in Nonattainment Area-Percent			**0.0%**

Table D-3 lists the NO_x on-road emissions for Abbeville County.

Table D-3: Abbeville County On-road NO_x Emissions			
County	**Tier 1**	**Tier 2**	**Highway NO_x (Tons Per Year)**
Abbeville	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	298.00
Abbeville	11-Highway Vehicles	02-Light-Duty Gas Trucks	171.00
Abbeville	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	49.00
Abbeville	11-Highway Vehicles	04-Diesels	447.00
	1999 Abbeville Co Total		**965.00**

Table D-4 lists the VOC on-road emissions.

Table D-4: Abbeville County On-road VOC Emissions			
County	**Tier 1**	**Tier 2**	**Highway VOC (Tons Per Year)**
Abbeville	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	343.00
Abbeville	11-Highway Vehicles	02-Light-Duty Gas Trucks	201.00
Abbeville	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	49.00
Abbeville	11-Highway Vehicles	04-Diesels	32.00
	1999 Abbeville Co Total		**625.00**

E. Traffic and Commuting Patterns

Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the South Carolina Department of Transportation (SCDOT). SCDOT determines current DVMT by multiplying traffic volume (through traffic counts) and lane miles (determined by the Highway Performance Monitoring System) for each particular area. The South Carolina Department of Public Safety, Division of Motor Vehicles, provided motor vehicle registration data. All other data in this section was obtained from the US Census Bureau. All data is based on the year 2000.

Table E-1[4] presents the breakdown by road classifications of DVMT traveled in Abbeville County from 2000 and projected through 2025. Abbeville County only had 578,094 DVMT in 2002 and is projected to have 789,900 DVMT for 2025.

	Table E-1: DVMT Data for Abbeville County			
	2000	**Projected 2007**	**Projected 2012**	**Projected 2025**
Abbeville County				
Rural Interstate (01)	-	-	-	-
Rural Principal Arterial (02)	137,955	152,107	162,216	188,499
Rural Minor Arterial (03)	159,381	175,731	187,410	217,775
Rural Major Collector (04)	83,796	92,392	98,533	114,498
Rural Minor Collector (05)	20,102	22,164	23,637	27,467
Rural Local (09)	93,022	102,565	109,381	127,104
Rural Total	*494,255*	*544,960*	*581,177*	*675,343*
Urban Interstate (11)	-	-	-	-
Urban Freeway/Expressway (12)	-	-	-	-
Urban Principal Arterial (13)	30,911	34,082	36,347	42,236
Urban Minor Arterial (14)	21,683	23,907	25,496	29,627
Urban Collector (15)	18,353	20,236	21,581	25,077
Urban Local (18)	12,892	14,214	15,159	17,615
Urban Total	*83,839*	*92,440*	*98,583*	*114,556*
Grand Total DVMT	**578,094**	**637,399**	**679,761**	**789,900**

Table E-2[5] presents the 2000 worker flow data from each of the counties. Some counties that are listed on this table are not being considered for boundary recommendations and are being included on this chart to account for all workers in each county. This table shows that approximately 52% of workers that live in Abbeville County work inside the county. Of the residents that work outside of Abbeville County, approximately 74% commute to the neighboring Counties of Greenwood or Anderson.

	Table E-2: Where People Work Who Live in SC		
	County of Residence		
County Worked In	Abbeville	Out of State	Grand Total
Grand Total	11,334	162	11,496
Abbeville	5,898	162	6,060
Aiken	15		15
Anderson	1,762		1,762
Berkeley	6		6
Edgefield	25		25
Florence	6		6
Greenville	527		527
Greenwood	2,271		2,271

[4] Data provided by SCDOT.
[5] Data provided by US Census: 2000.

	Table E-2: Where People Work Who Live in SC		
	County of Residence		
Laurens	147		147
Lexington	5		5
McCormick	123		123
Oconee	32		32
Out of State	345		345
Pickens	85		85
Richland	33		33
Spartanburg	45		45
Union	9		9

Figure E-1:
Urban vs. Rural DVMT for Abbeville County

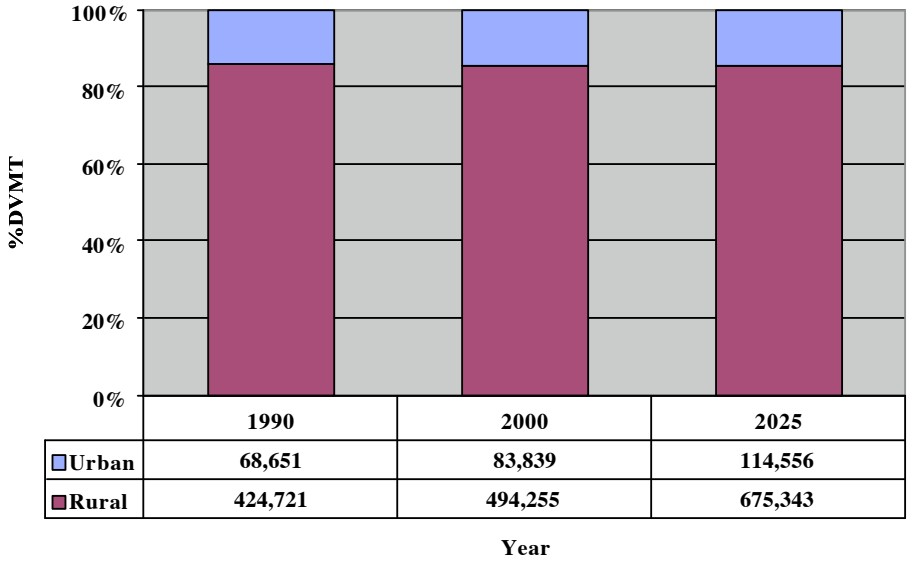


Figure E-1[6] presents the Urban and Rural DVMT comparison for Abbeville County. Note that only about 10-15% of the DVMT in Abbeville County is traveled on urban roads. This shows that there are few roads in Abbeville County that support large traffic volumes, and further supports the rural transport recommendation.

[6] Data provided by US Census: 2000.

Figure E-2:
2000 Motor Vehicle Registration for Abbeville County

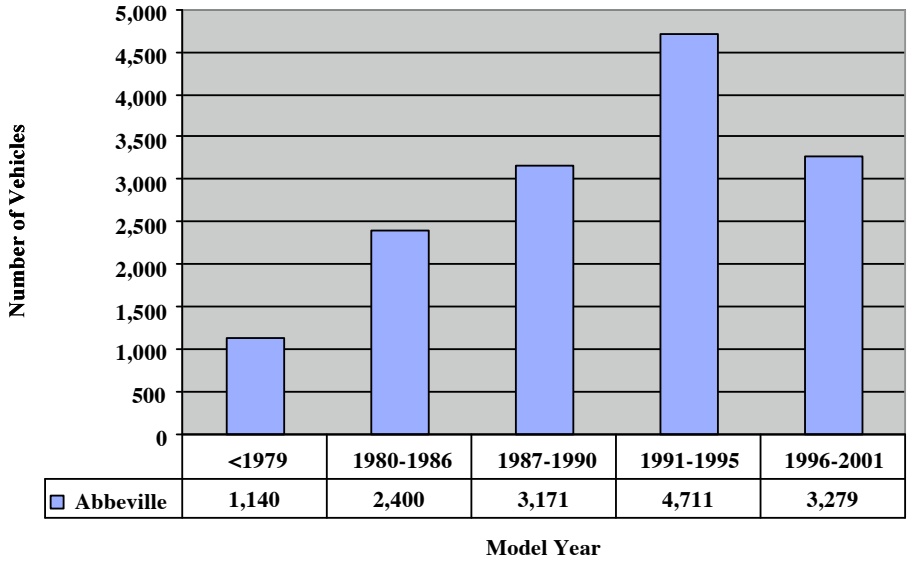


Figure E-2[7] presents the motor vehicle registration data for Anderson and Abbeville Counties. Only a small portion of the vehicles are pre-1981 model years. In 1981 new cars were outfitted with three-way catalysts, on-board computers, and oxygen sensors to help increase the efficiency of the catalytic converters. This figure shows that the majority of cars registered are model years 1991-1995. In 1991 the EPA established lower tailpipe standards for hydrocarbons and nitrogen oxides beginning with 1994 model year vehicles.

This data reflects 2000 registration figures, and many of the older vehicles will probably have been replaced with newer vehicles. These vehicle turnovers, combined with future national low sulfur fuel standards, the use of Onboard Diagnostic (OBD) systems, and Onboard Refueling Vapor Recovery (ORVR) systems will help to offset any potential impacts from the increased emissions from mobile sources in this area.

F. Expected Growth (Including Extent, Pattern, and Rate of Growth)

Limited data is available in assessing expected growth for Abbeville County. No known data is available for accurately assessing growth for the recommended area. Conclusions were drawn based on historical data from 1990, current data from 2000, and population projections for 2020 as contained in Table F-1. Economic growth, relative to population growth, is even harder to predict. No knowledge of major economic expansions is available. While it is certain that population counts will grow, it is only assumed that current economic factors will remain stable or that some economic growth will occur.

[7] Data provided from SC Department of Public Safety, Division of Motor Vehicles.

Table F-1: Historical and Projected Population and Population Density	
	Abbeville County
Population, 1990[8]	23,862
Population, 2000[9]	26,167
Projected Population, 2020[10]	29,350
Population. Growth Rate, 1990 – 2000 (Persons per 5 Years)	1152.5
Projected Population Growth Rate, 2000 - 2020 (Persons per 5 Years)	795.8
Land Area (Sq. Miles)	508
Persons per Sq. Mile, 2000	51.5
Projected Persons per Sq. Mile, 2020	57.8
Urban Population, 2000	6,130
% Urban Population, 2000	23.4%
Rural Population, 2000	20,037
% Rural Population, 2000	76.7%

The largest employment sector in the county is manufacturing.[11] The second and third largest sectors are health care and social assistance and retail trade, respectively.

G. Meteorology

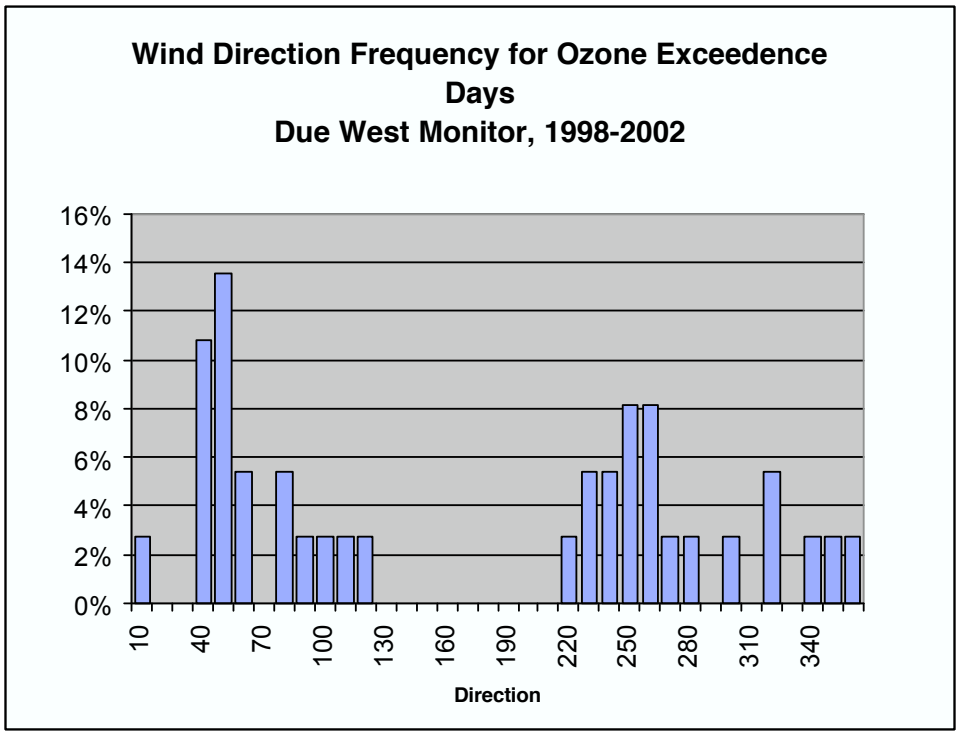
I. Introduction

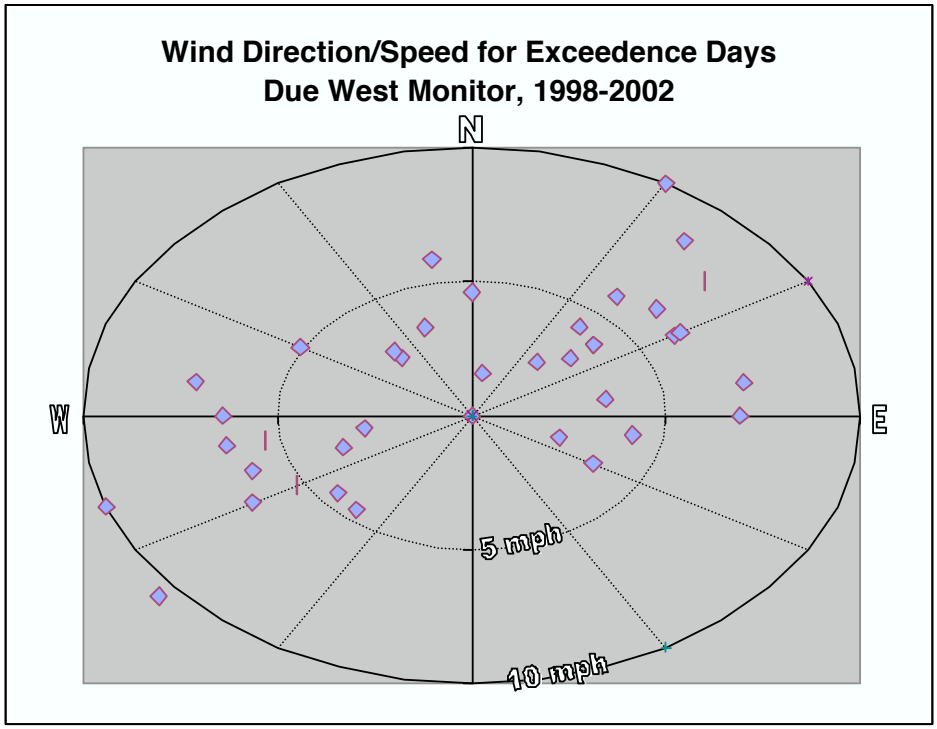
Meteorological conditions play an important role in sourcing precursory pollutants essential to the formation of ozone across a monitored geographical area. This is especially true for largely rural Abbeville County, an area devoid of significant sources of NO_x and VOC. Thus, peak concentrations of ground-level ozone measured at the Due West monitor, the sole monitoring site in Abbeville County, are determinant on the magnitude of upwind sourcing and high ozone events (8-hour peak ozone concentrations of 85 parts per billion (ppb) or more) which occur when high concentrations of pollutants from outside the local area are transported to the Due West vicinity by the ambient wind.

This dependence on upwind sourcing for high ozone events is evidenced by the distribution of surface wind directions during the 37 ozone "exceedence days" (8-hour peak concentration of 85 ppb or more) as measured at the Due West monitor during the 1998-2002 period (Figures G-1 and G-2). As shown in Figure G-1, the most frequent wind directions (24-hour average measured at the Greenville-Spartanburg Airport) during these episodes were northeasterly and west-southwesterly, while no winds were measured from the southeast through south-southwest sector. This same pattern is illustrated in the "wind rose" type graph in Figure G-2 in which each plotted point indicates the wind direction and speed for each of the 37 exceedence days. Wind directions from the northeast and west-southwest place the Due West monitor directly downwind of the Charlotte and Atlanta metropolitan areas, respectively. Conversely, there are no major metropolitan areas located in the southeast through south-southwest quadrant from Due West. Therefore, these data indicate on a broad scale that high ozone events at Due West occur most frequently when upwind sourcing is from high population urban areas.

[8] Data provided by US Census: 2000.
[9] Data provided by US Census: 2000.
[10] Data provided by EPA.
[11] Data provided by US Census: 2000.

Figures G-1 and G-2





To better illustrate the relationship between wind (speed, direction, and duration) and transport of ozone precursors into the Due West area, two representative high-ozone events were evaluated using meteorological data from the National Oceanic & Atmospheric Association's air resource lab website, namely near-surface (1000 mb) streamline analyses and low-level air back-trajectories. These analyses were compared with ozone concentration maps from EPA's AirNow mapping system to show the relationship between the wind field, patterns of regional ozone concentration, and peak ozone levels observed at the Due West monitor during these periods. The results of these evaluations confirm transport as the major reason for such high ozone levels at a monitoring site in such a sparsely populated and lightly industrialized county.

II. Example Event #1

The first "event" evaluated occurred from June 12-13, 2002, where levels by the afternoon hours on the 13 ultimately reached 102 ppb at the monitoring site. The genesis of the event occurred as many as 48 hours earlier on the afternoon of June 11, where levels over the Atlanta Metro area reached above 105 ppb (the "Red" category) for the second of three consecutive days (Figure G-3). In contrast, the Abbeville monitor barely reached the "Yellow" category, with an 8hr peak near 80 ppb that same afternoon (Figure G-3). Streamline analysis over the 12-hour overnight period (8pm 6/12 through 8am 6/13) (Figures G-4 through G-6) noted a very light (or less than 5 mph) westerly wind that eventually "recirculated" (became southerly then easterly) for a few hours between 8pm and midnight. By daybreak on the 13 (Figures G-7 & G-8) these winds, which had pushed the air mass back over its source areas from the day before, began flowing lightly back to the east towards the SC border. This now southwesterly flow became persistent throughout the morning and afternoon hours (Figures G-9 through G-12), transporting pollutants across a wide swath of the Piedmonts of Georgia, South Carolina, and ultimately, North Carolina (Figure G-14). Tracing the trajectory of the wind through the air mass back 24 hours (Figure G-13), elevated ozone across Abbeville County, and in fact the entire region, appears to follow a markedly precise vector back from northern Georgia.

Fig. G-3: 8-hour Average Peak Concentration on June 11th and June 12th, 2002

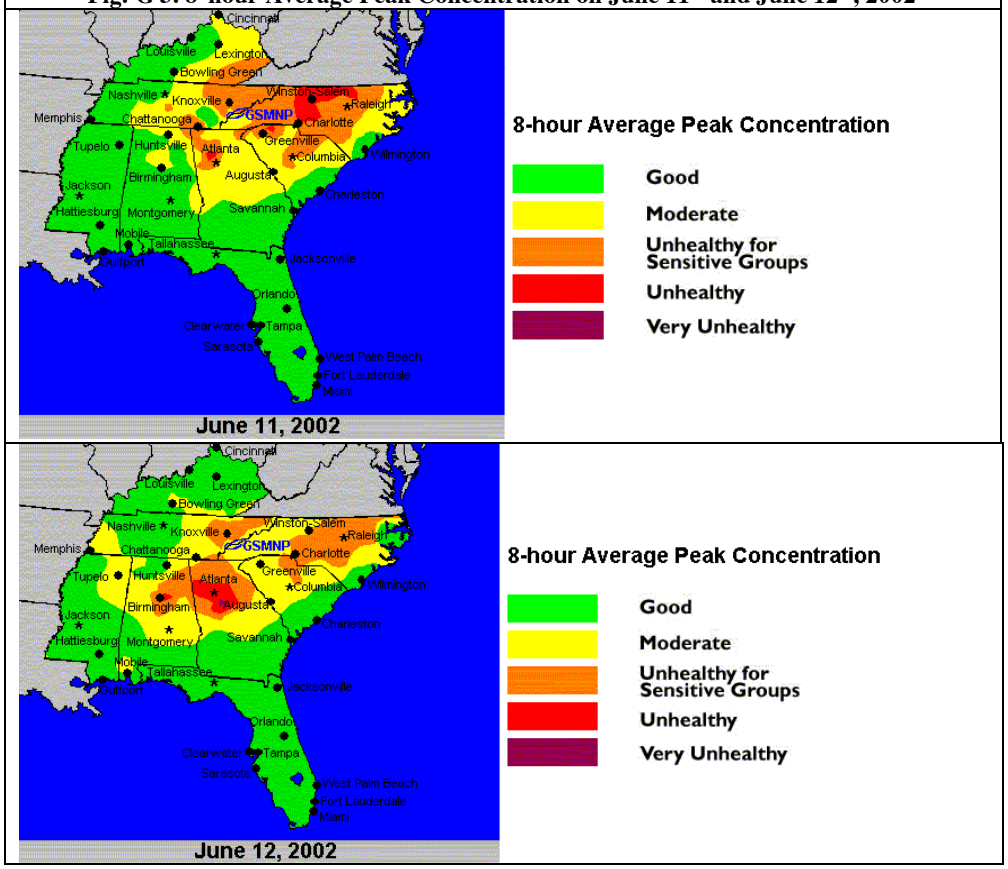


Fig. G-4: 1000mb Streamlines on June 12, 2002 at 8:00 pm

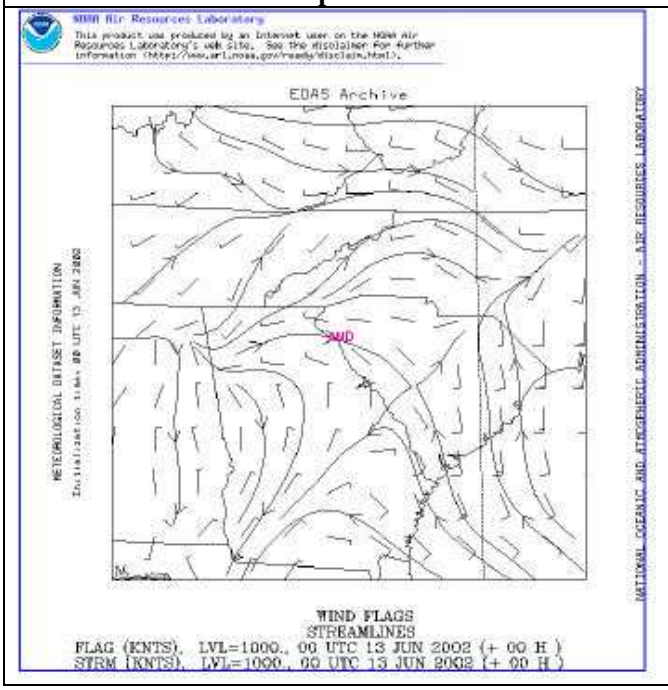


Fig. G-5: 1000mb Streamlines on June 12, 2002 at 11:00 pm

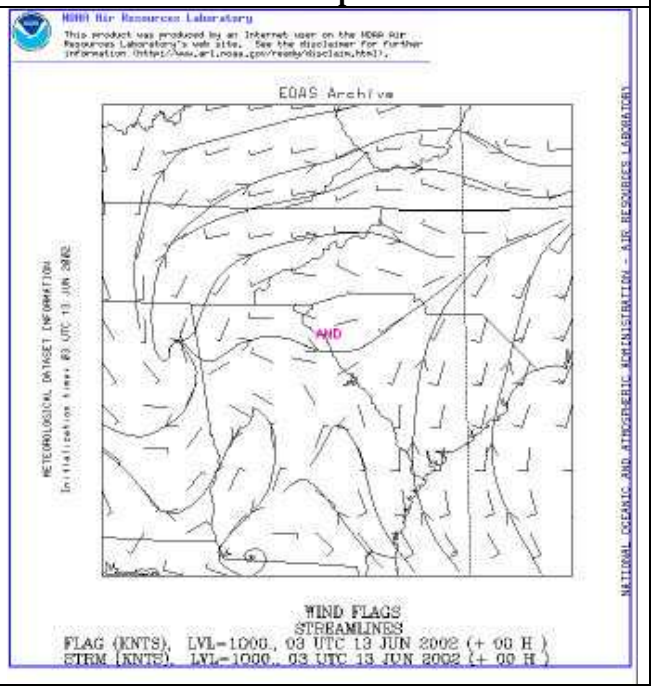


Fig. G-6: 1000mb Streamlines on June 13, 2002 at 2:00 am

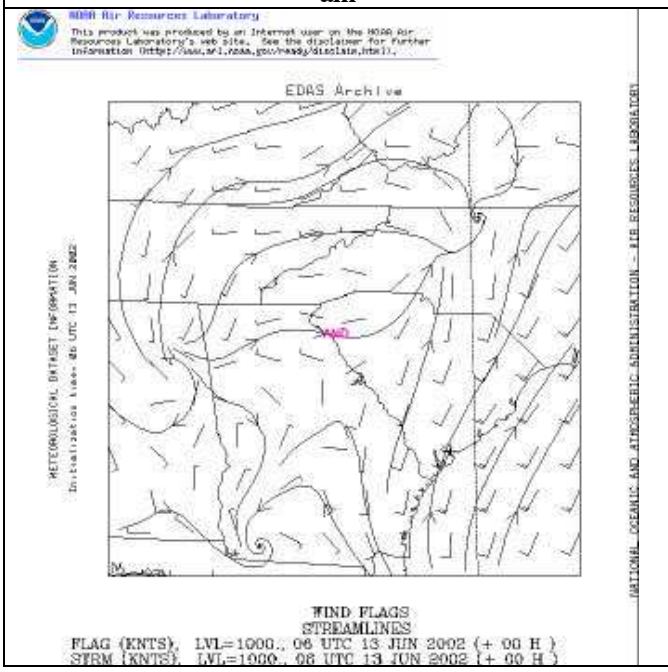


Fig. G-7: 1000mb Streamlines on June 13, 2002 at 5:00 am

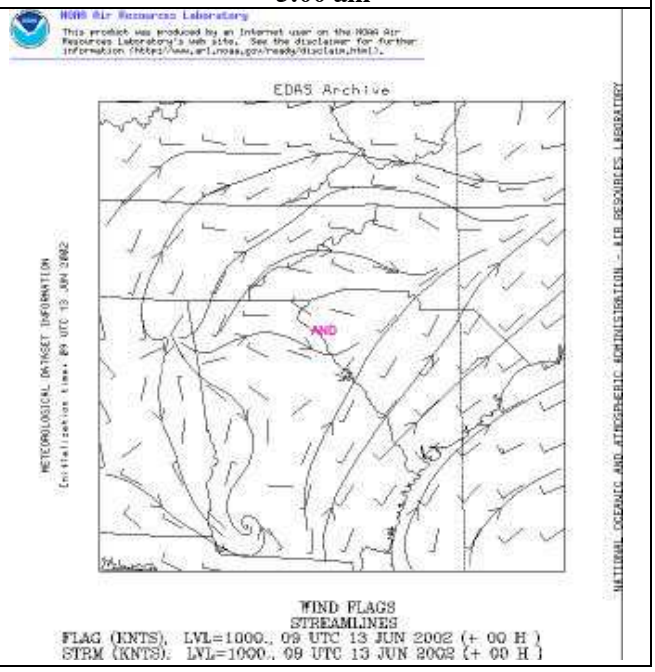


Fig. G-8: 1000mb Streamlines on June 13, 2002 at 8:00 am

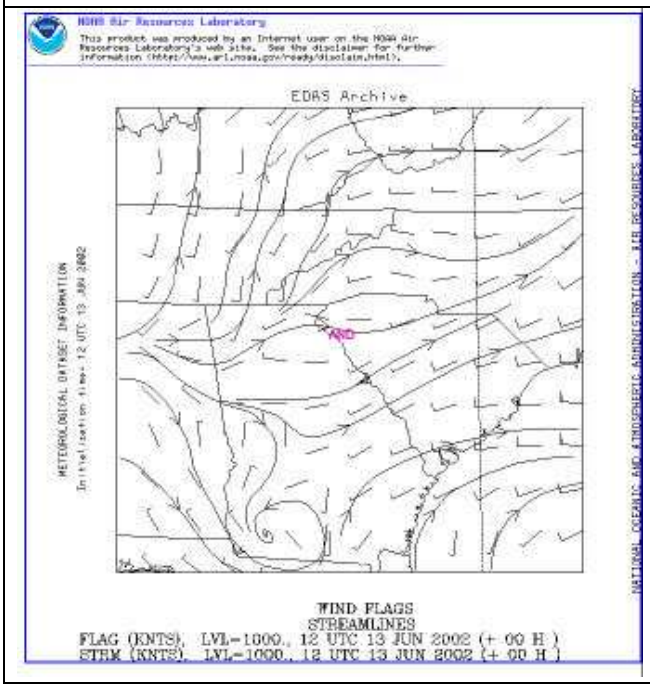


Fig. G-9: 1000mb Streamlines on June 13, 2002 at 11:00 am

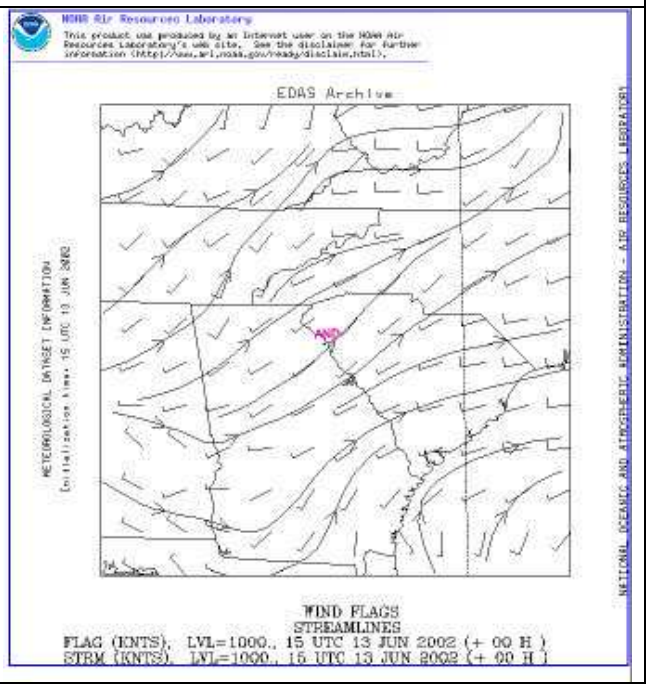


Fig. G-10: 1000mb Streamlines on June 13, 2002 at 2:00 pm

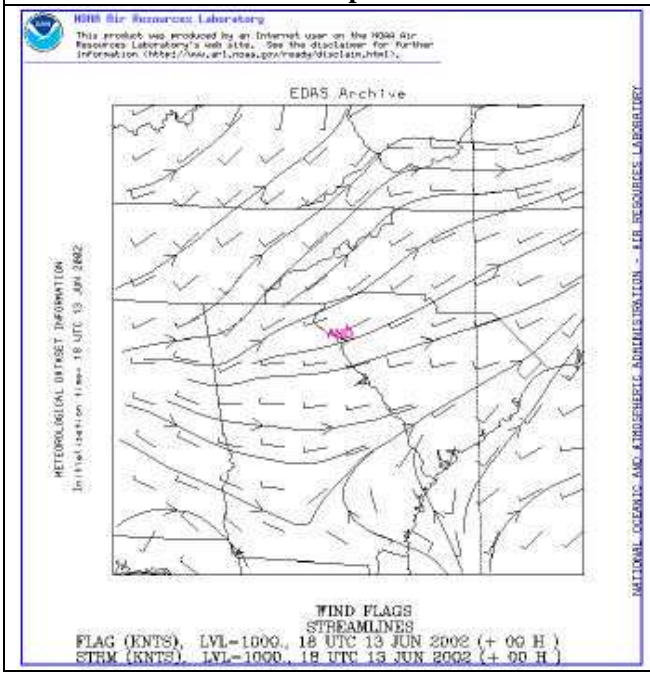


Fig. G-11: 1000mb Streamlines on June 13, 2002 at 5:00 pm

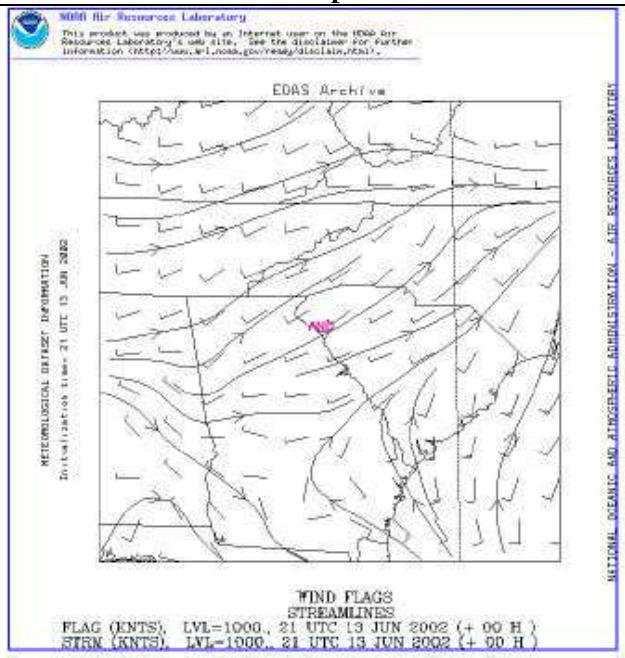


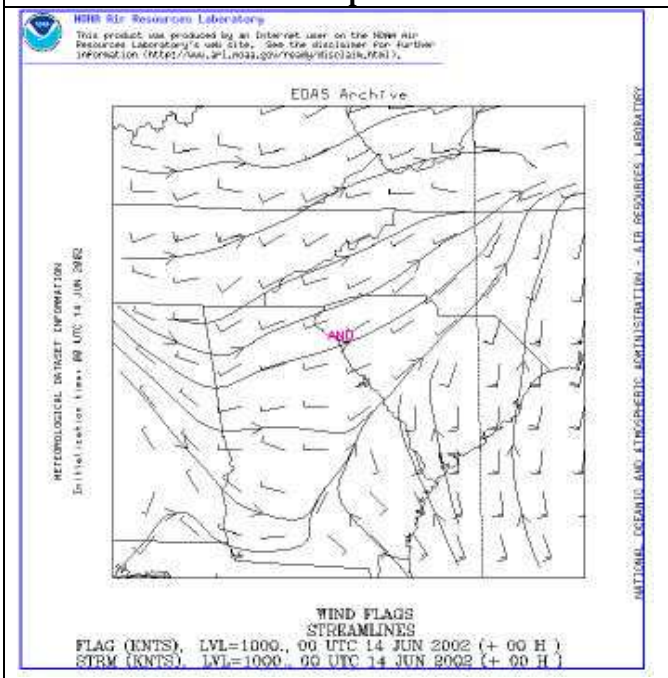
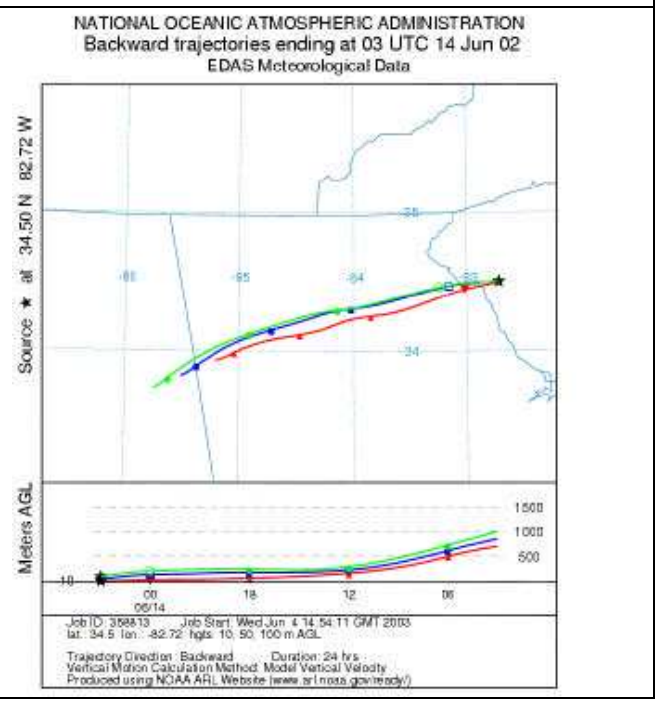
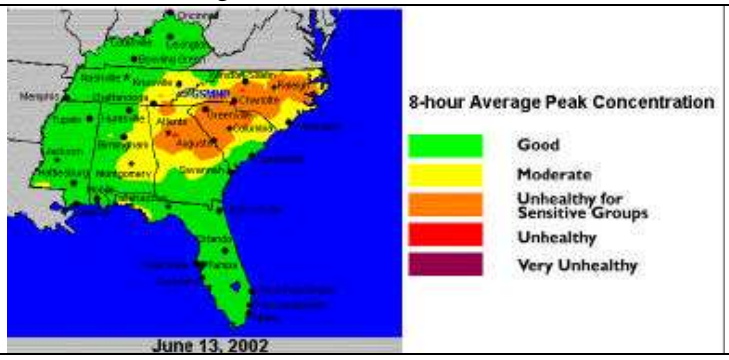
Fig. G-12: 1000mb Streamlines on June 13, 2002 at 8:00 pm	Fig. G-13: 24-hr Back-trajectory, 11pm, June 13th, 2002
	

Fig. G-14: 8-hour Average Peak Concentration on June 13, 2003



III. Example Event #2

To contrast the initial analysis, a second "event", which occurred from July 5-6, 2002, was evaluated. This event was selected as an example of sourcing from large metropolitan areas to the northeast that significantly increased ozone concentrations over the Due West site. Streamline analyses throughout the period (Figs. G-15 through G-23) show an elongated trof extending from the Gulf though the Atlantic Coastal areas. A significant cyclonic eddy developed along the trof in southern Georgia, moving slowly throughout the period along its axis into the Lowcountry of South Carolina (Figs. G-19 through G-22). Winds were fairly light from a general northerly direction in the zone of subsiding air on the northwestern

side of this feature. This brought pollutants from recent stagnation over the Mid-Atlantic region into North Carolina and, ultimately, the Upstate of South Carolina, including the Due West area (Fig. G-25). Once again, back-trajectory tracings demonstrate the source region for this period to be geographically far from the Abbeville area (Fig. G-24). Thus, as was the case of the previous evaluation, transport was shown as the main reason for levels exceeding the 8-hr standard at Due West on the 5 and 6.

Figs. G-15 thru G-23
1000mb Streamline analyses
July 4th, 2002 at 8:00pm through July 6th, 2002 at 8:00pm.

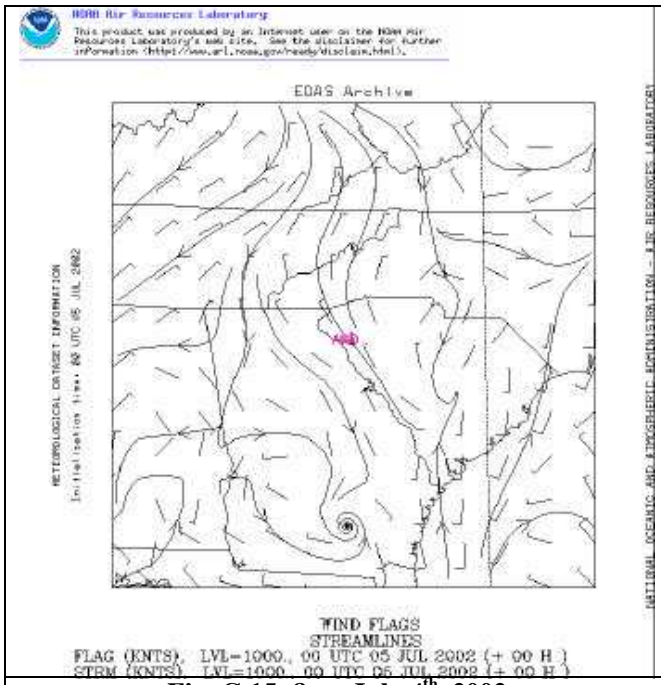


Fig. G-15: 8pm July 4th, 2002

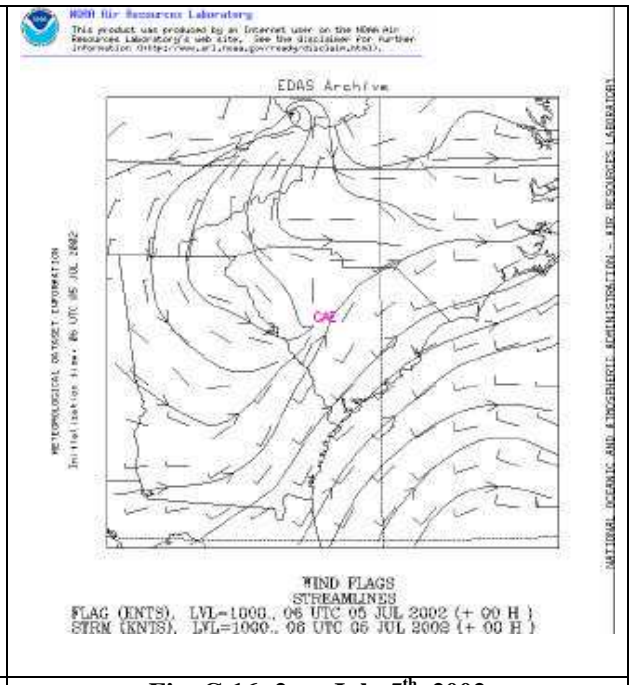


Fig. G-16: 2am July 5th, 2002

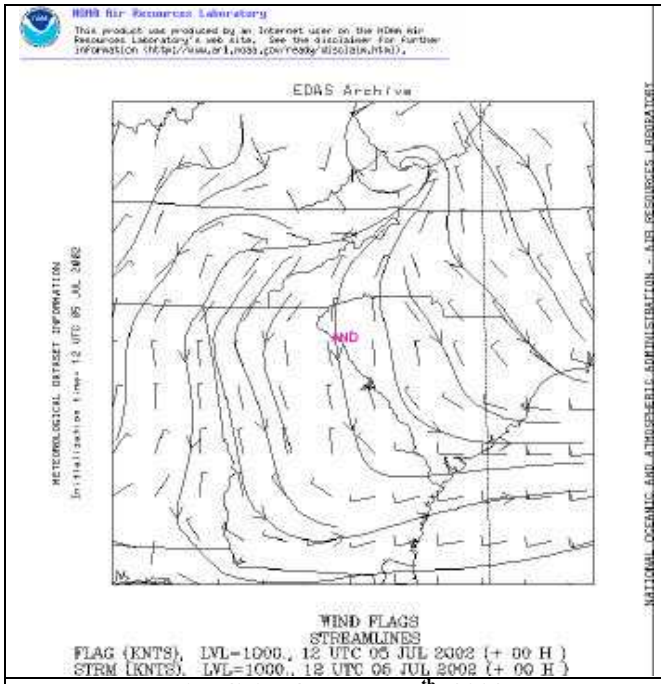


Fig. G-17: 8am July 5th, 2002

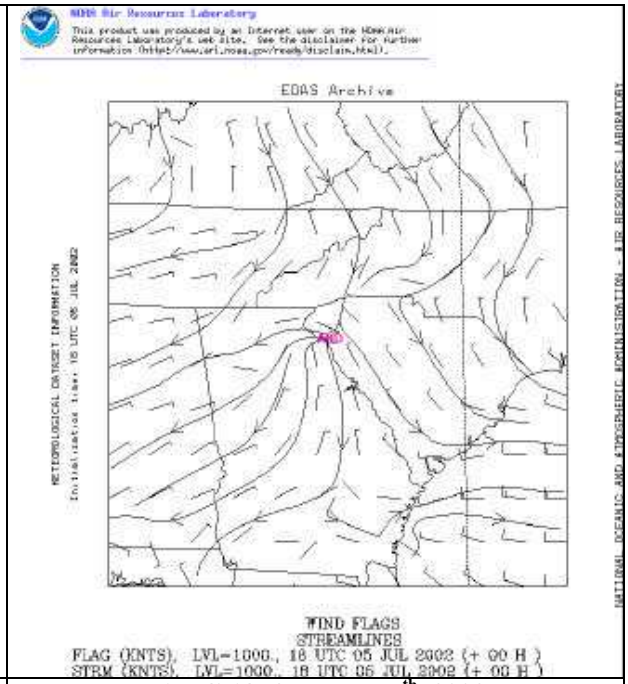


Fig. G-18: 2pm July 5th, 2002

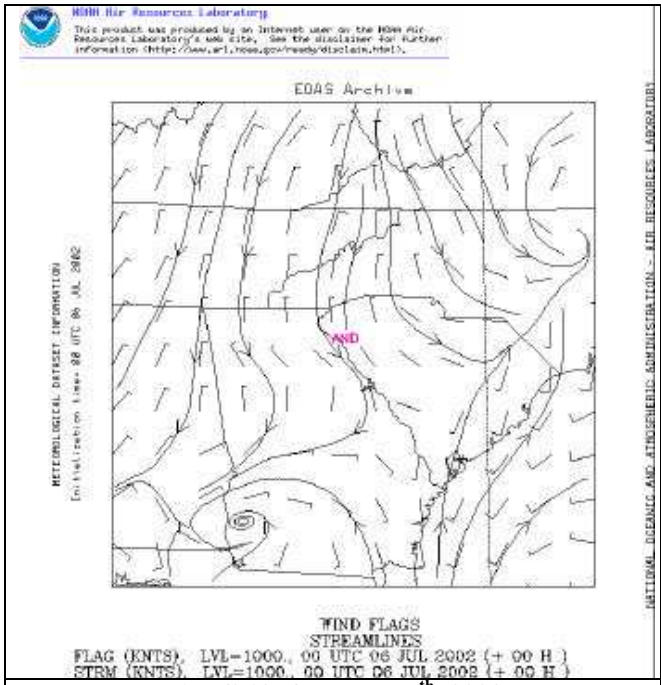


Fig. G-19: 8pm July 5th, 2002

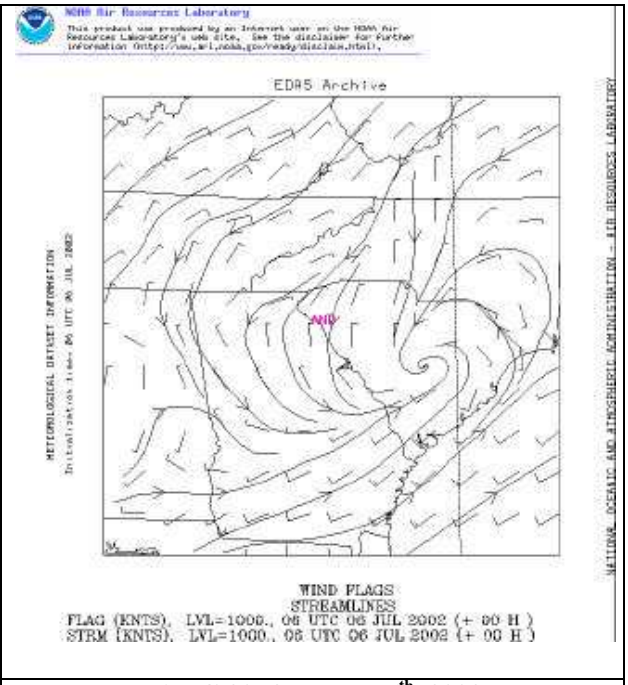


Fig. G-20: 2am July 6th, 2002

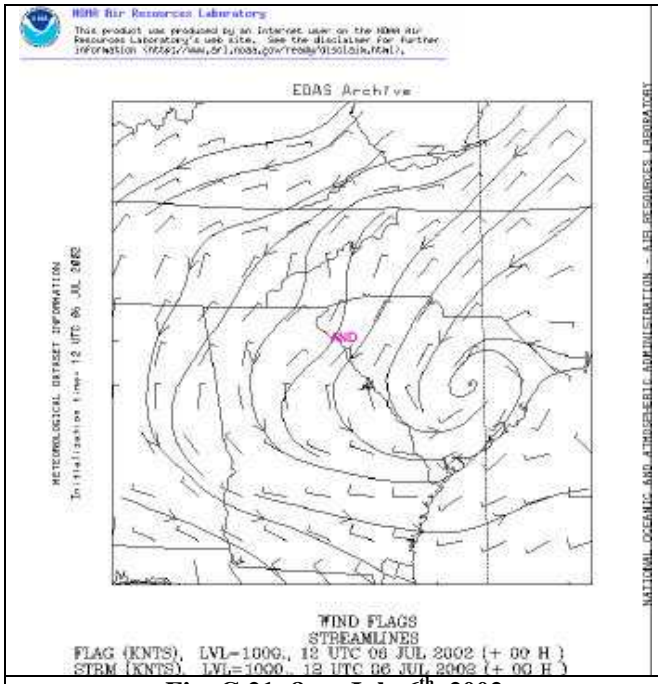


Fig. G-21: 8am July 6th, 2002

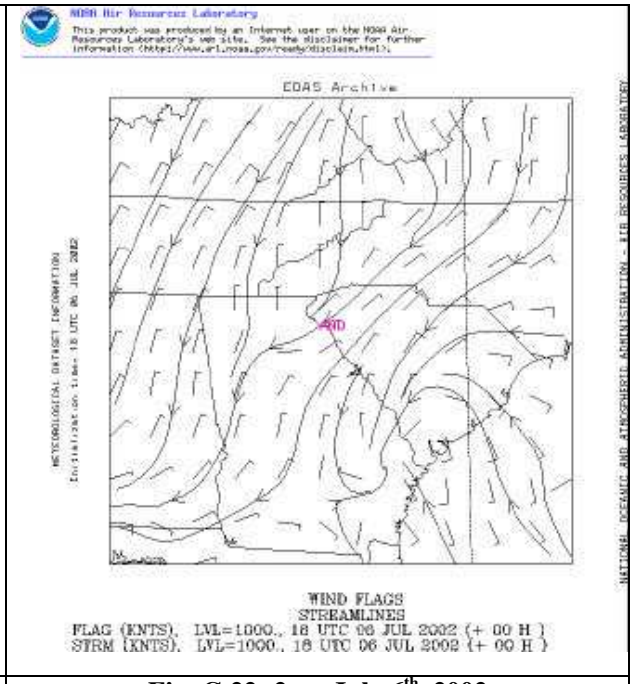


Fig. G-22: 2pm July 6th, 2002

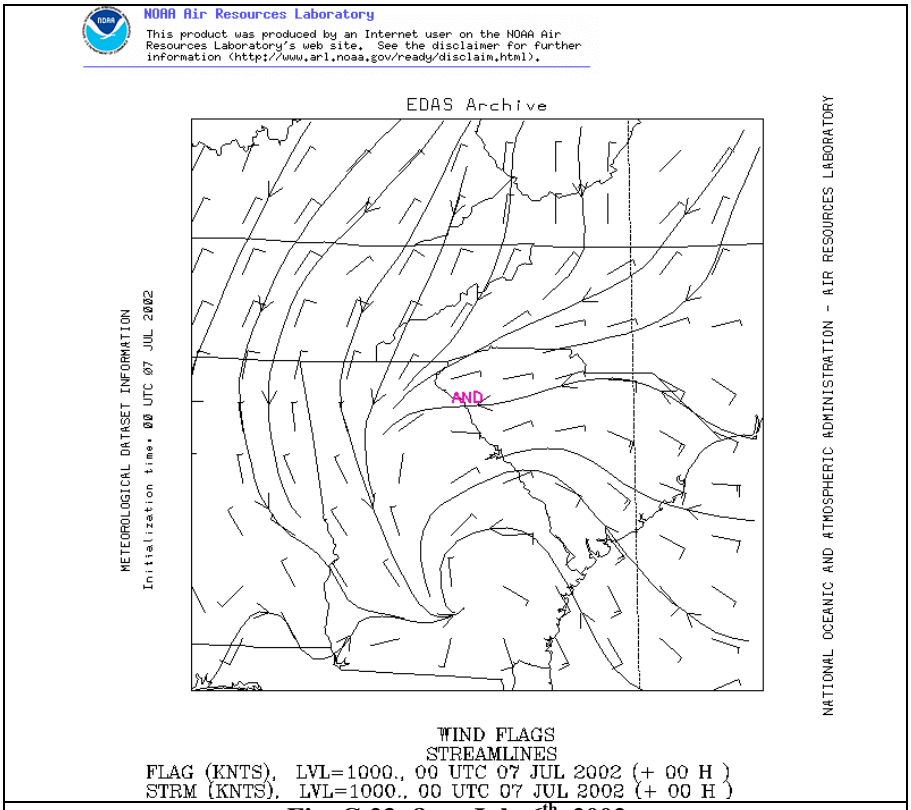


Fig. G-23: 8pm July 6th, 2002

Fig. G-24: 24-hr Back-trajectory, 8:00pm July 6th, 2002

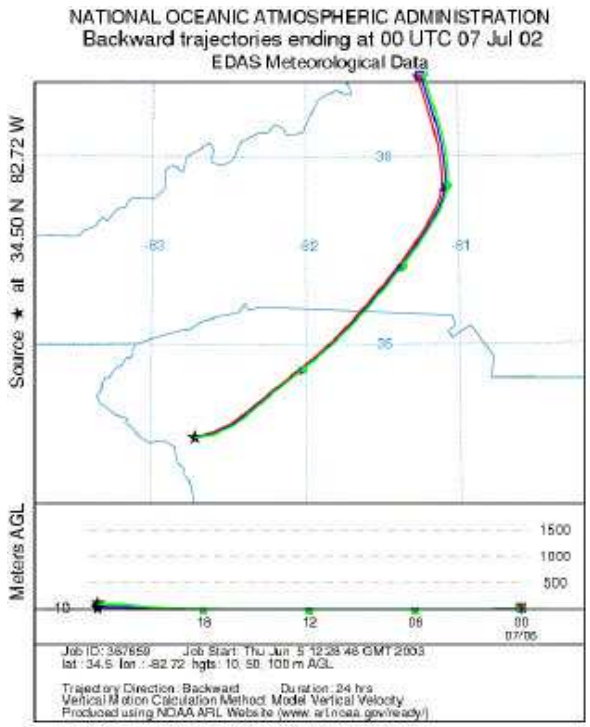
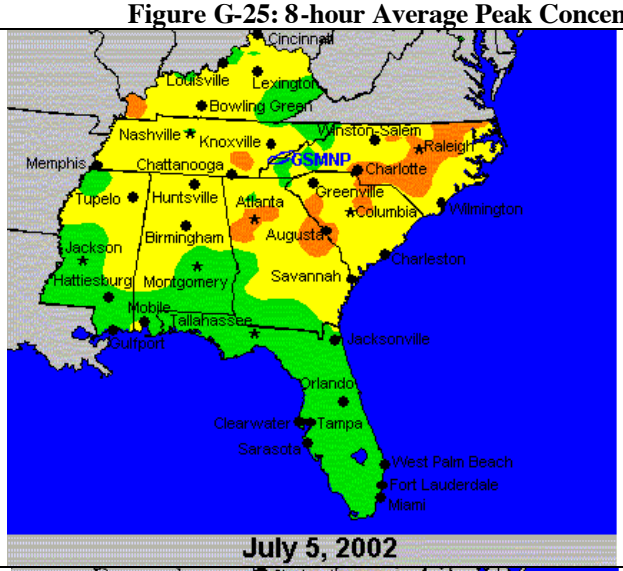
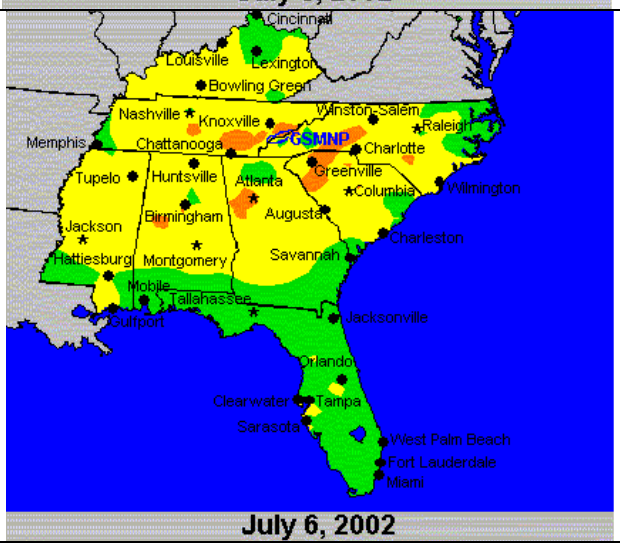


Figure G-25: 8-hour Average Peak Concentration July 5th & July 6th, 2002





IV. Summary

In summary, with native sourcing of NO_x and VOC from Abbeville County representing only 0.73% and 1.88% respectively of cumulative statewide releases, it is highly unlikely that emissions from this area alone can account for elevated ozone readings, especially "exceedence" events as evaluated above. All meteorological data reviewed clearly support upwind sourcing as the primary cause of elevated ozone measured at the Due West monitor, and the Department, as such, requests that the EPA treat Abbeville County as a "Rural Transport Area" in accordance with Section 182(h)(2) of the Clean Air Act.

H. Topography

See Section V - H of Introduction.

I. Jurisdictional Boundaries

The boundary of the Due West Monitoring Site Nonattainment Area is defined with the following description:

Starting point is in the town of Due West at the corner of Haynes Street (Mill Street) and College Street (SC 185 / SC 20).

Follows College Street (SC 185 / SC 20) southeast for 1.0 mile to Ellis Road (S-1-114).

Follows Ellis Road (SR-S-1-114) west then northwest for 0.8 miles. Ellis Road becomes Abbeville Street.

Follows Abbeville Street for 0.4 miles to Haynes Street.

Follows Haynes Street for 0.4 miles back to the starting point at College Street (SC 185 / SC 20).

J. Level of Control of Emission Sources

Through its participation with the Early Action Compact, Abbeville County is currently exploring local control strategies such as ozone awareness and education, open burning and mowing restrictions, and fuel efficient and low emission vehicles.

K. Regional Emissions Reductions

See Section V of the Introduction.

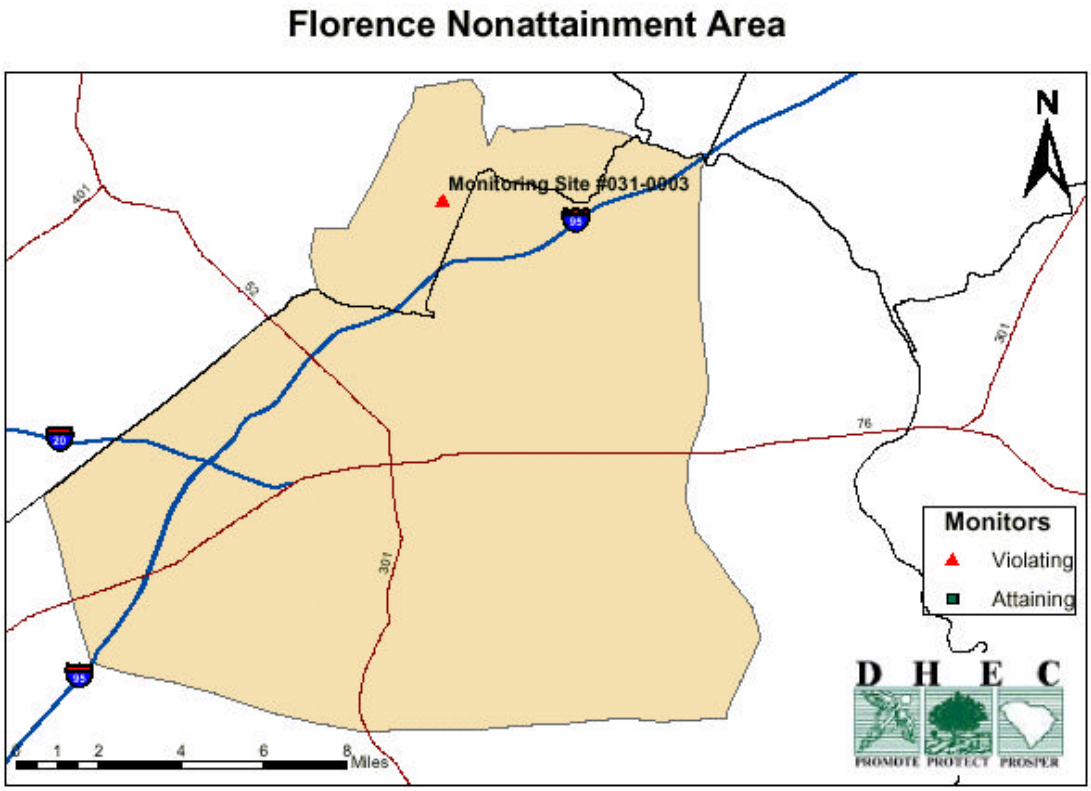


Figure 1: Florence Nonattainment Area Map

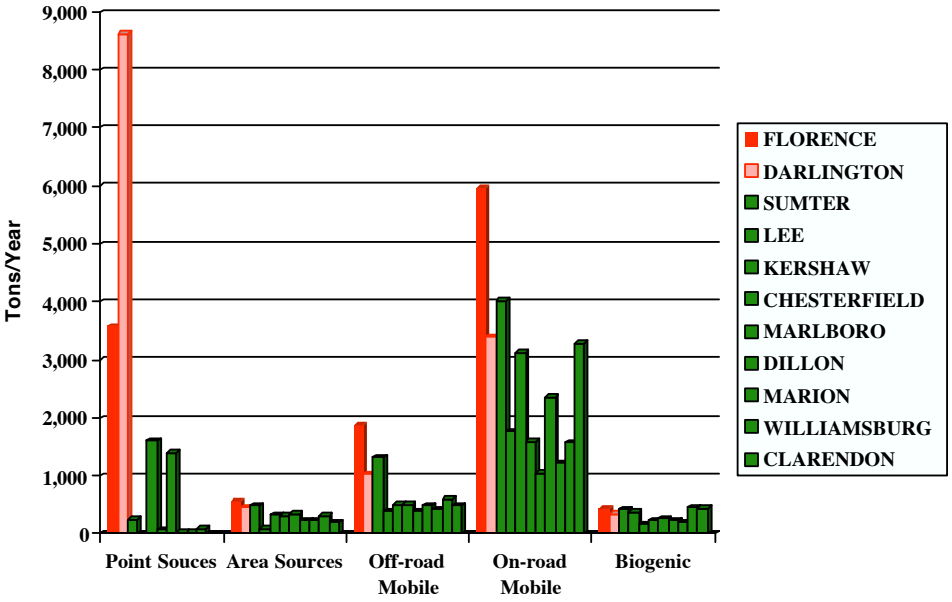
The South Carolina Department of Health and Environmental Control (Department) recommends that the area encompassed by the boundaries of the Florence Metropolitan Planning Organization (MPO) and a portion of Darlington County be designated a nonattainment area for violating the 8-hour ozone National Ambient Air Quality Standard (air quality standard) based on 2000 through 2002 monitoring data. This recommended area will be referred to as the Florence Nonattainment Area throughout the rest of this document.

The proposed Florence Nonattainment Area boundary captures 43% of the population of Florence and Darlington Counties. The portion not captured within the recommended boundary is predominately rural, particularly as 55% of Darlington County residents live in non-urban areas. There are two major NO_x sources in Darlington County, both of which are located outside the proposed boundary. However, both are subject to the NO_x SIP Call. One has a 2004 ozone season budget estimated at 458 tons and the other has 2004 ozone season emissions estimated at 723 tons. There is major NO_x one facility in Florence County, which is located outside the proposed boundary. However, it is subject to the NO_x SIP Call and it has 2004 ozone season emissions estimated at 1,366 tons. The recommended boundary captures 47% of the daily vehicle miles traveled and it is estimated that this number will remain constant in 2025. The monitor in the proposed boundary sits just across the Florence County line in Darlington County. This monitor is marginally violating the 8-hour ozone standard. Also, the Department operates an ozone monitor in Williamsburg County, southeast of Florence. This monitor indicates attainment of the ozone standard, supporting the recommended boundary for the Florence area.

The Department is submitting this document to provide detailed information pertaining to the factors which EPA suggested be addressed in support of any nonattainment area designation recommendations.

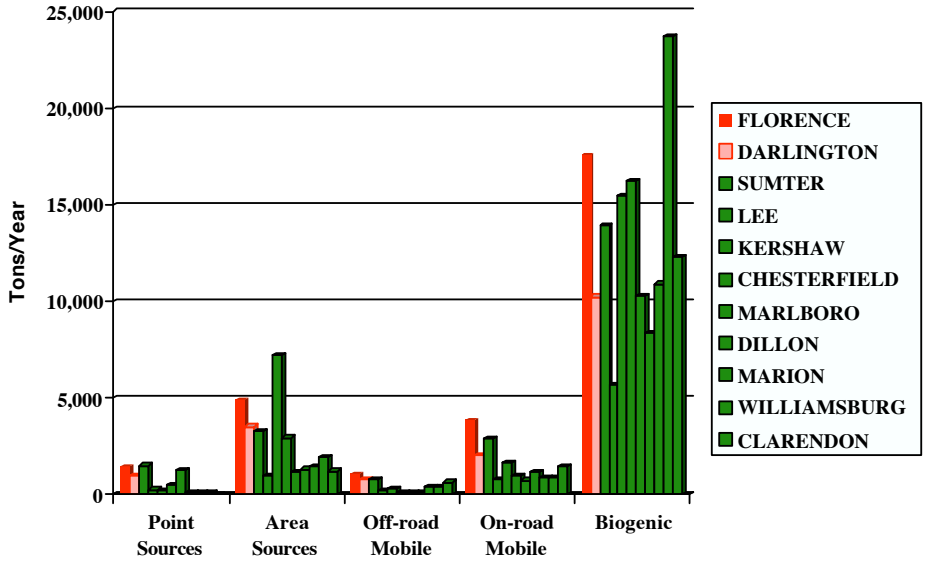
A. Emissions and Air Quality in Adjacent Areas (Including Adjacent MSAs)

Figure A-1: NOx Sources for Florence, Darlington and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

Figure A-2: VOC Sources for Florence, Darlington and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

To evaluate the emissions in Florence and Darlington Counties and the adjacent areas, the Department utilized the estimated annual 1999 oxides of nitrogen (NO_x) and volatile organic compounds (VOC) emissions. The types of NO_x and VOC emission sources that were evaluated include point, area, biogenic, and on-road and off-road mobile sources. Figures A-1 and A-2 show the percentage of emissions from each source category for Florence and Darlington and surrounding South Carolina counties. Additional emissions inventory information is provided in Section D.

The Department has one ozone-monitoring site in the Florence Nonattainment Area with three years of data. Only Florence County is a part of the Florence MSA. Air quality information is provided in Section C.

B. Population Density and Degree of Urbanization Including Commercial Development (Significant Difference from Surrounding Areas)

According to the US Census, urban is defined as all territory, population, and housing units in urbanized areas and urban clusters. An urbanized area is defined as a densely settled area that has a census population of at least 50,000, and an urban cluster is defined as a densely settled area that has a census population of 2,500 to 49,999. An urban area is a generic term that refers to both urbanized areas and urban clusters. Rural is defined as all territory, population, and housing units located outside of urbanized areas and urban clusters.

Florence County is 800 square miles and had a population of 125,761 in 2000. The current population density is 157.2 persons per square mile. The majority of Florence County is urban as 58% of Florence

County residents live in the urban area (either urbanized areas or urban clusters). The Florence County portion of the recommended area had a population of 78,676 in 2000. The recommended area encompasses about 63% of the population of Florence County. Covering 194.7 square miles, the recommended area has a population density of 404.2 persons per square mile.

Darlington County is 561 square miles and had a population of 67,394 in 2000. The current population density is 120.1 persons per square mile. The majority of Darlington County is rural as 54.6% of the county population lives in non-urban areas. The Darlington County portion of the recommended area is estimated to be about 28 square miles and the population is estimated to be about 3,460 people. Based on these two estimates, the population density for the Darlington County portion of the recommended area is 123.6 persons per square mile.

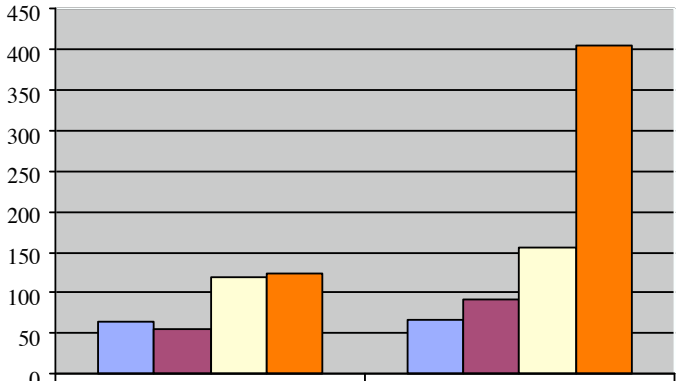
Table B-1:
Total Population, Land Area, and Urban/Rural Population, 2000

	Florence County	Recommended Area of Florence County	Darlington County	Recommended Area of Darlington County
Population[1]	125,761	78,676	67,394	3,460
Land Area (Square Miles)[1]	800	194.7	561	28
Persons per Square Mile[1]	157.2	404.2	120.1	123.6
Urban Population[2]	72,929	Unknown at this time	30,579	Unknown at this time
% Urban Population[2]	58	Unknown at this time	45.4	Unknown at this time
Rural Population[2]	52,832	Unknown at this time	36,815	Unknown at this time
% Rural Population[2]	42	Unknown at this time	54.6	Unknown at this time

* The data for the recommended area of Darlington County is based on assumptions and is only estimates. The actual data may be greater than or less than the data provided.

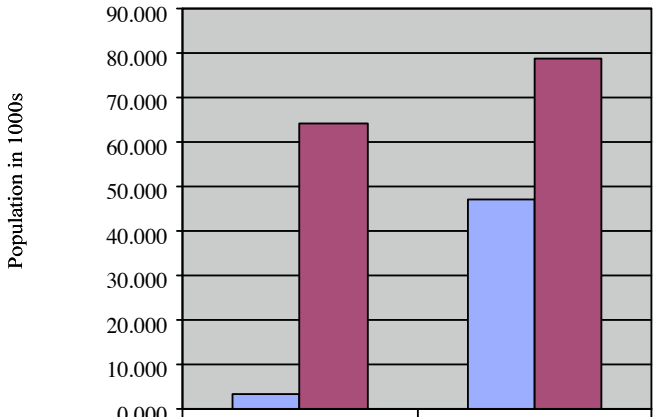
[1] Data provided by US Census: 2000 Portions of the data for the recommended area were obtained from the SCDOT.
[2] Data provided by SC Office of Research and Statistics.

Figure B-1: Population Density, 2000
(Persons per Square Mile)



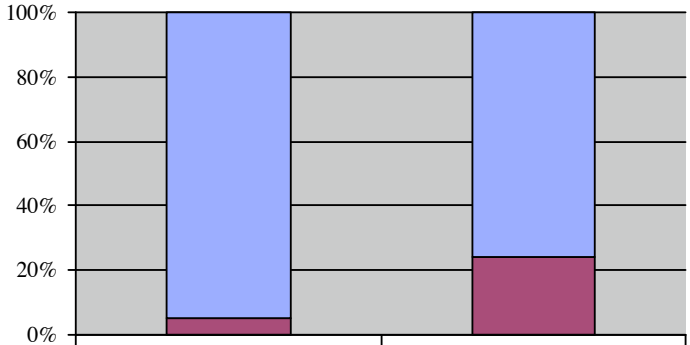
	Darlington	Florence
County Rural Persons per Sq. Mi.	65.6	66
County Urban Persons per Sq. Mi.	54.5	91.2
Total County Persons per Sq. Mi.	120.1	157.2
Recommended Area Persons per Sq. Mi.	123.6	404.2

Figure B-2: Population Distribution
Relative to Recommended Area Boundaries, 2000



	Darlington	Florence
Inside Recommended Area Boundary	3.460	47.085
Outside Recommended Area Boundary	63.934	78.676

Figure B-3: Land Area Distribution
According to Recommended Area Boundaries, 2000



	Darlington County	Florence County
Non-Recommended Area Land Area in Sq. Mi.	533.0	605.3
Recommended Area Land Area in Sq. Mi.	28.0	194.7

Figures B-1, B-2, and B-3 show the population density distribution, land area distribution, and population distribution, respectively, for Florence and Darlington Counties relative to the Florence Nonattainment Area boundaries.

According to the US Census, manufacturing is defined as the mechanical, physical, or chemical transformation of materials or substances into new products. The assembly of components into new products is also considered manufacturing, except when it is appropriately classified as construction. Establishments in the manufacturing sector are often described as plants, factories, or mills and typically use power-driven machines and materials-handling equipment. Also included in the manufacturing sector are some establishments that make products by hand, like custom tailors and the makers of custom draperies. While manufacturers typically do not sell to the public, some establishments like bakeries and candy stores that make products on the premises may be included. The retail trade sector comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.

The Florence Nonattainment Area contains a large majority of the economic development in both Florence and Darlington Counties. Sixty-six percent of the manufacturing employees in Florence County are contained inside of the Florence County portion of the recommended area boundary. The number of manufacturing employees in the Florence County portion of the recommended area (8,247 persons) outnumbers the number of manufacturing employees in the whole of Darlington County (8,145 persons) by one hundred two persons. Also, 89 out of 116 manufacturing establishments in Florence County, or 76.7%, are located inside the recommended area boundary. There is no data available to compare the location of retail trade establishments in Florence and Darlington Counties to the boundaries of the recommended area. It is reasonable to assume that a majority of the retail trade, like the manufacturing

sector, is contained inside the boundary, particularly for Florence County.

Tables B-2, B-3, and B-4 contain the manufacturing and retail trade data for Florence and Darlington Counties and the Florence Nonattainment Area.

	Table B-2: Total Number of Manufacturing Employees, 2000[3]		
	In Recommended Area Boundary	In County Boundary	Percent in Recommended Area Boundary
Florence	8,257	12,428	66.44%
Darlington	0	8,145	0.0%
Total	8,257	20,573	40.14%

	Table B-3: Total Number of Manufacturing Establishments, 2000 [3]		
	In Recommended Area Boundary	In County Boundary	Percent in Recommended Area Boundary
Florence	89	116	76.72%
Darlington	0	50	0.0%
Total	**139**	**166**	**83.73%**

	Table B-4: Retail Trade Patterns, 2000[4]	
	Number of Employees	Number of establishments
Florence Co.	26,275	1,860
Darlington Co.	4,671	367
Total	**30,946**	**2,227**

[3] Data from Bureau of Air Quality "SC Company File1.xls," based on 2001.
[4] Data provided by the US Census: 2000.

Figure B-4: Distribution of Manufacturing Employees, 2000

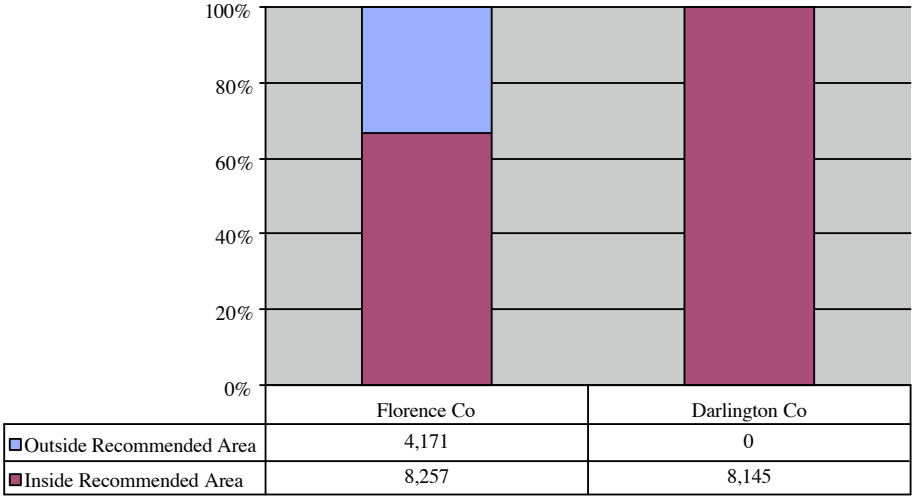


Figure B-4 shows the distribution of manufacturing employees relative to the recommended nonattainment boundaries

C. Monitoring Data Representing Ozone Concentrations in Local Areas and Larger Areas (urban or regional scale)

The Florence Nonattainment Area Map (Figure 1) shows the ozone monitoring station. A neighboring ozone monitor is located in Williamsburg County. The Darlington County ozone monitoring station (Pee Dee Experimental Station 45-031-003) is located on Road 21-26 in Darlington County and is approximately 39 meters above sea level. It was established in 1993. Ozone concentrations there are measured continuously (all year). The land surrounding this monitor is used for agriculture. The monitor lies approximately 0.5 miles west of the Florence County line and less than 1.5 miles by air to I-95. According to the South Carolina Department of Transportation (SCDOT) traffic count for 1993 shows that five hundred (500) vehicles per day accessed the road. The nearest schools are 5 miles south of the site and the nearest industry is a concrete plant on I-95, approximately 2 miles south of the site. The monitoring objective for Pee Dee Experimental Station is to measure ozone concentrations for general/background.

The Williamsburg County ozone monitoring station (Indiantown 45-089-0001) is approximately 15 to 20 miles away from the southern Florence County line, which supports a partial Florence County boundary since the monitoring site indicates attainment with the 8-hour ozone standard. The monitoring objective is to measure the ozone concentration for general background.

Table C-1 presents the 2000 through 2002 8-hour ozone monitoring data for Darlington and Williamsburg Counties. The design value is the annual fourth-highest daily maximum 8-hour ozone concentration, expressed in parts per million (ppm), averaged over three consecutive years. Since the

2002 ozone design value for the Pee Dee Experimental Station monitoring site is 0.086 ppm, the site is marginally exceeding the 8-hour ozone standard.

Table C-1:
Florence and Surrounding Area Ozone Monitoring Data

County	Site ID	Site Name	4th Maximum 8-Hour			Design Value
			2000	2001	2002	
Darlington	45-031-0003	Pee Dee Exp. Station	0.087	0.081	0.090	0.086
Williamsburg	45-089-0001	Indiantown	0.077	0.067	0.077	0.073

Table C-2 contains the 2000 through 2002 daily maximum ozone concentrations above 0.084 ppm for the Darlington and Williamsburg County monitoring stations. A period indicates that no exceedance occurred on the same day at that location.

Table C-2:
Pee Dee Experimental Station and Indiantown Sites

Date of Exceedance	Florence Daily Maximum 8-hour Average ppm	Williamsburg Daily Maximum 8-hour Average ppm
06/02/2000	0.1	.
06/03/2000	0.095	.
07/19/2000	0.09	.
08/18/2000	0.087	.
2000 Total Hits	**4**	**0**
08/23/2001	0.085	.
2001 Total Hits	**1**	**0**
05/24/2002	0.086	.
05/25/2002	0.099	.
06/03/2002	0.09	.
06/10/2002	0.086	.
07/03/2002	0.085	.
07/18/2002	0.094	.

Table C-2: Pee Dee Experimental Station and Indiantown Sites		
Date of Exceedance	Florence Daily Maximum 8-hour Average ppm	Williamsburg Daily Maximum 8-hour Average ppm
08/23/2002	0.088	.
09/11/2002	0.095	.
2002 Total Hits	**8**	**0**

D. Location of Emission Sources

Table D-1 lists the NO_x point sources that are in operation in Darlington and Florence Counties based on the 1999 NO_x and VOC emissions inventory iSteps data. Darlington County has 12 NO_x point sources in operation. None of these point sources are located within the nonattainment area. Florence County has 18 NO_x point sources in operation and 13 of these point sources are located within the nonattainment area. Facilities in Red are within the proposed boundary; facilities in Black are outside the proposed boundary.

Table D-1: Darlington & Florence Counties Point Source NO2 Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-NO2 (Tons Per Year)**
Darlington	Chesterfield Lumber	0820-0045	NO2	20.90
Darlington	CP&L: Robinson	0820-0002	NO2	5,010.35
Darlington	Darlington Shredding	0820-0014	NO2	4.39
Darlington	Darlington Veneer	0820-0011	NO2	1.16
Darlington	Galey&Lord: Society Hill	0820-0010	NO2	485.51
Darlington	Georgia-Pacific Corp	0820-0006	NO2	6.51
Darlington	Hartsville Oil Mill	0820-0008	NO2	13.19
Darlington	Nucor Steel: Darlington	0820-0001	NO2	91.96
Darlington	Royster-Clark Inc: Hartsville	0820-0003	NO2	3.97
Darlington	Sonoco: Hartsville	0820-0012	NO2	1,004.18
Darlington	Stingray Boats	0820-0040	NO2	0.24
Darlington	Wellman Ind: Palmetto	0820-0013	NO2	286.19
	1999 Darlington Co Total			**6,928.55**
	Emissions in Nonattainment Area-Total			**0.00**
	Emissions in Nonattainment Area-Percent			**0.0%**
Florence	APAC Carolina: #418 Florence	9900-0160	NO2	9.38
Florence	APAC Carolina: #422 Florence	9900-0217	NO2	4.32
Florence	Delta Mills: Pamplico/Cypress	1040-0011	NO2	3.50

Table D-1: Darlington & Florence Counties Point Source NO2 Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-NO2 (Tons Per Year)**
Florence	Dupont: Teijin Films	1040-0015	NO2	216.65
Florence	Esab Welding & Cutting Products	1040-0013	NO2	1.95
Florence	Ingram Lumber Co	1040-0016	NO2	4.04
Florence	Interstate Brands Corp	1040-0089	NO2	2.66
Florence	Koppers, Inc: Florence	1040-0008	NO2	11.30
Florence	Marsh Lumber Co	1040-0010	NO2	7.16
Florence	Maytag: Florence Plant	1040-0067	NO2	4.63
Florence	McCall Farms	1040-0070	NO2	6.27
Florence	McLeod Medical Center	1040-0048	NO2	5.75
Florence	Palmetto Paving: Florence	9900-0337	NO2	3.49
Florence	Roche Carolina	1040-0076	NO2	3.30
Florence	Stone Container: Florence	1040-0003	NO2	2,935.78
Florence	Vulcraft Division Of Nucor	1040-0029	NO2	1.29
Florence	Wellman Inc: Main Plant & Recycling	1040-0006	NO2	21.39
Florence	Young Pecan Company	1040-0026	NO2	0.16
	1999 Florence Co Total			**3,243.02**
	Emissions in Nonattainment Area-Total			**246.88**
	Emissions in Nonattainment Area-Percent			**8.2%**

There are two major NO_x sources in Darlington County that are subject to the NO_x SIP Call, Sonoco and CP&L: Robinson. Sonoco has a 2004 ozone season NO_x budget estimated at 458 tons. CP&L: Robinson has a 2004 ozone season NO_x budget of 723 tons. There is only one facility in Florence County that is subject to the SIP Call, Stone Container. Stone Container has a 2004 ozone season NO_x budget estimated at 1,366 tons.

Table D-2 lists the VOC point sources that are in operation in Darlington and Florence Counties based on the 1999 NO_x and VOC emissions inventory i-Steps data. The county of Darlington has 12 VOC point sources in operation. None of the point sources are located within the nonattainment area. Florence County has 19 VOC point sources in operation and 15 are located within the nonattainment area.

Table D-2: Darlington & Florence Counties Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-VOC (Tons Per Year)**
Darlington	Chesterfield Lumber	0820-0045	VOC	141.72
Darlington	CP&L: Robinson	0820-0002	VOC	14.13
Darlington	Darlington Shredding	0820-0014	VOC	0.00
Darlington	Darlington Veneer	0820-0011	VOC	0.02
Darlington	Galey&Lord: Society Hill	0820-0010	VOC	534.48
Darlington	Georgia-Pacific Corp	0820-0006	VOC	41.47
Darlington	Hartsville Oil Mill	0820-0008	VOC	58.66

Table D-2: Darlington & Florence Counties Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-VOC (Tons Per Year)**
Darlington	Nucor Steel: Darlington	0820-0001	VOC	159.10
Darlington	Royster-Clark Inc: Hartsville	0820-0003	VOC	0.10
Darlington	Sonoco: Hartsville	0820-0012	VOC	191.32
Darlington	Stingray Boats	0820-0040	VOC	70.39
Darlington	Wellman Ind: Palmetto	0820-0013	VOC	191.91
	1999 Darlington Co Total			**1,403.30**
	Emissions in Nonattainment Area-Total			**0.00**
	Emissions in Nonattainment Area-Percent			**0.0%**
Florence	APAC Carolina: #418 Florence	9900-0160	VOC	4.50
Florence	APAC Carolina: #422 Florence	9900-0217	VOC	0.71
Florence	Delta Mills: Pamplico/Cypress	1040-0011	VOC	5.80
Florence	Dupont: Teijin Films	1040-0015	VOC	43.50
Florence	Esab Welding & Cutting Products	1040-0013	VOC	30.34
Florence	Interstate Brands Corp	1040-0089	VOC	79.41
Florence	Koppers, Inc: Florence	1040-0008	VOC	44.40
Florence	Marsh Lumber Co	1040-0010	VOC	0.55
Florence	Maytag: Florence Plant	1040-0067	VOC	7.39
Florence	McCall Farms	1040-0070	VOC	0.03
Florence	McLeod Medical Center	1040-0048	VOC	2.37
Florence	Palmetto Paving: Florence	9900-0337	VOC	2.55
Florence	Roche Carolina	1040-0076	VOC	0.07
Florence	Socar	1040-0086	VOC	149.98
Florence	Steelfab	1040-0092	VOC	9.98
Florence	Stone Container: Florence	1040-0003	VOC	1,375.85
Florence	Vulcraft Division Of Nucor	1040-0029	VOC	582.33
Florence	Wellman Inc: Main Plant & Recycling	1040-0006	VOC	41.18
Florence	Young Pecan Company	1040-0026	VOC	0.01
	1999 Florence Co Total			**2,380.95**
	Emissions in Nonattainment Area-Total			**957.54**
	Emissions in Nonattainment Area-Percent			**40.2%**

Table D-3 lists the NO_x on-road emissions for Darlington and Florence Counties and Table D-4 lists the VOC on-road emissions.

Table D- 3: Darlington & Florence Counties On-road NO_x Emissions			
County	**Tier 1**	**Tier 2**	**Highway NO_x (Tons Per Year)**
Darlington	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	1,086.00
Darlington	11-Highway Vehicles	02-Light-Duty Gas Trucks	606.00
Darlington	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	165.00
Darlington	11-Highway Vehicles	04-Diesels	1,545.00
	1999 Darlington Co Total		**3,402.00**
Florence	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	1,993.00
Florence	11-Highway Vehicles	02-Light-Duty Gas Trucks	1,101.00
Florence	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	292.00
Florence	11-Highway Vehicles	04-Diesels	2,589.00
	1999 Florence Co Total		**5,975.00**

Table D-4: Florence County On-road VOC Emissions			
County	**Tier 1**	**Tier 2**	**Highway VOC (Tons Per Year)**
Darlington	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	1,125.00
Darlington	11-Highway Vehicles	02-Light-Duty Gas Trucks	649.00
Darlington	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	156.00
Darlington	11-Highway Vehicles	04-Diesels	98.00
	1999 Darlington Co Total		**2,028.00**

E. Traffic and Commuting Patterns

Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the South Carolina Department of Transportation (SCDOT). SCDOT determines current DVMT by multiplying traffic volume (through traffic counts) and lane miles (determined by the Highway Performance Monitoring System) for each particular area. The South Carolina Department of Public Safety, Division of Motor Vehicles, provided motor vehicle registration data. All other data in this section were obtained from the US Census Bureau. All data is based on the year 2000.

Table E-1: DVMT for Florence Nonattainment Area.[5]				
County	**2000 DVMT**	**2025 DVMT**	**DVMT Change (2000-2025)**	**Projected % Annual Change**
Florence	4,228,587	6,318,159	2,089,572	1.98
Darlington	2,007,033	2,909,582	902,550	1.80
County Total	6,235,620	9,227,741	2,992,122	1.92

[5] Data provided by SCDOT.

Table E-1: DVMT for Florence Nonattainment Area.[5]				
County	**2000 DVMT**	**2025 DVMT**	**DVMT Change (2000-2025)**	**Projected % Annual Change**
Florence Nonattainment Total[6]	2,643,724	4,336,050	1,692,326	2.56
% DVMT Captured inside MPO boundary	42.40	47.00		

There are eight major routes of travel through Darlington and Florence Counties. They include two interstates (I-20, and I-95), and six US Highways (US 76, US 401, US 301, US 378, US 15 and US 52). Both interstates are located within the Florence Nonattainment Area. There are also numerous State and secondary roads in the area that connect the larger towns. I-20 terminates in Florence and is the major corridor of travel to Columbia, South Carolina.

Table E-2[7] presents the breakdown by road classifications of DVMT traveled in the Florence Nonattainment Area counties from 2000 and projected through 2025.

	Table E-2: DVMT Data for Florence Nonattainment Area Counties			
	2000	Projected 2007	Projected 2012	Projected 2025
Darlington County				
Rural Interstate (01)	334,983	420,863	482,205	641,696
Rural Principal Arterial (02)	433,026	473,555	500,628	586,074
Rural Minor Arterial (03)	215,307	235,459	248,919	291,405
Rural Major Collector (04)	435,277	476,017	503,230	589,121
Rural Minor Collector (05)	25,263	27,628	29,207	34,192
Rural Local (09)	247,639	270,817	286,299	335,165
Rural Total	1,691,496	1,904,339	2,050,489	2,477,653
Urban Interstate (11)	26,775	30,788	33,655	41,108
Urban Freeway/Expressway (12)	-	-	-	-
Urban Principal Arterial (13)	14,527	15,887	16,795	19,661
Urban Minor Arterial (14)	177,581	194,202	205,304	240,345
Urban Collector (15)	43,336	47,392	50,101	58,652
Urban Local (18)	53,318	58,308	61,642	72,163
Urban Total	315,537	346,577	367,496	431,929
Grand Total DVMT	**2,007,033**	**2,250,916**	**2,417,985**	**2,909,582**
Florence County				
Rural Interstate (01)	949,641	1,169,281	1,326,166	1,734,069
Rural Principal Arterial (02)	638,746	707,942	750,434	888,624
Rural Minor Arterial (03)	368,850	408,808	433,345	513,145
Rural Major Collector (04)	612,277	678,605	719,336	851,800

[6] Florence Nonattainment Area totals based on MPO figures and may reflect an underestimation of the total percent captured by the boundary.
[7] Data provided by SCDOT.

	Table E-2: DVMT Data for Florence Nonattainment Area Counties			
	2000	Projected 2007	Projected 2012	Projected 2025
Rural Minor Collector (05)	80,672	89,412	94,778	112,231
Rural Local (09)	273,651	303,296	321,500	380,703
Rural Total	2,923,837	3,357,343	3,645,560	4,480,572
Urban Interstate (11)	81,478	96,679	107,537	135,768
Urban Freeway/Expressway (12)	35,778	39,654	42,034	49,774
Urban Principal Arterial (13)	457,457	507,013	537,445	636,414
Urban Minor Arterial (14)	433,570	480,539	509,382	603,183
Urban Collector (15)	209,219	231,884	245,802	291,066
Urban Local (18)	87,249	96,700	102,504	121,380
Urban Total	1,304,750	1,452,470	1,544,705	1,837,586
Grand Total DVMT	**4,228,587**	**4,809,814**	**5,190,265**	**6,318,159**

Table E-3[8] presents the 2000 worker flow data from each of the counties. Some counties that are listed on this table are not being considered for boundary recommendations and are being included on this chart to account for all workers in each county. This table shows that 89.66% of the workers in Florence and Darlington Counties commute between those two counties. This verifies that while there is a significant amount of DVMT in both of the counties, only a minimal amount of it is traveled by workers commuting outside the area.

Table E-3: Where People Work Who Live In SC				
	County of Residence			
County Worked In	Darlington	Florence	Out of State	Grand Total
Grand Total	28,234	54,482	611	83,327
Aiken	9	4		13
Anderson	6	14		20
Beaufort	12	17		29
Berkeley	7	26		33
Charleston	13	110		123
Chester		8		8
Chesterfield	870	133		1,003
Clarendon		273		273
Darlington	17,609	3,214	187	21,010
Dillon	59	380		439
Dorchester		31		31
Fairfield	8			8
Florence	7,853	45,491	424	53,768
Georgetown	22	213		235
Greenville	30	41		71
Hampton		12		12

[8] Data provided by US Census: 2000.

Table E-3: Where People Work Who Live In SC				
	County of Residence			
County Worked In	Darlington	Florence	Out of State	Grand Total
Horry	154	785		939
Kershaw	147	45		192
Lancaster	6	8		14
Laurens		4		4
Lee	318	240		558
Lexington	35	99		134
Marion	69	474		543
Marlboro	282	156		438
Orangeburg		16		16
Out of State	350	580		930
Pickens		12		12
Richland	120	326		446
Spartanburg	49			49
Sumter	198	396		594
Williamsburg	8	1,349		1,357
York		25		25

Figure E-1:
Florence and Darlington Counties:
Time Leaving Home to Go to Work

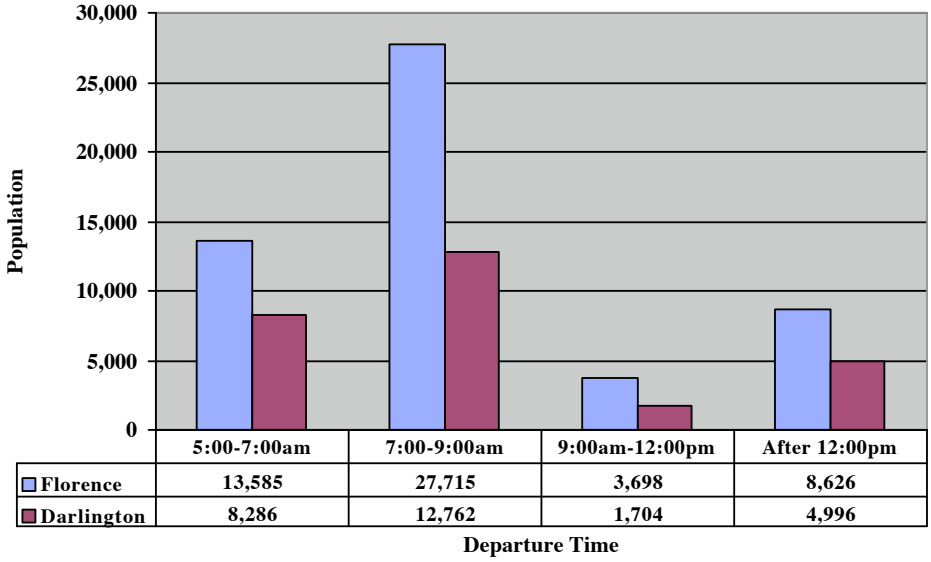
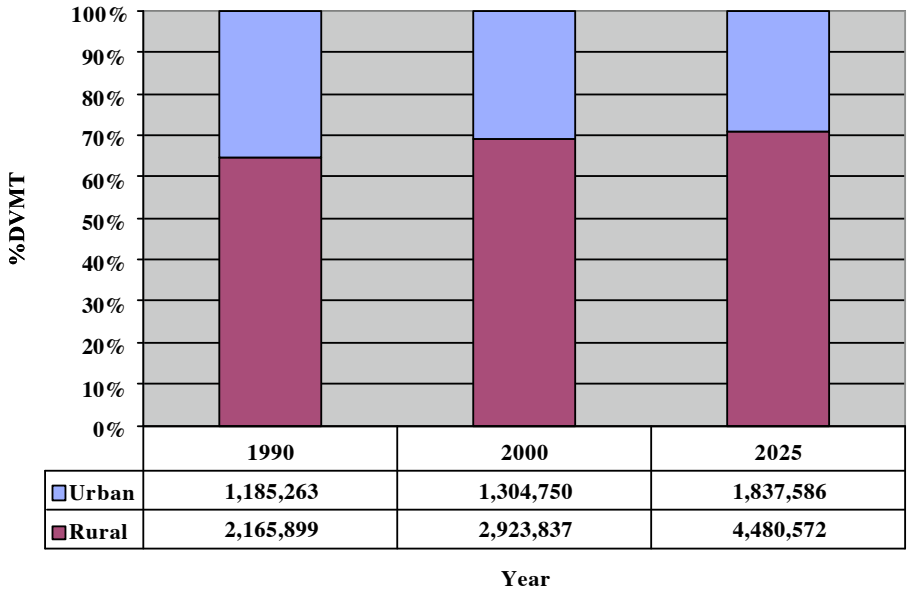


Figure E-1[9] presents the departure times for workers in Florence and Darlington Counties. The figure shows that the largest amount of traffic occurs between 7:00 am to 9:00 am. Note that Florence County contributes the largest amount of traffic during these times and this county makes up the majority of the landmass of the Florence Area boundary. It should also be noted that ozone formation is believed to begin formation in this area starting around the morning hours and continuing throughout the day until sunset. This is important (since the majority of the traffic is contributed from Florence County and this traffic occurs during the typical start of ozone formation) because it suggests that the mobile source emission of NO_x and VOC that help contribute to the ozone formation is mainly from the commuters that reside inside the Florence Nonattainment Area.

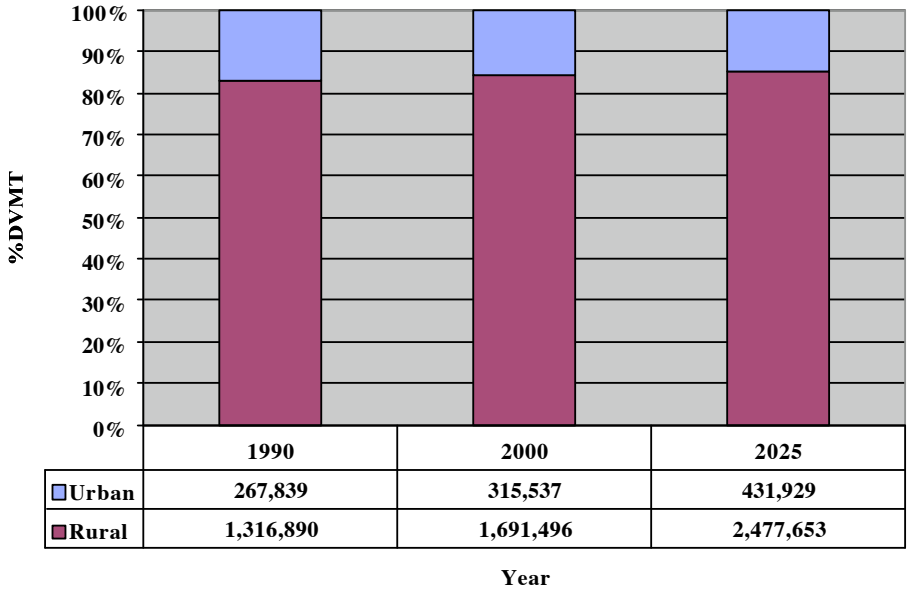
Figure E-2: Urban vs. Rural DVMT for Florence County



	1990	2000	2025
Urban	1,185,263	1,304,750	1,837,586
Rural	2,165,899	2,923,837	4,480,572

[9] Data provided by US Census: 2000.

Figure E-3: Urban vs. Rural DVMT for Darlington County

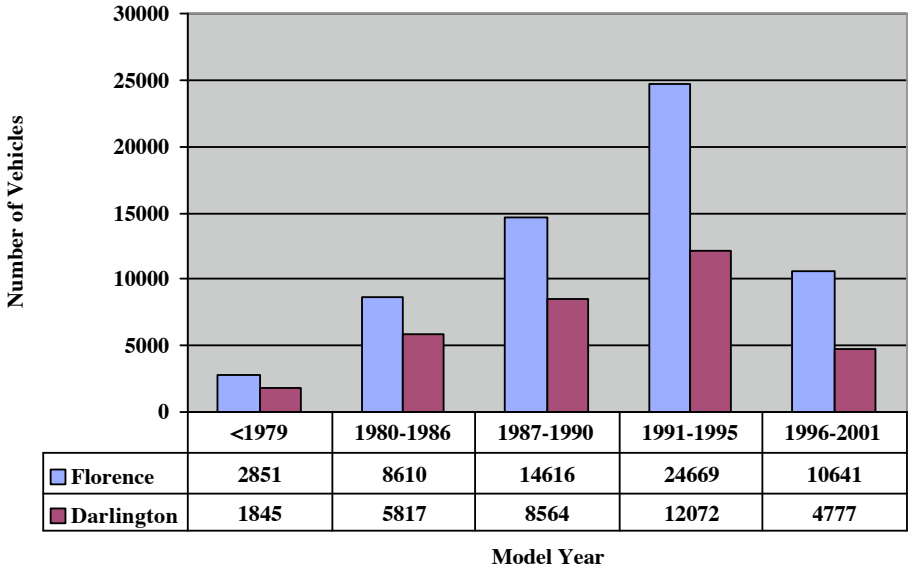


	1990	2000	2025
Urban	267,839	315,537	431,929
Rural	1,316,890	1,691,496	2,477,653

Figures E-2 and E-3[10] show that there is very little urban DVMT in either county. This shows why only small portions of each county were included inside the boundary.

[10] Data provided by US Census: 2000.

Figure E-4: 2000 Motor Vehicle Registration for Florence and Darlington Counties



	<1979	1980-1986	1987-1990	1991-1995	1996-2001
Florence	2851	8610	14616	24669	10641
Darlington	1845	5817	8564	12072	4777

Figure E-4[11] presents the motor vehicle registration data for Florence and Darlington Counties. Only a small portion of the vehicles are pre-1981 model years. In 1981 new cars were outfitted with three-way catalysts, on-board computers, and oxygen sensors to help increase the efficiency of the catalytic converters. This figure shows that the majority of cars registered are model years 1991-1995. In 1991 the EPA established lower tailpipe standards for hydrocarbons and nitrogen oxides beginning with 1994 model year vehicles.

This data reflects 2000 registration figures, and many vehicle owners will elect to replace vehicles with newer vehicles in the coming years. These vehicle turnovers, combined with future national low sulfur fuel standards, the use of Onboard Diagnostic (OBD) systems, and Onboard Vapor Recovery (ORVR) systems will help to offset any potential impacts from the increased emissions from mobile sources in this area.

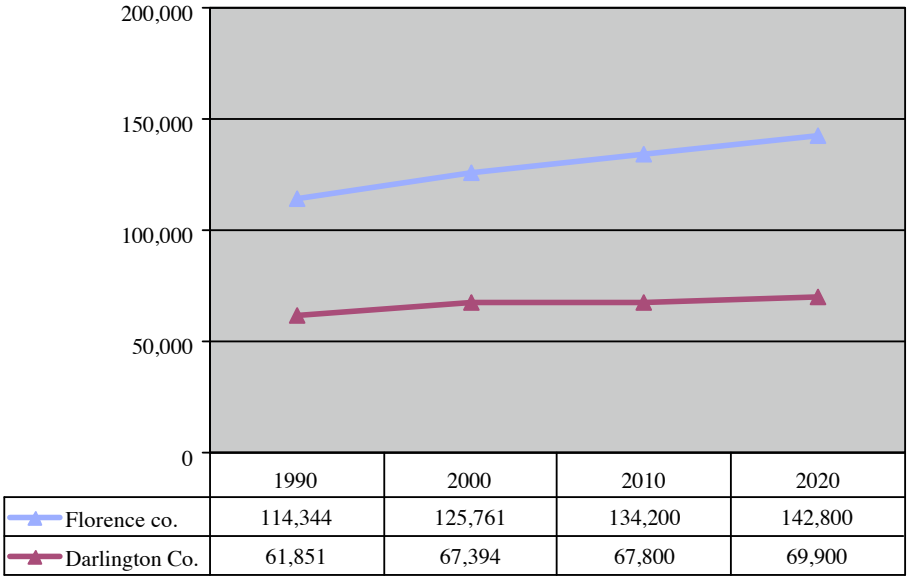
F. Expected Growth (Including Extent, Pattern, and Rate of Growth)

Limited data is available in assessing expected growth for the Florence Nonattainment Area boundary. Conclusions were drawn based on historical data from 1990, current data from 2000, and population projections for 2010 and 2020 as contained in Table F-1. Economic growth, relative to population growth, is even harder to predict. No knowledge of major economic expansions is available. While it is certain that population counts will grow, it is only assumed that current economic factors will remain stable or that some economic growth will occur. It is reasonable to expect the majority of that growth to be located inside, or at least near, the boundary.

[11] Data provided by South Carolina Department of Public Safety: Division of Motor Vehicles.

Table F-1: Historical and Projected Population and Population Density per County		
	Florence County	**Darlington County**
Population, 1990 [12]	114,344	61,851
Population, 2000 [13]	125,761	67,394
Projected Population, 2020 [14]	142,800	69,900
Population. Growth Rate, 1990 – 2000 (Persons per 5 Years)	5708.5	2771.5
Projected Population Growth Rate, 2000 - 2020 (Persons per 5 Years)	4259.8	626.5
Land Area (Sq. Miles)	800	561
Persons per Sq. Mile, 2000	157.2	120.1
Projected Persons per Sq. Mile, 2020	178.5	124.6
Urban Population, 2000	72,929	30,579
% Urban Population, 2000	58	45.4
Rural Population, 2000	52,832	36815
% Rural Population, 2000	42	54.6

Figure F-1
Population Growth by County, 1990 - 2020



[12] Data provided by US Census: 2000.
[13] Data provided by US Census: 2000.
[14] Data provided by EPA.

Figure F-2
Population Growth, 1990 - 2020

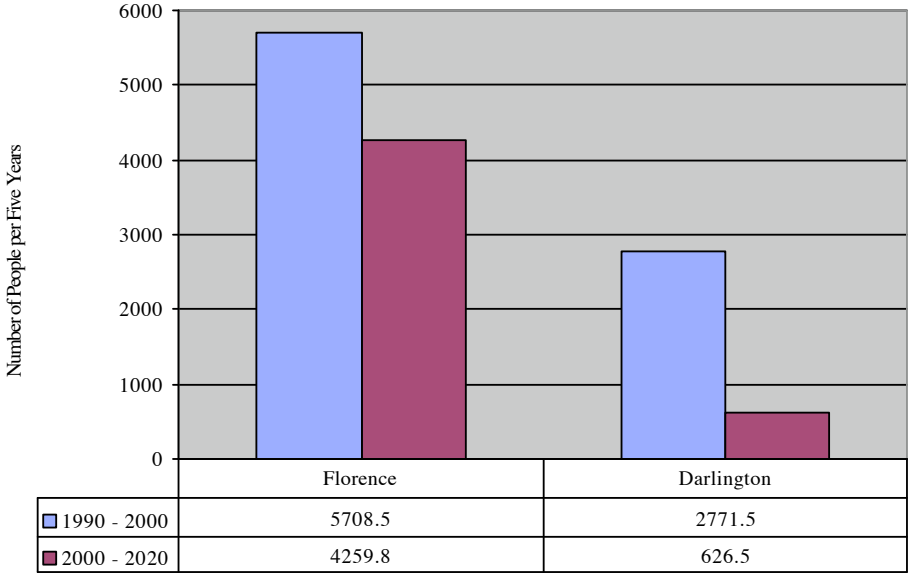
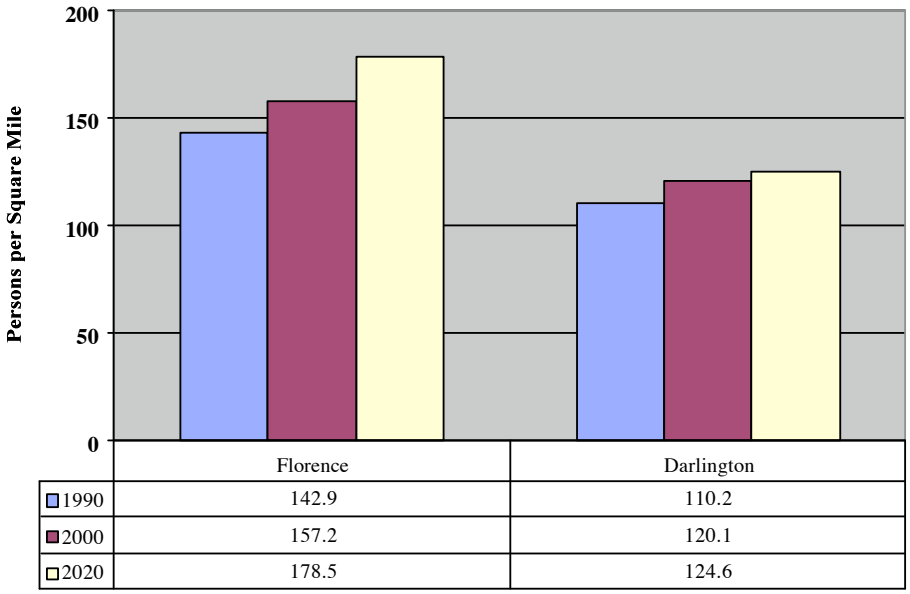


Figure F-3
Historical and Projected Population Density



Figures F-1, F-2, and F-3 show historical and projected data for total population, rate of growth, and population density, respectively, for Florence and Darlington Counties. Since the Florence Nonattainment Area boundary already captures the area's urban population and contains portions of the manufacturing and retail trade, it is reasonable to conclude that the boundary at least approximates, if not contains, the expected population growth, and hence the economic growth, for the area in the coming years.

It should be noted that trends are based on projected data for 2020. The population will grow in each county; however, comparing the population increase per five years over the last ten years (1990 – 2000) to the projected population increase per five years over the next twenty years (2000 – 2020) shows that the rate of growth slows for Florence and Darlington Counties. Since the recommended area includes the urbanized portion of Florence and Darlington Counties, it is assumed that the Florence Nonattainment Area will encompass the majority of expected population growth.

The manufacturing sector employs the most people in both Florence and Darlington Counties.[15] Health care and social assistance and retail trade are the second and third largest employers in Florence County, respectively, while retail trade and health care and social assistance are second and third in Darlington County, respectively.

G. Meteorology

See Section V - G of Introduction.

H. Topography

See Section V - H of Introduction.

I. Jurisdictional Boundaries

The Florence Nonattainment Area boundary includes all portions of the Florence MPO and an additional (contiguous) portion around the Pee Dee Experimental Station ozone monitoring site, which is located in Darlington County.

Starts at I-95 at Great Pee River / Florence/Marlboro county line.
Follows Great Pee Dee River/Florence/Marlboro/Dillon county line southeast for 3.5 miles to Schoolhouse Branch.
Follows Schoolhouse Branch west and south for 4.1 miles to Jamestown Rd.
Follows Jamestown Rd south for 0.9 miles to S-21-24 (E. Old Marion Rd).
Follows S-21-24 (E. Old Marion Rd) west for 0.6 miles to S-21-165 (N. Firetower Rd).
Follows S-21-165 (N. Firetower Rd) south for 5.2 miles across US 76/301 to S-21-13 (Bethel Rd).
Follows S-21-13 (Bethel Rd) east for 0.2 miles to Middle Branch.
Follows Middle Branch south for 0.4 miles to Jeffries Creek.
Follows Jeffries Creek southeast for 2.6 miles to S-21-24 (Paper Mill Rd).
Follows S-21-24 (Paper Mill Rd) west and southwest for 1.3 miles to S-21-57 (Old River Rd).
Follows S-21-57 (Old River Rd) southeast for 0.1 miles to Willow Creek.
Follows Willow Creek west and southwest for 3.4 miles to railroad tracks.
Follows railroad tracks northwest for 0.5 miles to S-21-575 (Francis Marion Rd).
Follows S-21-575 (Francis Marion Rd) north for 0.4 miles to US 327.

[15] Data provided by US Census: 2000.

Follows US 327 southwest 0.4 miles to railroad tracks.
Follows railroad tracks northwest 0.3 miles to Ben Ingram Rd.
Follows Ben Ingram Rd south for 0.3 miles to US 327.
Follows US 327 southeast for 0.4 miles to S-21-1613 (Megan Rd).
Follows S-21-1613 (Megan Rd) northwest for 1.7 miles to S-21-551 (Flowers Rd).
Follows S-21-551 (Flowers Rd) southwest for 1.0 mile to SC 51 (Pamplico Hwy).
Follows SC 51 (Pamplico Hwy) northwest for 0.5 miles to S-21-552 (Branch Rd).
Follows S-21-552 (Branch Rd/Poor Farm Rd) west for 4.6 miles to US 52(Irby St).
Follows US 52 (Irby St) southeast for 0.2 miles to W. Christy Ln.
Follows W. Christy Ln west for 0.2 miles to S-21-100 (McLaughlin Rd).
Follows S-21-100 (McLaughlin Rd) southwest for 1.0 mile to S-21-1139 (Hill Harrell Rd).
Follows S-21-1139 (Hill Harrell Rd) west for 1.2 miles to S-21-136 (Stagecoach Rd).
Follows S-21-136 (Stagecoach Rd) northwest for 0.6 miles to Dock Broach Ln.
Follows Dock Broach Ln west for 0.4 miles to S-21-35 (W. John Paul Jones Rd).
Follows S-21-35 (W. John Paul Jones Rd) southwest for 1.6 miles to S-21-848 (W. Cummings Rd).
Follows S-21-848 (W. Cummings Rd) northwest for 2.1 miles to S-21-45 (Penial Rd).
Follows S-21-45 (Penial Rd/N. Sally Hill Rd) northwest for 8.0 miles over I-95 and US 76 to Florence/Darlington county line.
Follows Florence/Darlington county line northeast for 7.4 miles over I-20 to US 52 (Lucas St).
Follows US 52 (Lucas St) northwest for 0.3 miles to S-16-1243 (Aberdeen Dr).
Follows S-16-1243 (Aberdeen Dr) northeast for 0.3 miles to S-16-1137 (National Ave).
Follows S-16-1137 (National Ave) northwest for 0.4 miles to S-16-408 (Palmetto Rd).
Follows S-16-408 (Palmetto Rd) northeast for 1.0 mile to S-16-937 (Piano Rd).
Follows S-16-937 (Piano Rd) northeast for 1.2 miles to S-16-35 (Charleston Rd).
Follows S-16-35 (Charleston Rd) north for 0.7 miles to unnamed stream.
Follows unnamed stream north and East to S-16-35 (Charleston Rd).
Follows S-16-35 (Charleston Rd) northeast AII-SG-012 (Long Marsh).
Follows AII-SG-012 (Long Marsh) east to S-16-0495 (Georgetown Rd).
Follows S-16-0495 (Georgetown Rd) south to Florence/Darlington County Line.
Follows Florence/Darlington county line northeast for 1.2 miles to Fountain Branch Creek.
Follows Fountain Branch Creek north for 1.4 miles (past S-16-495) to Alligator Creek.
Follows Alligator Creek east for 3.7 miles to Great Pee Dee River/Darlington/Marlboro county line.
Follows Great Pee Dee River/Darlington/Marlboro/Florence county line east to I-95 and starting point.

J. Level of Control of Emission Sources

Through its participation with the Early Action Compact, Darlington County is exploring local control strategies such as an ozone action coordinator, alternative fuels, open burning restrictions, fleet replacement, community awareness, energy conservation, and mowing restrictions. Florence County is exploring local control strategies such as alternate work schedules, park and ride facilities, idling policy, alternative fuels, energy education, and open burning restrictions.

K. Regional Emissions Reductions

See Section V of Introduction.

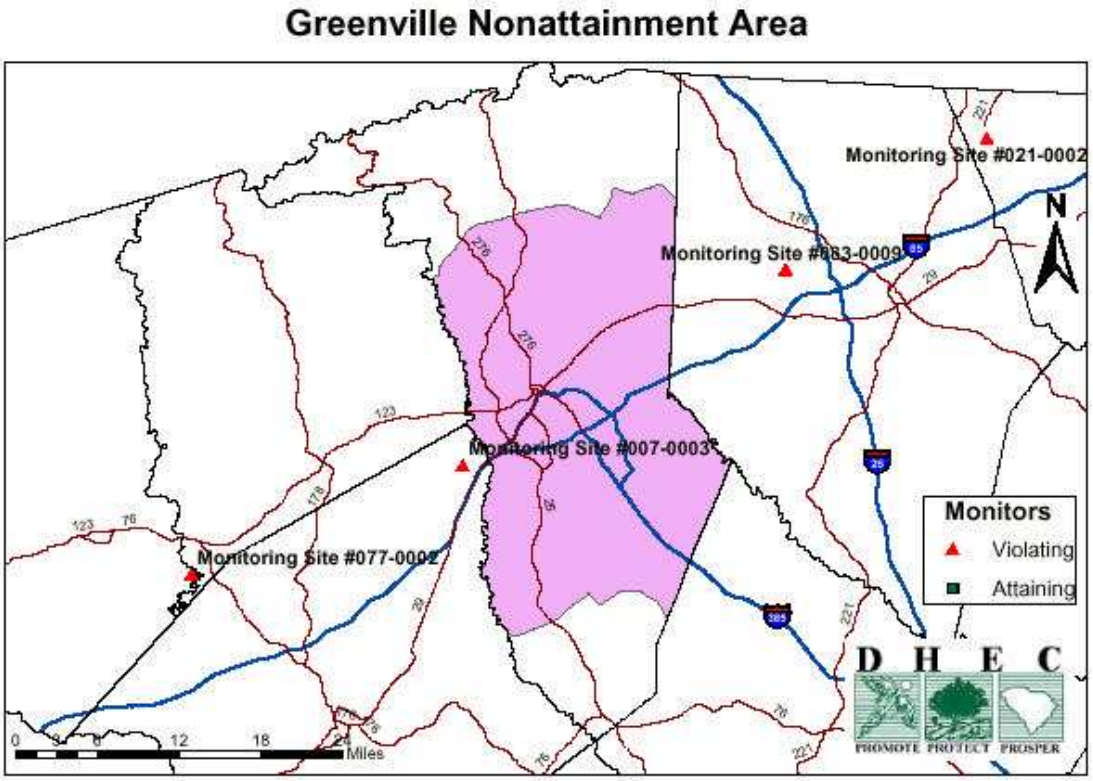


Figure 1: Greenville Nonattainment Area Map

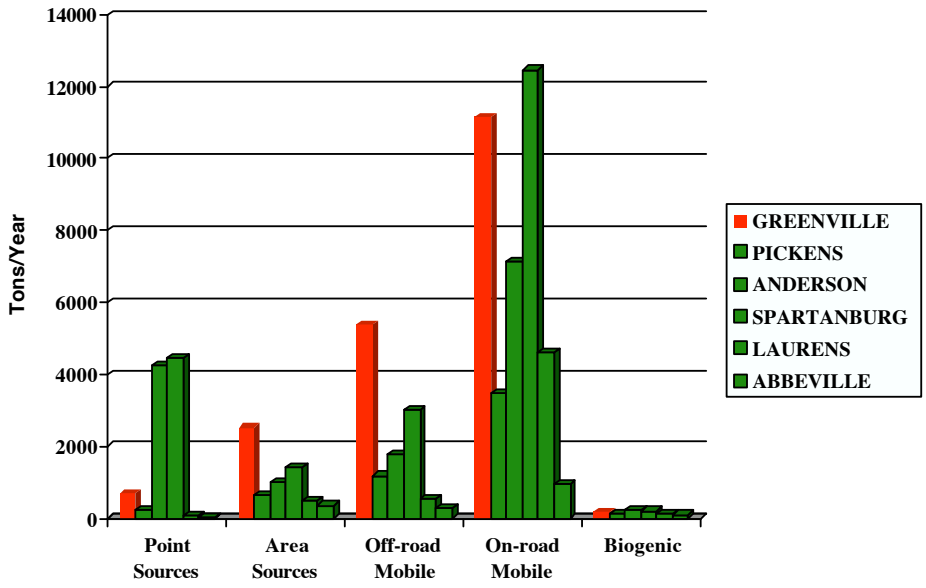
The South Carolina Department of Health and Environmental Control (Department) recommends that the area within Greenville County encompassed by the boundaries of the Greenville Metropolitan Planning Organization (MPO) be designated a nonattainment area for violating the 8-hour ozone National Ambient Air Quality Standard (air quality standard) based on 2000 through 2002 monitoring data. This recommended area will be referred to as the Greenville Nonattainment Area throughout the rest of this document.

The recommended boundary for the Greenville Nonattainment Area captures the most urbanized portion of the County, as 95% of the population resides within this boundary. The proposed boundary captures 89% of the NO_x point source emissions and 97% of the VOC point source emissions. This boundary also captures 95% of the daily vehicle miles traveled and it is estimated that the boundary will continue to capture this same percentage in 2025. While Greenville County does not have an ozone monitor, because of the location of the core of the population in the Greenville Nonattainment Area, the monitor at Powdersville in Anderson County best reflects the air quality in the area.

The Department is submitting this document to provide detailed information pertaining to the factors which EPA suggested be addressed in support of any nonattainment area designation recommendations.

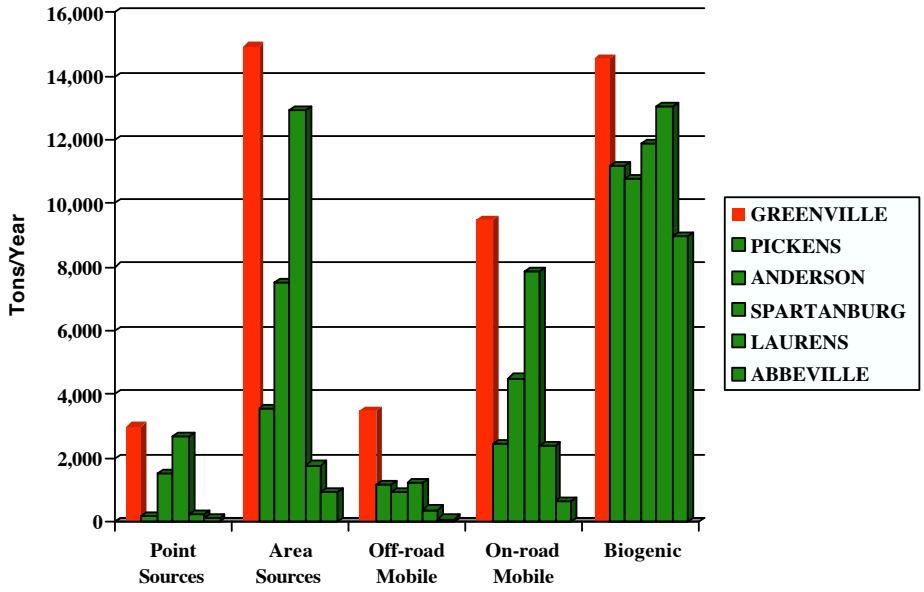
A. Emissions and Air Quality in Adjacent Areas (Including Adjacent MSAs)

Figure A-1: NOx Sources for Greenville and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

Figure A-2: VOC Sources for Greenville and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

To evaluate the emissions in Greenville County and the adjacent areas, South Carolina utilized the estimated annual 1999 oxides of nitrogen (NO_x) and volatile organic compounds (VOC) emissions. The types of NO_x and VOC emission sources that were evaluated include point, area, biogenic, and on-road and off-road mobile sources. Figures A-1 and A-2 show the percentage of emissions from each source category for Greenville County and surrounding South Carolina Counties. Additional emissions inventory information is provided in Section D.

B. Population Density and Degree of Urbanization Including Commercial Development (Significant Difference from Surrounding Areas)

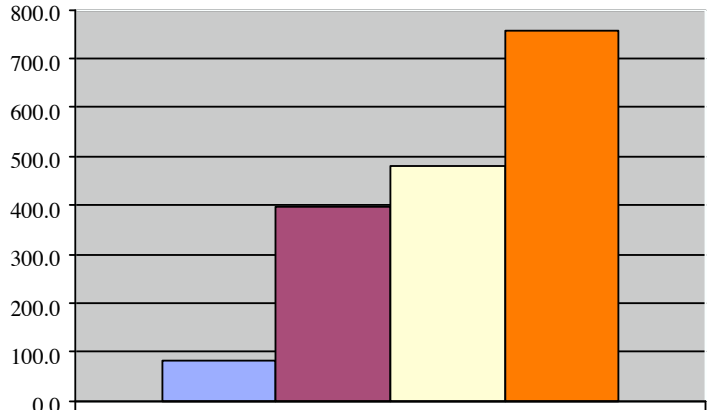
According to the US Census, urban is defined as all territory, population, and housing units in urbanized areas and urban clusters. An urbanized area is defined as a densely settled area that has a census population of at least 50,000, and an urban cluster is defined as a densely settled area that has a census population of 2,500 to 49,999. An urban area is a generic term that refers to both urbanized areas and urban clusters. Rural is defined as all territory, population, and housing units located outside of urbanized areas and urban clusters.

Greenville County is 790 square miles and had a population of 379,616 in 2000. The current population density is 480.5 persons per square mile. The majority of Greenville County's population is urban as 83%, or 315,095 persons, mostly reside in urbanized areas. The recommended area portion of Greenville County has a population of 359,875 and encompasses 474.4 square miles, or 60% of the county's land area. The population density in the Greenville portion of the boundary is 758.6 persons per square mile.

	Table B-1: Total Population, Land Area, and Urban/Rural Population, 2000	
	Greenville County	**Recommended Area**
Population[1]	379,616	359,875
Land Area (Square Miles) [1]	790	474.4
Persons per Square Mile [1]	480.5	758.6
Urban Population[2]	315,095	
% Urban Population [2]	83.0%	
Rural Population [2]	64,521	
% Rural Population [2]	17.0%	

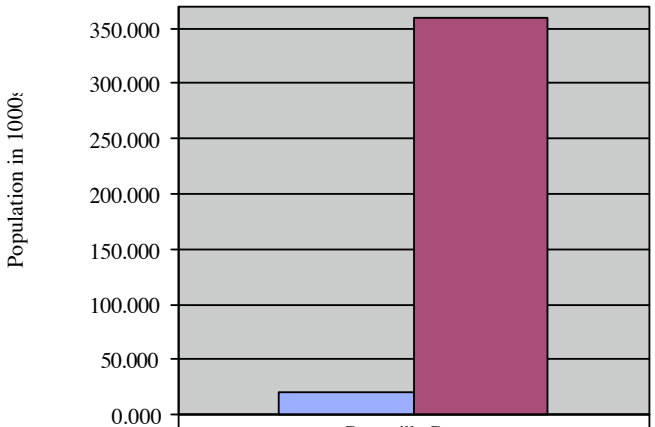
[1] Data provided by US Census: 2000. The data for the recommended area was obtained from the SCDOT.
[2] Data provided by SC Office of Research and Statistics.

Figure B-1: Population Density, 2000
(Persons per Square Mile)



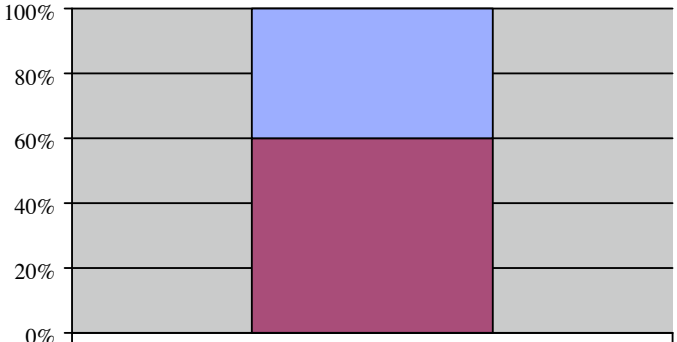
	Greenville County
County Rural Persons per Sq. Mi.	81.7
County Urban Persons per Sq. Mi.	398.8
Total County Persons per Sq. Mi.	480.5
Recommended Area Persons per Sq. Mi.	758.6

Figure B-2:
Population Distribution
Relative to recommended Area Boundaries, 2000



	Greenville County
Outside Recommended Area	19.741
Inside Recommended Area	359.875

Figure B-3: Land Area Distribution According to Recommended Area Boundaries, 2000



	Greenville County
Non-Recommended Area Land Area in Sq. Mi.	315.6
Recommended Area Land Area in Sq. Mi.	474.4

According to the US Census, manufacturing is defined as the mechanical, physical, or chemical transformation of materials or substances into new products. The assembly of components into new products is also considered manufacturing, except when it is appropriately classified as construction. Establishments in the manufacturing sector are often described as plants, factories, or mills and typically use power-driven machines and materials-handling equipment. Also included in the manufacturing sector are some establishments that make products by hand, like custom tailors and the makers of custom draperies. While manufacturers typically do not sell to the public, some establishments like bakeries and candy stores that make products on the premises may be included. The retail trade sector comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.

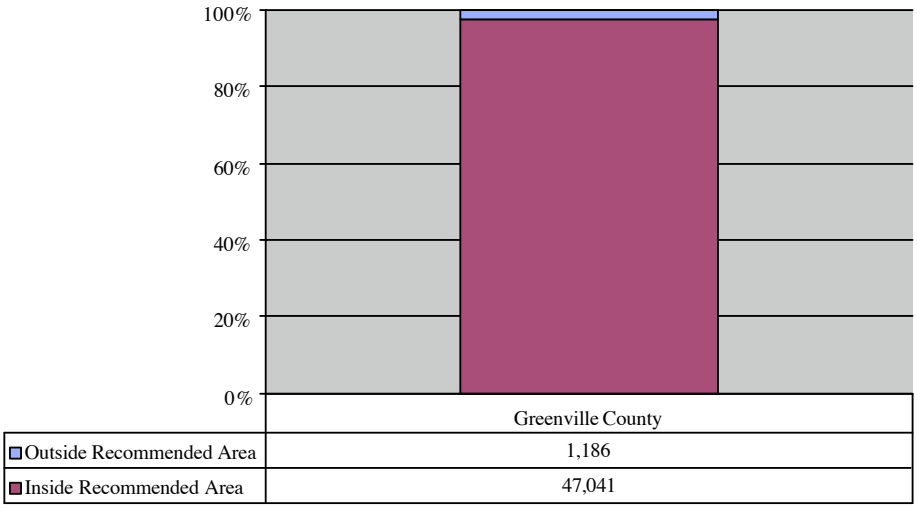
The Greenville Nonattainment Area contains a large majority of the economic development, both manufacturing and retail trade, relative to Greenville County. Almost 99% of the manufacturing establishments and 97.5% of the manufacturing employees in Greenville County are located inside of the boundary. The concentrated urban recommended area also supports retail trade. Greenville County employs a total of 26,275 retail trade employees at 1,860 establishments throughout the area. Given that the vast majority of the manufacturing establishments and employees in the county are located in the recommended area, that the county is predominantly urban, and that the recommended area contains the urbanized areas in the county, it is reasonable to assume that the majority of the retail trade employees and establishments in the county are contained within the recommended area boundary.

	Table B-2: Total Number of Manufacturing Employees, 2000[3]		
	In Recommended Boundary	In County Boundary	Percent in Recommended Boundary
Greenville County	47,041	48,227	97.5%

	Table B-3: Total Number of Manufacturing Establishments, 2000[4]		
	In Recommended Area	In County Boundary	Percent in Recommended Area
Greenville County	537	543	98.9%

	Table B-4: Retail Trade Patterns, 2000[5]	
	Number of Employees	Number of establishments
Greenville County	26,275	1,860

Figure B-4: Distribution of Manufacturing Employees Relative to Greenville Boundary, 2000



[3] Data from Bureau of Air Quality file entitled "SC Company File1.xls."
[4] Data from Bureau of Air Quality file entitled "SC Company File1.xls."
[5] Data provided by US Census: 2000.

C. Monitoring Data Representing Ozone Concentrations in Local Areas and Larger Areas (urban or regional scale)

Greenville County does not have an ozone monitoring station; however, neighboring Anderson, Pickens, and Spartanburg Counties do. Ozone concentration data from those areas can be found in the Anderson Nonattainment Area and Spartanburg Nonattainment Area documents.

D. Location of Emission Sources

Table D-1 lists the NO_x point sources that are in operation in Greenville County based on the 1999 NO_x and VOC emissions inventory iSteps data. Greenville County has 56 NO_x point sources in operation and 53 of these point sources are located within the nonattainment area. Facilities in Red are within the proposed boundary; facilities in Black are outside the proposed boundary.

Table D- 1: Greenville County Point Source NO2 Emissions

County	Plant Name	Permit Number	Pollutant	Emissions (tons/year)
Greenville	3M:Film Plant	1200-0073	NO2	24.19
Greenville	Air Products: Piedmont	1200-0075	NO2	2.31
Greenville	American Woodworks: Greenville	1200-0346	NO2	0.52
Greenville	Ashmore: #1	9900-0013	NO2	6.97
Greenville	Bellsouth: Greenville-College St	1200-0231	NO2	0.76
Greenville	Blythe Construction: Plant 4	9900-0169	NO2	2.46
Greenville	Bob Jones University	1200-0245	NO2	58.54
Greenville	Caraustar: Taylors	1200-0013	NO2	32.86
Greenville	Cognis Corporation	1200-0067	NO2	0.20
Greenville	Columbia Farms: Greenville	1200-0232	NO2	3.20
Greenville	Crown Metro: Plant 1	1200-0034	NO2	2.78
Greenville	Cryovac-Simpsonville (Sealed Air Corp)	1200-0024	NO2	24.03
Greenville	Dan River: White Horse	1200-0196	NO2	4.16
Greenville	Delta Mills: Estes	1200-0016	NO2	3.07
Greenville	Engineered Products: Furman Hall Rd Plant	1200-0181	NO2	0.19
Greenville	Ethox Chemicals	1200-0171	NO2	6.82
Greenville	Excalibur Tool: Poinsett	1200-0277	NO2	0.13
Greenville	Gateway Mfg: Plant #2 - Greenville	1200-0317	NO2	0.01
Greenville	GE: Greenville	1200-0094	NO2	46.95
Greenville	Geschmay Corp	1200-0315	NO2	2.71
Greenville	Greenville Finishing	1200-0217	NO2	2.20
Greenville	Greenville Hospital System: Energy Plant	1200-0145	NO2	14.05
Greenville	Hitachi Electronic	1200-0203	NO2	30.69
Greenville	Holly Oak Chemical	1200-0191	NO2	0.55
Greenville	JPS:Slater	1200-0017	NO2	31.55
Greenville	Kemet: Fountain Inn	1200-0147	NO2	3.19

Table D- 1: Greenville County Point Source NO2 Emissions				
County	Plant Name	Permit Number	Pollutant	Emissions (tons/year)
Greenville	Kemet: Greenville	1200-0018	NO2	0.77
Greenville	Kemet: Mauldin	1200-0104	NO2	46.97
Greenville	King Asphalt: # 3	9900-0283	NO2	2.82
Greenville	Kyocera Mita	1200-0207	NO2	0.09
Greenville	Lockheed Martin Aircraft Center	1200-0149	NO2	2.06
Greenville	Messer Industries	1200-0269	NO2	0.00
Greenville	Metromont: Paris Mountain	1200-0150	NO2	0.01
Greenville	Metromont: Roper Mountain Road	1200-0200	NO2	0.00
Greenville	Michelin: Greenville	1200-0039	NO2	71.87
Greenville	Milliken: Enterprise Plant	1200-0060	NO2	1.98
Greenville	Milliken: Gayley Mill	1200-0029	NO2	27.25
Greenville	Milliken: Judson Mill	1200-0028	NO2	2.52
Greenville	Mitsubishi Polyester Film LLC	1200-0026	NO2	33.39
Greenville	National Electric Carbon	1200-0121	NO2	1.16
Greenville	Nutricia: Greenville	1200-0127	NO2	4.44
Greenville	Panagakos Asphalt Paving	9900-0362	NO2	0.77
Greenville	Para-Chem Southern Inc	1200-0099	NO2	1.05
Greenville	Rexroth:Southchase Court	1200-0326	NO2	13.59
Greenville	Reynolds Chemical: Greenville	1200-0247	NO2	2.08
Greenville	RMAX	1200-0345	NO2	0.13
Greenville	Saint Gobain Abrasives	1200-0179	NO2	0.03
Greenville	SC Steel Corp	1200-0362	NO2	0.00
Greenville	Scotts Sierra: Travelers Rest	1200-0033	NO2	1.49
Greenville	Sherwin Williams: Fountain Inn	1200-0163	NO2	0.31
Greenville	Specialty Shearing	1200-0123	NO2	10.61
Greenville	St Francis Hospital	1200-0139	NO2	4.01
Greenville	Stevens Aviation: Donaldson Park	1200-0311	NO2	0.75
Greenville	Transflo Terminal SVCS: Greenville	1200-0337	NO2	2.22
Greenville	US Finishing	1200-0009	NO2	55.23
Greenville	Zupan & Smith: Simpsonville	9900-0158	NO2	0.26
	1999 Greenville Co. Total			**592.95**
	Emissions in Nonattainment Area-Total			**532.17**
	Emissions in Nonattainment Area-Percent			**89.7%**

Table D-2 lists the VOC point sources that are in operation in Greenville County based on the 1999 NO_x and VOC emissions inventory i-Steps data. Greenville County has 64 VOC point sources in operation and 61 of these point sources are located within the nonattainment area.

Table D-2: Greenville County Point Source VOC Emissions				
County	Plant Name	Permit Number	Pollutant	Emissions (tons/year)
Greenville	3M: Film Plant	1200-0073	VOC	55.34
Greenville	3M: Tape Plant	1200-0148	VOC	641.15
Greenville	Air Products: Piedmont	1200-0075	VOC	4.08
Greenville	American Woodworks: Greenville	1200-0346	VOC	6.94
Greenville	Ashmore: #1	9900-0013	VOC	0.13
Greenville	Bellsouth: Greenville-College St	1200-0231	VOC	0.04
Greenville	Blythe Construction: Plant 4	9900-0169	VOC	0.05
Greenville	Bob Jones University	1200-0245	VOC	34.41
Greenville	Caraustar: Taylors	1200-0013	VOC	0.65
Greenville	Cognis Corporation	1200-0067	VOC	7.11
Greenville	Columbia Farms: Greenville	1200-0232	VOC	0.06
Greenville	Crown Metro:Plant1	1200-0034	VOC	6.03
Greenville	Cryovac-Simpsonville (Sealed Air Corp)	1200-0024	VOC	407.78
Greenville	Dan River: White Horse	1200-0196	VOC	4.12
Greenville	Delta Mills:Estes	1200-0016	VOC	5.74
Greenville	Engineered Products: Furman Hall Rd Plant	1200-0181	VOC	76.92
Greenville	Ethox Chemicals	1200-0171	VOC	0.52
Greenville	Excalibur Tool: Poinsett	1200-0277	VOC	14.41
Greenville	Gateway Mfg: Plant #2 - Greenville	1200-0317	VOC	26.65
Greenville	GE: Greenville	1200-0094	VOC	22.02
Greenville	Geschmay Corp	1200-0315	VOC	1.97
Greenville	Greenville Finishing	1200-0217	VOC	2.20
Greenville	Greenville Hospital System: Energy Plant	1200-0145	VOC	0.83
Greenville	Greenville News	1200-0226	VOC	1.35
Greenville	Hitachi Electronic	1200-0203	VOC	97.74
Greenville	Holly Oak Chemical	1200-0191	VOC	0.03
Greenville	JPS: Slater	1200-0017	VOC	26.28
Greenville	Kemet: Fountain Inn	1200-0147	VOC	46.19
Greenville	Kemet: Greenville	1200-0018	VOC	22.57
Greenville	Kemet: Mauldin	1200-0104	VOC	53.57
Greenville	King Asphalt: # 3	9900-0283	VOC	4.50
Greenville	Kyocera Mita	1200-0207	VOC	0.01
Greenville	Lockheed Martin Aircraft Center	1200-0149	VOC	21.01
Greenville	Messer Industries	1200-0269	VOC	19.53
Greenville	Metromont: Paris Mountain	1200-0150	VOC	0.00
Greenville	Metromont: Roper Mountain Road	1200-0200	VOC	0.00
Greenville	Michelin: Greenville	1200-0039	VOC	654.79
Greenville	Milliken: Enterprise Plant	1200-0060	VOC	15.76
Greenville	Milliken: Gayley Mill	1200-0029	VOC	40.35
Greenville	Milliken: Judson Mill	1200-0028	VOC	4.09
Greenville	Mitsubishi Polyester Film LLC	1200-0026	VOC	171.12

Table D-2: Greenville County Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Emissions (tons/year)**
Greenville	National Cabinet Lock	1200-0107	VOC	2.01
Greenville	National Electric Carbon	1200-0121	VOC	40.97
Greenville	Nutricia: Greenville	1200-0127	VOC	66.37
Greenville	Panagakos Asphalt Paving	9900-0362	VOC	1.19
Greenville	Para-Chem Southern Inc	1200-0099	VOC	1.06
Greenville	Parthenon Marble	1200-0260	VOC	7.12
Greenville	Rexroth: Southchase Court	1200-0326	VOC	0.87
Greenville	Reynolds Chemical: Greenville	1200-0247	VOC	25.23
Greenville	Rmax	1200-0345	VOC	9.55
Greenville	Rudco Products Inc	1200-0194	VOC	17.93
Greenville	Saint Gobain Abrasives	1200-0179	VOC	0.00
Greenville	SC Steel Corp	1200-0362	VOC	32.60
Greenville	Scotts Sierra: Travelers Rest	1200-0033	VOC	0.06
Greenville	Sherwin Williams: Fountain Inn	1200-0163	VOC	12.83
Greenville	Specialty Shearing	1200-0123	VOC	0.27
Greenville	St Francis Hospital	1200-0139	VOC	5.55
Greenville	Standard Motor Products Inc	1200-0132	VOC	0.88
Greenville	Stevens Aviation: Donaldson Park	1200-0311	VOC	20.07
Greenville	Thermo Kinetics	1200-0313	VOC	1.01
Greenville	Transflo Terminal SVCS: Greenville	1200-0337	VOC	0.12
Greenville	US Finishing	1200-0009	VOC	135.16
Greenville	Woven Electronics	1200-0252	VOC	5.16
Greenville	Zupan&Smith: Simpsonville	9900-0158	VOC	0.01
	1999 Greenville Co. Total			**2,884.06**
	Emissions in Nonattainment Area-Total			**2,801.67**
	Emissions in Nonattainment Area-Percent			**97.1%**

Table D-3 lists the NO_x on-road emissions for Greenville County and Table D-4 lists the VOC on-road emissions.

Table D- 3: Greenville County On-road NO_x Emissions			
County	**Tier 1**	**Tier 2**	**Highway NO_2 (Tons Per Year)**
Greenville	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	4,091.00
Greenville	11-Highway Vehicles	02-Light-Duty Gas Trucks	2,268.00
Greenville	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	588.00
Greenville	11-Highway Vehicles	04-Diesels	4,219.00
	1999 Greenville Co Total		**11,166.00**

Table D-4: Greenville County On-road VOC Emissions			
County	**Tier 1**	**Tier 2**	**Highway VOC (Tons Per Year)**
Greenville	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	5,411.00
Greenville	11-Highway Vehicles	02-Light-Duty Gas Trucks	3,040.00
Greenville	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	708.00
Greenville	11-Highway Vehicles	04-Diesels	332.00
	1999 Greenville Co Total		**9,491.00**

E. Traffic and Commuting Patterns

Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the South Carolina Department of Transportation (SCDOT). SCDOT determines current DVMT by multiplying traffic volume (through traffic counts) and lane miles (determined by the Highway Performance Monitoring System) for each particular area. The South Carolina Department of Public Safety, Division of Motor Vehicles, provided motor vehicle registration data. All other data in this section was obtained from the US Census Bureau. All data is based on the year 2000.

Table E-1[6] shows that in 2000 the Greenville Nonattainment Area captured 91.62% of the DVMT and in 2025 it will capture 110.85% of the DVMT.

Table E-1: DVMT for the Greenville Nonattainment Area.				
County	**2000 DVMT**	**2025 DVMT**	**DVMT Change (2000-2025)**	**Projected % Annual Change**
Greenville	9,421,709	14,705,492	5,283,783	2.24
Greenville Nonattainment Total[7]	8,632,514	16,301,210	7,668,696	3.55
%DVMT Captured inside Nonattainment Boundary	91.62	110.85		

The Greenville Nonattainment Area Map (Figure 1) shows that there are six major routes of travel through the Greenville Nonattainment Area boundary. They include two interstates (I-85 and I-385) and four US Highways (25, 29, 123, and 276). There are also numerous State and secondary roads in the county that connect the larger towns together. I-85 is the major corridor between Atlanta, Georgia, and Charlotte, North Carolina.

Table E-2 presents the breakdown by road classifications of DVMT traveled in the Greenville Nonattainment Area boundary counties from 2000 and projected through 2025.

[6] Data provided by SCDOT.

[7] Greenville Nonattainment Area totals based on MPO figures and may reflect an overestimation of the total percent captured by the boundary.

Table E-2: DVMT Data for Greenville Area Counties				
	2000	**Projected 2007**	**Projected 2012**	**Projected 2025**
Greenville County				
Rural Interstate (01)	605,987	755,682	862,607	1,140,612
Rural Principal Arterial (02)	470,166	534,064	568,524	691,096
Rural Minor Arterial (03)	543,348	617,191	657,015	798,665
Rural Major Collector (04)	930,573	1,057,042	1,125,247	1,367,847
Rural Minor Collector (05)	50,942	57,865	61,599	74,880
Rural Local (09)	309,140	351,154	373,812	454,404
Rural Total	*2,910,155*	*3,372,998*	*3,648,804*	*4,527,504*
Urban Interstate (11)	1,604,349	1,985,303	2,257,413	2,964,899
Urban Freeway/Expressway (12)	46,581	52,912	56,326	68,469
Urban Principal Arterial (13)	1,743,223	1,980,136	2,107,902	2,562,360
Urban Minor Arterial (14)	1,797,160	2,041,403	2,173,123	2,641,641
Urban Collector (15)	1,036,576	1,177,451	1,253,426	1,523,660
Urban Local (18)	283,665	322,217	343,008	416,959
Urban Total	*6,511,554*	*7,559,421*	*8,191,197*	*10,177,988*
Grand Total DVMT	9,421,709	10,932,419	11,840,001	14,705,492

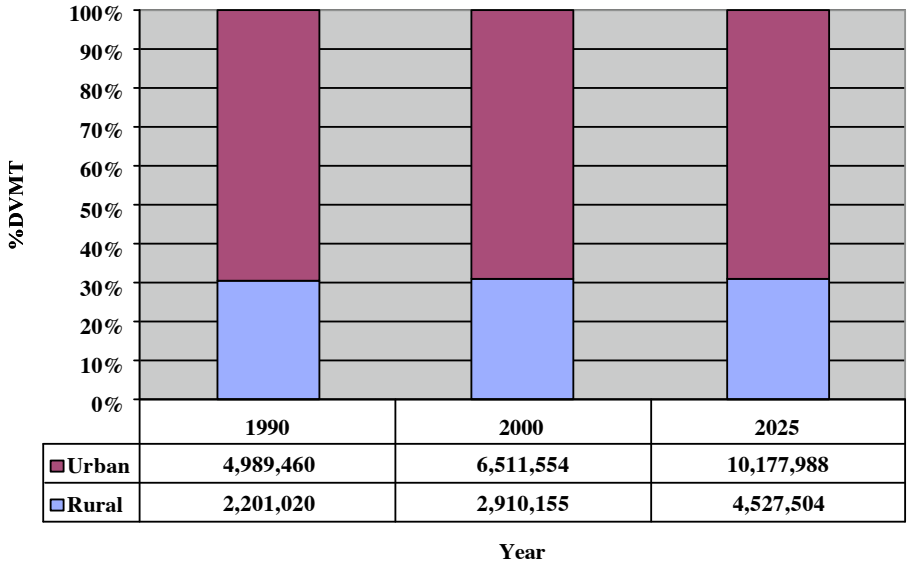
	Table E-3: Where People Work Who Live In SC		
	County of Residence		
County Worked In	Greenville	Out of state	Grand Total
Grand Total	159,316	3,998	163,314
Abbeville	13		13
Aiken	37		37
Allendale	9		9
Anderson	2,679		2,679
Barnwell	32		32
Beaufort	12		12
Berkeley	5		5
Charleston	101		101
Cherokee	85		85
Chester	22		22
Colleton	5		5
Dorchester	16		16
Edgefield	6		6
Fairfield	5		5
Florence	20		20
Georgetown	13		13
Greenville	143,844	3,998	147,842
Greenwood	130		130
Horry	42		42
Jasper	6		6
Kershaw	4		4
Lancaster	8		8
Laurens	991		991

	Table E-3: Where People Work Who Live In SC		
	County of Residence		
County Worked In	Greenville	Out of state	Grand Total
Lexington	54		54
McCormick	8		8
Newberry	28		28
Oconee	278		278
Orangeburg	15		15
Out of state	2,003		2,003
Pickens	1,981		1,981
Richland	215		215
Spartanburg	6,537		6,537
Sumter	15		15
Union	36		36
York	61		61

Table E-3[8] presents the 2000 worker flow data from each of the counties. Some counties that are listed on this table are not being considered for boundary recommendations and are being included on this chart to account for all workers in each county. Approximately 87% of workers that live in Greenville County work inside the county. Approximately 80% of the workers that work outside of Greenville County commute to the neighboring Counties of Anderson, Pickens, Laurens, or Spartanburg, and approximately 12% work out of state.

[8] Data provided from US Census: 2000.

Figure E-1:
Urban vs. Rural DVMT for Greenville County



	1990	2000	2025
Urban	4,989,460	6,511,554	10,177,988
Rural	2,201,020	2,910,155	4,527,504

Figure E-1[9] presents the urban and rural DVMT for Greenville County. This figure shows that Greenville County has approximately 70% of DVMT categorized as urban in nature.

[9] Data provided from US Census: 2000.

Figure E-2:
Motor Vehicle Registration
Greenville MPO Counties, 2000

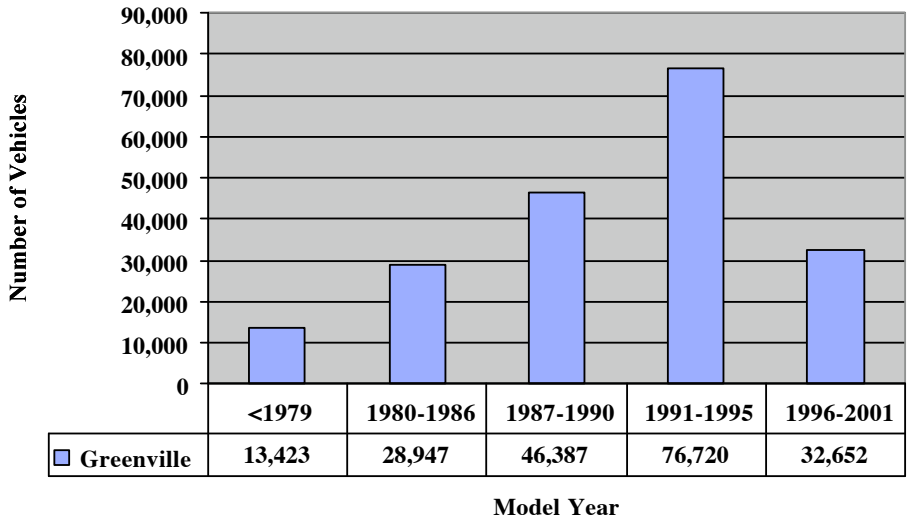


Figure E-2[10] presents the motor vehicle registration data for Greenville County. Only a small portion of the vehicles are pre-1981 model years. In 1981 new cars were outfitted with three-way catalysts, on-board computers, and oxygen sensors to help increase the efficiency of the catalytic converters. This figure shows that the majority of cars registered are model years 1991-1995. In 1991 the EPA established lower tailpipe standards for hydrocarbons and nitrogen oxides beginning with 1994 model year vehicles.

This data reflects 2000 registration figures, and many vehicle owners will elect to replace vehicles with newer vehicles in the coming years. These vehicle turnovers, combined with future national low sulfur fuel standards, the use of Onboard Diagnostic (OBD) systems, and Onboard Refueling Vapor Recovery (ORVR) systems will help to offset any potential impacts from the increased emissions from mobile sources in this area.

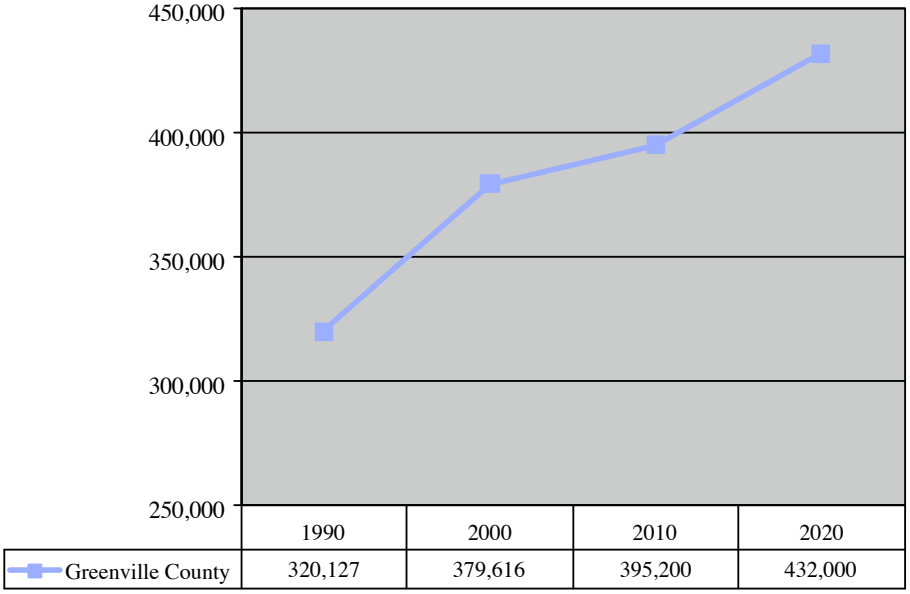
F. Expected Growth (Including Extent, Pattern, and Rate of Growth)

Limited data is available in assessing expected growth for Greenville County, and there is no known data to assess growth for the Greenville Nonattainment Area. Conclusions were drawn based on historical data from 1990, current data from 2000, and population projections for 2020. Economic growth, relative to population growth, is even harder to predict. No knowledge of major economic expansions is available. While it is certain that population counts will grow, it is only assumed that current economic factors will remain stable or that some economic growth will occur. It is reasonable to expect the majority of that growth to be located inside, or at least near, the boundary.

[10] Data provided by SC Department of Public Safety, Division of Motor Vehicles.

Table F-1: Historical and Projected Population and Population Density per County	
	Greenville County
Population, 1990[11]	320,127
Population, 2000[12]	379,616
Projected Population, 2020[13]	432,000
Population Growth Rate, 1990 - 2000 (Persons per 5 Years)	29,744.5
Projected Population Growth Rate, 2000 - 2020 (Persons per 5 Years)	13,096
Land Area (Sq. Miles)	790
Persons per Sq. Mile, 2000	480.5
Projected Persons per Sq. Mile, 2020	546.8
Urban Population, 2000	315,095
% Urban Population, 2000	83.0%
Rural Population, 2000	64,521
% Rural Population, 2000	17.0%

Figure F-1:
Population Growth by County, 1990 - 2020



It should be noted that trends are based on projected data for 2020. The population will grow in the

[11] Data provided by US Census: 2000.
[12] Data provided by US Census: 2000.
[13] Data provided by EPA.

county. Comparing the population increase per five years over the last ten years (1990 – 2000) to the projected population increase per five years over the next twenty years (2000 – 2020) shows that the rate of growth slow for Greenville County.

Figure F-2:
Rate of Population Growth, 1990 - 2020

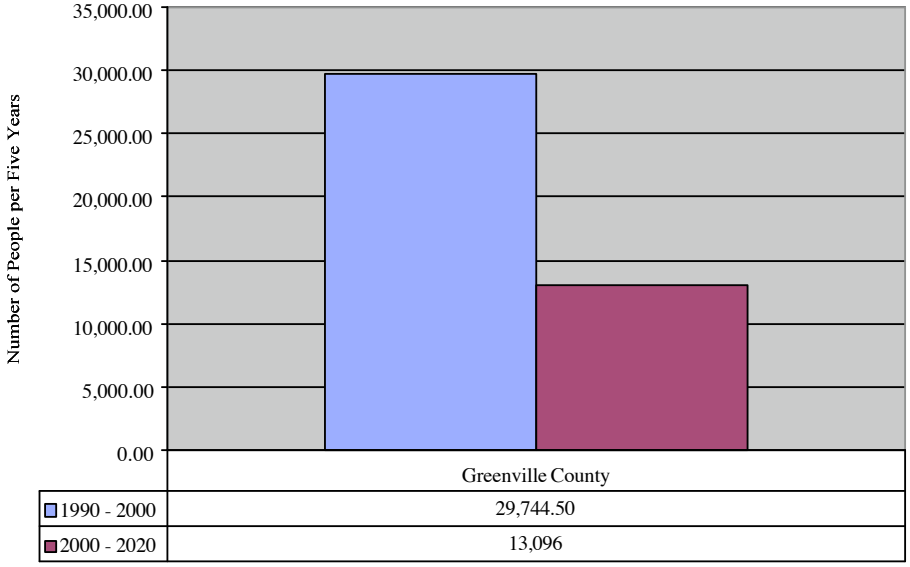
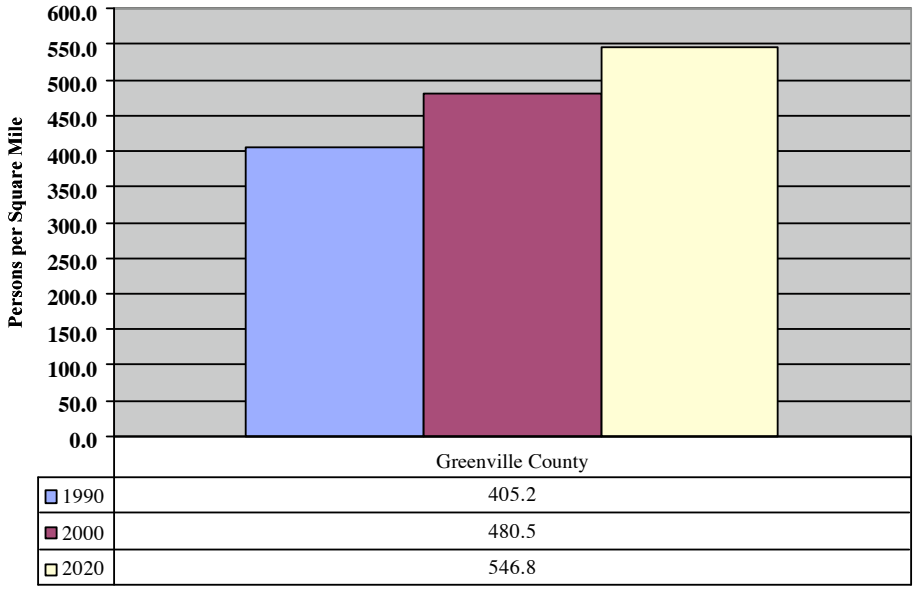


Figure F-3:
Historical and Projected Population Density



Figures F-1, F-2, and F-3 show historical and projected data for total population, rate of growth, and population density, respectively, for Greenville County. Since the boundary includes the majority of Greenville County and already captures the area's urban population, it is reasonable to conclude that the boundary at least approximates, if not contains, the expected population growth, and hence the economic growth, for the area in the coming years.

The largest employment sector in Greenville County is manufacturing.[14] The second largest is construction while the third is administration, support, waste management, and remediation services.

G. Meteorology

See Section V - G of Introduction.

H. Topography

See Section V - H of Introduction.

I. Jurisdictional Boundaries

The Greenville Nonattainment Area boundary includes only that portion of the Greenville MPO that is within Greenville County. The portions of the Greenville MPO that are in Pickens County and

[14] Data provided by US Census: 2000.

Spartanburg County will be designated in separate nonattainment areas.

Starting point is on the west side of the Greenville County - Pickens County line at SC 183 (Farrs Bridge Rd) on the Saluda River.

Follows Saluda River - Greenville - Pickens county line north for 5.0 miles to North Saluda River.

Follows North Saluda River north and northeast into Greenville County for 7.2 miles to Bulls Creek.

Follows Bulls Creek east for 1.9 miles to Valley Lake.

From Valley Lake northeast for 0.4 miles to US 25 at Skyview Dr.

From US 25 at Skyview Dr. northeast for 1.3 miles to Mush Creek.

Follows Mush Creek east for 3.8 miles to South Tyger River.

Follows South Tyger River southeast for 1.9 miles to Wildcat Creek.

Follows Wildcat Creek northeast for 3.0 miles to intersection of S-23-114 (Donahue Rd) and S-23-277 (Jordan Rd.)

From intersection of S-23-114 (Donahue Rd.) and S-23-277 (Jordan Rd.) southeast for 0.5 miles to Pink Dill Mill Rd and Barnes Creek.

Follows Barnes Creek east for 3.6 miles to Middle Tyger River.

Follows Middle Tyger River southeast for 3.4 miles to the Greenville - Spartanburg county line.

Follows Greenville - Spartanburg county line southeast to intersection of Greenville - Spartanburg - Laurens county line.

Follows Greenville - Laurens county line southwest South Rabon Creek.

Follows South Rabon Creek northwest for 3.1 miles to S-23-55 (Fairview Rd.) at S-23-154 (McKelvey Rd.)

Follows S-23-154 (McKelvey Rd.) southwest for 0.6 miles to branch of Reedy River.

Follows branch of Reedy River west for 3.0 miles to Reedy River.

Follows Reedy River South 1.0 mile to Little Creek.

Follows Little Creek west for 4.9 miles to S-23-50 (Hopkins Rd.)

From S-23-50 (Hopkins Rd.) and Little Creek intersection southwest for 5.4 miles to Saluda River at gas pipeline on Greenville - Anderson county line just north of Kirby Green Rd.

Follows Saluda River - Greenville county line north back to starting point.

J. Level of Control of Emission Sources

Through its participation with the Early Action Compacts, Greenville County is exploring local control strategies such as an ozone action coordinator, low sulfur fuels, alternative fuels, hybrid vehicles, high occupancy vehicle lanes, modified speed limits, open burning restrictions, and congestion management and Intelligent Transportation System.

K. Regional Emissions Reductions

See Section V of the Introduction.

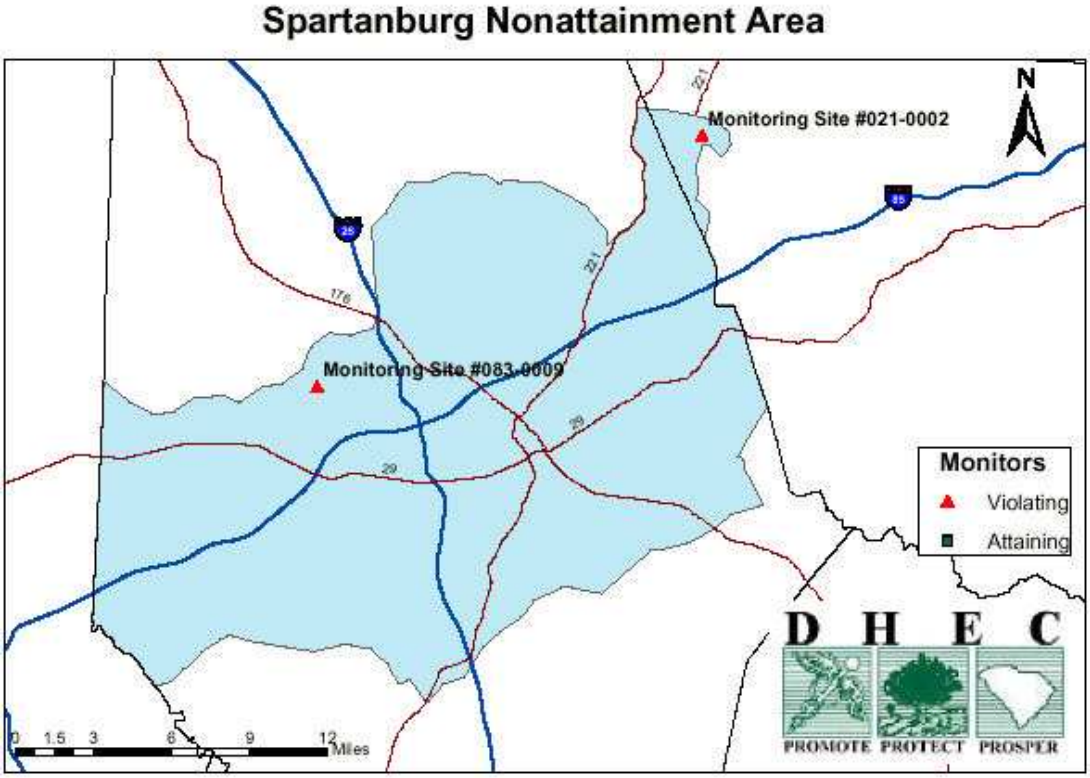


Figure 1: Spartanburg Nonattainment Area Map

The South Carolina Department of Health and Environmental Control (Department) recommends that the area encompassed by the boundaries of the Spartanburg Metropolitan Planning Organization (MPO) and additional portions of Spartanburg and Cherokee Counties be designated a nonattainment area for violating the 8-hour ozone National Ambient Air Quality Standard (air quality standard) based on 2000 through 2002 monitoring data. This recommended area will be referred to as the Spartanburg Nonattainment Area throughout the rest of this document.

The recommended boundary for the Spartanburg Nonattainment Area captures 58% of the population in Spartanburg and Cherokee Counties. Cherokee County is predominately rural as 61% of the population lives in non-urban areas. The Spartanburg Nonattainment Area captures 85% of the point source NO_x emissions and 84% of the VOC point source emissions in the two counties. The largest NO_x point source in the six (6) county Upstate region (Oconee, Pickens, Anderson, Greenville, Spartanburg and Cherokee) is captured in the proposed nonattainment boundary. While this facility is not currently subject to the NO_x SIP Call requirements as it is a Phase II source, it is working with the Department as a part of the Early Action Compact process to move forward with controls equivalent to Phase II as expeditiously as possible. This proposed boundary captures 60% of the daily vehicle miles traveled and the 2025 estimate captures 58%. There are two ozone monitors representing air quality in this area. One is in Spartanburg County and another is located just across the Spartanburg County line in Cherokee County. This monitor is marginally exceeding the 8-hour ozone standard. Monitors located in adjoining counties southeast and east of the area indicate attainment of the standard, supporting the recommended

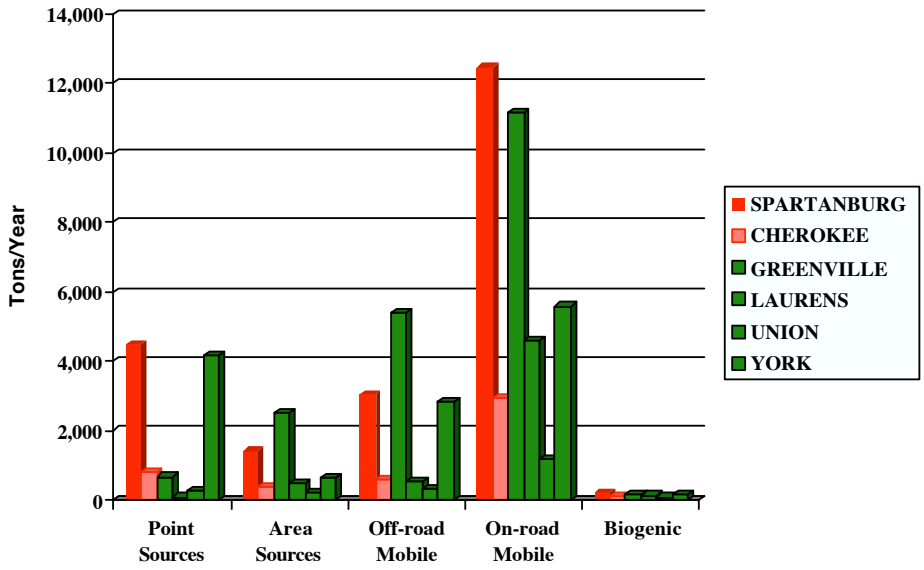
boundary.

The Department is submitting this document to provide detailed information pertaining to the factors which EPA suggested be addressed in support of any nonattainment area designation recommendations.

A. Emissions and Air Quality in Adjacent Areas (Including Adjacent MSAs)

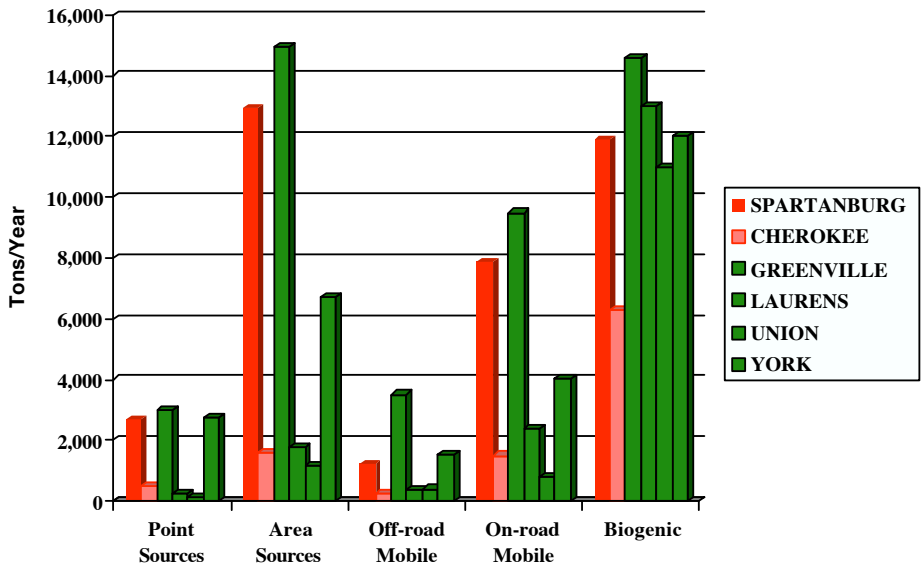
To evaluate the emissions in Spartanburg and Cherokee Counties and the adjacent areas, the Department utilized the estimated annual 1999 oxides of nitrogen (NO_x) and volatile organic compounds (VOC) emissions. The types of NO_x and VOC emission sources that were evaluated include point, area, biogenic, and on-road and off-road mobile sources. Figures A-1and A-2 show the percentage of emissions from each source category for Spartanburg and Cherokee Counties and surrounding South Carolina Counties. Additional emissions inventory information is provided in Section D.

Figure A-1: NOx Sources for Spartanburg, Cherokee and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

Figure A-2: VOC Sources for Spartanburg, Cherokee and Adjacent Counties*



*** Order of bars corresponds with order of counties in legend.**

The Department has two ozone-monitoring sites in the Spartanburg Nonattainment Area with three years of data; both monitors indicate a violation of the air quality standard. Spartanburg and Cherokee Counties are both part of the Greenville – Spartanburg - Anderson MSA. Air quality information is provided in Section C.

B. Population Density and Degree of Urbanization Including Commercial Development (Significant Difference from Surrounding Areas)

According to the US Census, urban is defined as all territory, population, and housing units in urbanized areas and urban clusters. An urbanized area is defined as a densely settled area that has a census population of at least 50,000, and an urban cluster is defined as a densely settled area that has a census population of 2,500 to 49,999. An urban area is a generic term that refers to both urbanized areas and urban clusters. Rural is defined as all territory, population, and housing units located outside of urbanized areas and urban clusters.

Spartanburg County is 811 square miles and had a population of 253,791 in 2000. The current population density is 313.0 persons per square mile. The county is nearly two-thirds urban, as 64.8 percent of the county's population, or 164,341 people, mostly live in urbanized areas.

The Spartanburg Nonattainment Area contains approximately 69.7% of the county's residents, or 176,796 persons, and covers 321.9 square miles. The population density of the Spartanburg

recommended area is 549.2 persons per square mile.

Cherokee County is 393 square miles and had a population of 52,537 in 2000. The current population density is 133.8 persons per square mile. The county is predominantly rural, as 38.7% percent of the county's population, or 20,307 people, live inside of an urban area.

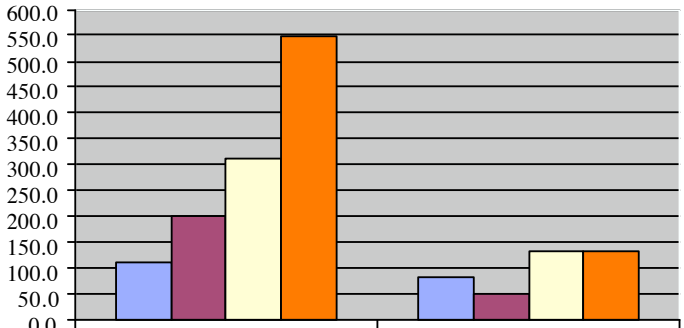
The recommended area covers a portion of Cherokee County. It is estimated to cover 4 square miles. Using this land area and the population density of Cherokee County (133.8 persons per square mile), the recommended area in Cherokee County is approximated to have a population of 535.2.

Table B-1 contains population data for Spartanburg and Cherokee Counties and their portions of the Spartanburg Nonattainment Area.

	Table B-1: Total Population, Land Area, and Urban/Rural Population, 2000			
	Spartanburg County	Spartanburg County Recommended Area	Cherokee County	Cherokee County Recommended Area
Population[1]	253,791	176,796	52,537	535
Land Area (Square Miles)[1]	811	323.4	393	6
Persons per Square Mile[1]	313.0	546.7	133.8	133.8
Urban Population[2]	164,341	Unknown at this time	20,307	Unknown at this time
% Urban Population[2]	64.8%	Unknown at this time	38.7%	Unknown at this time
Rural Population[2]	89,450	Unknown at this time	32,230	Unknown at this time
% Rural Population[2]	35.2%	Unknown at this time	61.3%	Unknown at this time
* The data for the recommended areas is based on assumptions and is only estimates. The actual data may be greater than or less than the data provided.				

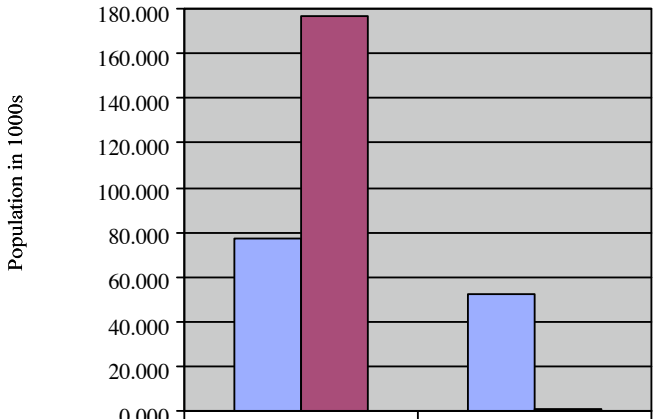
[1] Data provided by US Census: 2000 Portions of the data for the recommended area were obtained from the SC DOT.
[2] Data provided by SC Office of Research and Statistics.

Figure B-1: Population Density, 2000
(Persons per Square Mile)



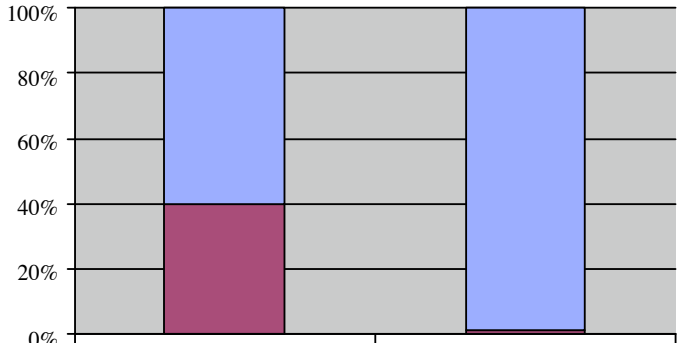
	Spartanburg County	Cherokee County
County Rural Persons per Sq. Mi.	110.2	82.02
County Urban Persons per Sq. Mi.	202.8	51.78
Total County Persons per Sq. Mi.	313.0	133.8
Recommended Area Persons per Sq. Mi.	549.2	133.8

Figure B-2:
Population Distribution
Relative to Recommended Area Boundaries, 2000



	Spartanburg County	Cherokee County
Outside Recommended Area	76.995	52.002
Inside Recommended Area	176.796	0.535

Figure B-3: Land Area Distribution in Spartanburg County According to Recommended Area Boundaries, 2000



	Spartanburg County	Cherokee county
Non-Recommended Area Land Area in Sq. Mi.	489.1	389
Recommended Area Land Area in Sq. Mi.	321.9	4

Figures B-1, B-2, and B-3 show the population density distribution, land area distribution, and population distribution, respectively, for Spartanburg and Cherokee Counties relative to the Spartanburg Nonattainment Area boundaries.

According to the US Census, manufacturing is defined as the mechanical, physical, or chemical transformation of materials or substances into new products. The assembly of components into new products is also considered manufacturing, except when it is appropriately classified as construction. Establishments in the manufacturing sector are often described as plants, factories, or mills and typically use power-driven machines and materials-handling equipment. Also included in the manufacturing sector are some establishments that make products by hand, like custom tailors and the makers of custom draperies. While manufacturers typically do not sell to the public, some establishments like bakeries and candy stores that make products on the premises may be included. The retail trade sector comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.

Spartanburg County has various industry and businesses located throughout the county. Manufacturing is the county's largest employment sector as some 37,548 persons are employed at 385 manufacturing establishments throughout the county. The Spartanburg County portion of the recommended area contains 87.17% of the county's manufacturing employees and 88.31% of the county's manufacturing establishments. Retail trade is the county's second largest sector of employment as some 15,095 persons work at some 1,123 retail businesses throughout the county. Being the urban area in the county, the Spartanburg County portion of the Spartanburg Nonattainment Area boundary is assumed to contain the majority - both employees and establishments - of the manufacturing, retail, and other business in the county.

Being predominantly rural, Cherokee County has various industry and businesses located throughout

the county, but the largest business type in the county is manufacturing. Manufacturing in Cherokee County employs 10,551 persons at some 79 manufacturing establishments. Retail trade is the second largest county employer as 2,556 persons work at some 241 retail businesses. The town of Gaffney, which is approximately 10 miles from the Cowpens monitoring site, appears to contain the majority - both employees and establishments - of the manufacturing and other business in the county.

Tables B-2 and B-3 contain the manufacturing and retail trade data for Spartanburg and Cherokee Counties and the Spartanburg Nonattainment Area.

	Table B-2: Manufacturing Patterns in, 2000[3]		
Spartanburg County	Recommended Area	County	% in Recommended Area
Employees	32,730	37,548	87.17%
Establishments	340	385	88.31%
Cherokee County			
Employees		10,551	0.0%
Establishments		79	0.0%

	Table B-3: Retail Trade Patterns, 2000[4]	
	Number of Employees	Number of Establishments
Spartanburg County	15,095	1,123
Cherokee County	2,556	241

[3] Data from Bureau of Air Quality "SC Company File1.xls," based on 2001.
[4] Data provided by US Census: 2000.

Figure B-4: Distribution of Maufacturing Employees in Spartanburg County According to Recommended Area Boundaries, 2000

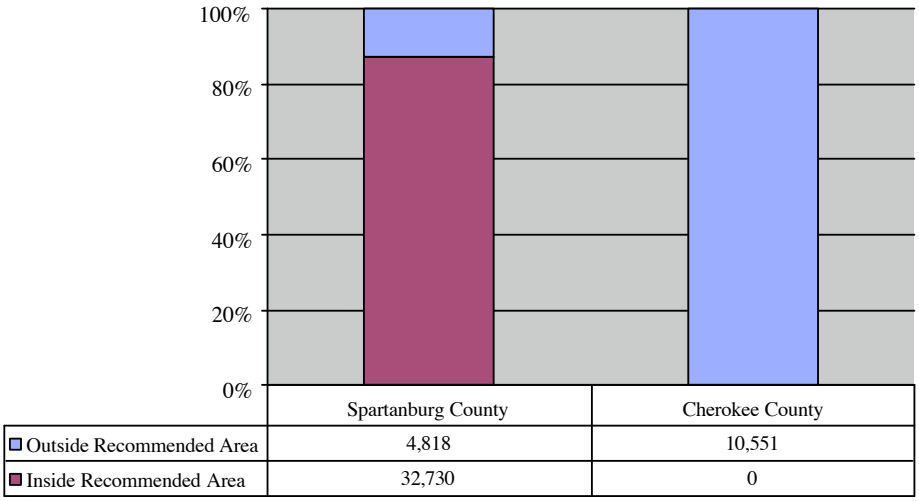


Figure B-4 shows the distribution of manufacturing employees relative to the recommended nonattainment boundaries.

C. Monitoring Data Representing Ozone Concentrations in Local Areas and Larger Areas (urban or regional scale)

The Spartanburg Nonattainment Area map (Figure 1) shows the ozone monitoring stations in Spartanburg Nonattainment Area for 2003. There are neighboring monitors in York and Union Counties. The Spartanburg County ozone monitoring station (North Spartanburg Fire Station 45-083-0009) is off John Dodd Road. The site has been in operation since 1990. Ozone concentrations are measured from mid-March through mid-November. The area surrounding the monitoring site is residential and it is located approximately 265 meters above sea level. According to the South Carolina Department of Transportation (SCDOT) traffic count for 1993, five hundred (500) vehicles per day accessed the road next to the monitor. The monitoring objective for North Spartanburg Fire Station site is to measure the maximum ozone concentration.

The Cherokee County ozone monitoring station (Cowpens National Battle Ground 45-021-0002) is located off Highway 11. The site has been in operation since 1988 and measurement of ozone concentrations has run continuously since April of that year. The area surrounding the monitoring site is forest and it is located approximately 296 meters above sea level. According to SCDOT traffic count for 1993, one thousand (1,000) vehicles per day accessed the road. The monitoring objective for Cowpens National Battle Ground is to measure concentrations for upwind background.

The Union County ozone monitoring station (Delta 45-087-0001) is located off Highway 121. The site has been in operation since 1983 but the ozone monitoring station only runs mid-March through mid-

November. The area surrounding the monitoring site is rural and it is located approximately 113 meters above sea level. According to SCDOT traffic count for 1993, twenty-five (25) vehicles per day accessed the road. The monitoring objective for the Delta site is to measure ozone concentrations for general background.

The York County ozone monitoring station (York CMS 45-091-0006) is located off of US 321. The site began operating in March 1993. The site is situated in a field and much of the surrounding land is agricultural. The site is approximately 222 meters above sea level. According to SCDOT the traffic count along US 321 in 1993 was one thousand (1,000) vehicles per day. The monitoring objective for York CMS is to measure extreme downwind ozone concentrations relative to Charlotte-Mecklenburg, particularly when the predominant winds are out of the northeast.

Table C-1 presents the 2000 through 2002 8-hour ozone monitoring data for Spartanburg, Cherokee, Union, and York Counties. The design value is the annual fourth-highest daily maximum 8-hour ozone concentration, expressed in parts per million (ppm), averaged over three consecutive years. Since the 2002 ozone design values for the North Spartanburg Fire Station and Cowpens National Battleground monitoring sites are 0.090 ppm and 0.087 ppm respectively, both sites are marginally exceeding the 8-hour ozone standard. The Union and York monitors indicate attainment with the 8-hour ozone standard.

Table C-1:
Spartanburg and Surrounding Area Ozone Monitoring Data

County	Site ID	Site Name	4th Maximum 8-Hour			Design Value
			2000	2001	2002	
Spartanburg	45-083-0009	North Spartanburg Fire Station	0.089	0.090	0.093	0.090
Union	45-087-0001	Delta	0.079	0.079	0.085	0.081
Cherokee	45-023-0002	Cowpens National Battle Ground	0.088	0.080	0.093	0.087
York	45-091-0006	York CMS	0.076	0.080	0.096	0.084

Table C-2 contains the 2000 through 2002 daily maximum ozone concentrations above 0.084 ppm for Spartanburg, Cherokee, Union, and York monitoring sites. A period indicates no exceedance occurred on the same day at that location.

Table C-2:
North Spartanburg Fire Station, Cowpens National Battle Ground, and Delta Sites

Date of Exceedance	Spartanburg Daily Maximum 8-hour Average ppm	Union Daily Maximum 8-hour Average ppm	Cherokee Daily Maximum 8-hour Average ppm	York Daily Maximum 8-hour Average ppm
06/01/2000	0.085	.	.	.
06/02/2000	0.089	0.087	0.085	.

Table C-2: North Spartanburg Fire Station, Cowpens National Battle Ground, and Delta Sites				
Date of Exceedance	Spartanburg Daily Maximum 8-hour Average ppm	Union Daily Maximum 8-hour Average ppm	Cherokee Daily Maximum 8-hour Average ppm	York Daily Maximum 8-hour Average ppm
06/09/2000	0.086	.	.	.
06/12/2000	0.091	.	.	.
07/19/2000	0.086	.	.	.
08/10/2000	0.097	.	.	.
08/17/2000	0.1	.	.	.
10/05/2000	0.089	.	.	.
2000 Total Hits	**8**	**1**	**1**	**0**
05/04/2001	0.085	.	.	.
05/05/2001	0.09	.	.	.
05/30/2001	0.085	.	.	.
06/18/2001	0.088	.	.	.
06/20/2001	0.094	.	.	.
07/12/2001	0.093	.	.	.
07/16/2001	0.086	.	.	.
07/18/2001	0.09	.	.	.
08/14/2001	.	.	0.091	.
08/23/2001	0.089	.	.	.
08/25/2001	.	.	0.085	.
2001 Total Hits	**9**	**0**	**2**	**0**
05/24/2002	0.098	0.088	.	.
05/25/2002	0.085	.	.	0.087
06/03/2002	0.088	.	.	0.085
06/10/2002	0.088	.	0.091	0.096
06/11/2002	0.107	.	.	.
06/12/2002	.	.	0.086	0.092

Table C-2: North Spartanburg Fire Station, Cowpens National Battle Ground, and Delta Sites				
Date of Exceedance	Spartanburg Daily Maximum 8-hour Average ppm	Union Daily Maximum 8-hour Average ppm	Cherokee Daily Maximum 8-hour Average ppm	York Daily Maximum 8-hour Average ppm
06/13/2002	0.093	0.096	0.09	0.089
06/18/2002	0.085	.	.	.
06/19/2002	0.092	.	.	.
06/20/2002	0.086	.	.	.
06/29/2002	.	.	0.085	.
07/02/2002	.	.	0.089	.
07/03/2002	0.086	.	0.088	.
07/06/2002	0.088	.	0.085	.
07/08/2002	0.091	.	0.093	0.089
07/09/2002	0.087	.	.	.
07/17/2002	.	.	0.102	0.101
07/18/2002	.	.	0.085	.
07/31/2002	.	.	0.09	0.088
08/01/2002	0.085	.	.	0.086
08/02/2002	.	.	0.09	0.098
08/05/2002	.	.	0.096	0.095
08/09/2002	0.09	.	0.087	0.086
08/10/2002	0.093	.	.	0.085
08/11/2002	0.093	.	.	.
08/12/2002	0.1	.	.	.
08/21/2002	.	0.085	0.098	0.098
08/23/2002	.	0.086	0.085	0.087
09/05/2002	0.093	.	.	.
2002 Total Hits	**19**	**4**	**16**	**15**

D. Location of Emission Sources

Table D-1 lists the NO_x point sources that are in operation within Cherokee and Spartanburg Counties based on the 1999 NO_x and VOC emissions inventory i-Steps data. Cherokee County has 17 NO_x point sources in operation. None of these point sources are located within the nonattainment area. Spartanburg County has 59 NO_x point sources in operation and 47 of these point sources are located within the nonattainment area. Facilities in Red are within the proposed boundary; facilities in Black are outside the proposed boundary.

Table D-1: Cherokee & Spartanburg Counties Point Source NO2 Emissions

County	Plant Name	Permit Number	Pollutant	Point Source-NO2 (Tons Per Year)
Cherokee	Boren Clay Products - Blacksburg Plt	0600-0005	NO2	10.83
Cherokee	Broad River Energy LLC	0600-0076	NO2	294.18
Cherokee	Cherokee Cogeneration	0600-0060	NO2	54.40
Cherokee	Core Materials Corp	0600-0068	NO2	2.79
Cherokee	Hamrick Industries: Plant 5	0600-0036	NO2	1.74
Cherokee	Hamrick Mills: Hamrick Plant	0600-0004	NO2	1.43
Cherokee	Hamrick Mills: Musgrove	0600-0062	NO2	1.36
Cherokee	IFCO ICS-South Carolina Inc	0600-0055	NO2	0.94
Cherokee	Industrial Minerals	0600-0039	NO2	3.34
Cherokee	Linpac Paper	0600-0044	NO2	57.28
Cherokee	Milliken Chemical: Cypress	0600-0040	NO2	0.20
Cherokee	Milliken: Magnolia	0600-0007	NO2	244.06
Cherokee	Nestle Frozen Foods	0600-0033	NO2	25.88
Cherokee	SC Pipeline: Blacksburg	0600-0065	NO2	23.14
Cherokee	Springfield LLC: Limestone	0600-0014	NO2	1.62
Cherokee	Timken Co, The	0600-0009	NO2	27.69
Cherokee	TNS Mills: Gaffney	0600-0054	NO2	1.55
	1999 Cherokee Co Total			**752.43**
	Emissions in Nonattainment Area-Total			**0.0**
	Emissions in Nonattainment Area-Percent			**0.0%**
Spartanburg	Asphalt Associates	9900-0023	NO2	0.77
Spartanburg	Asphalt Contractors LLC	9900-0152	NO2	4.94
Spartanburg	BASF: Spartanburg	2060-0068	NO2	7.51
Spartanburg	Bayer Corp: Wellford	2060-0055	NO2	7.41
Spartanburg	Blackman Uhler Chemical	2060-0029	NO2	17.85
Spartanburg	BMW Manufacturing Corp	2060-0230	NO2	27.58
Spartanburg	Bommer Industries: Landrum	2060-0119	NO2	1.22
Spartanburg	Cooper Standard Automotive	2060-0088	NO2	0.00
Spartanburg	Crown Cork & Seal: Spartanburg	2060-0077	NO2	4.61
Spartanburg	Donnelley, RR & Sons	2060-0081	NO2	0.13
Spartanburg	Eastman Chemical Company	2060-0051	NO2	0.05
Spartanburg	Exopack LLC	2060-0075	NO2	7.76

Table D-1: Cherokee & Spartanburg Counties Point Source NO2 Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-NO2 (Tons Per Year)**
Spartanburg	F & R Asphalt: Plant #1	9900-0090	NO2	3.34
Spartanburg	Goodyear: Spartanburg	2060-0035	NO2	2.58
Spartanburg	Hoke Inc	2060-0175	NO2	1.30
Spartanburg	Inman Mills: Ramey Plant	2060-0271	NO2	3.87
Spartanburg	Inman Mills: Saybrook	2060-0042	NO2	2.71
Spartanburg	Intelicoat Technologies	2060-0182	NO2	7.80
Spartanburg	ISG Resources Inc	2060-0025	NO2	4.34
Spartanburg	Johns Manville	2060-0344	NO2	0.00
Spartanburg	King Asphalt: # 4	9900-0352	NO2	1.21
Spartanburg	Kohler Co: Plastics Plant	2060-0071	NO2	21.66
Spartanburg	Kosa: Arteva Specialties	2060-0345	NO2	258.74
Spartanburg	Leigh Fibers Inc	2060-0084	NO2	0.04
Spartanburg	Mack Molding Co	2060-0061	NO2	0.09
Spartanburg	Mary Black Memorial Hospital	2060-0121	NO2	3.10
Spartanburg	MEMC Electronic Materials	2060-0070	NO2	0.59
Spartanburg	Metromont: Hwy 101	9900-0166	NO2	0.00
Spartanburg	Metromont: Spartanburg I-85	2060-0038	NO2	0.01
Spartanburg	Michelin: Spartanburg	2060-0065	NO2	23.95
Spartanburg	Milliken Chemical: Dewey	2060-0001	NO2	6.87
Spartanburg	Milliken: Cotton Blossom-Plant	2060-0288	NO2	0.24
Spartanburg	Milliken: Research	2060-0022	NO2	4.34
Spartanburg	Mohawk: Landrum	2060-0012	NO2	2.19
Spartanburg	Mount Vernon Mills: Arkwright	2060-0028	NO2	1.40
Spartanburg	National Starch & Chemical Company	2060-0085	NO2	10.14
Spartanburg	Palmetto Landfill & Recycling Ctr	2060-0221	NO2	28.21
Spartanburg	Palmetto Vermiculite	2060-0181	NO2	1.22
Spartanburg	Phelps Dodge	2060-0086	NO2	0.83
Spartanburg	Piedmont Concrete: Duncan	9900-0282	NO2	0.02
Spartanburg	Piedmont Dielectrics	2060-0108	NO2	0.06
Spartanburg	Reeves Brothers: Fairforest	2060-0019	NO2	5.64
Spartanburg	Reeves Brothers: Spartanburg	2060-0262	NO2	3.24
Spartanburg	Saxon Fibers LLC	2060-0039	NO2	6.44
Spartanburg	Sew Eurodrive	2060-0167	NO2	0.00
Spartanburg	Sloan Construction: Lyman	9900-0115	NO2	4.60
Spartanburg	Sloan Construction: Pacolet	9900-0091	NO2	6.30
Spartanburg	Spartanburg Automotive Products	2060-0007	NO2	1.45
Spartanburg	Spartanburg Hospital Restoration Care	2060-0128	NO2	0.29
Spartanburg	Spartanburg Regional Medical Center	2060-0142	NO2	32.72
Spartanburg	Spartanburg Stainless Products	2060-0348	NO2	1.45
Spartanburg	Springs Industries: Lyman	2060-0018	NO2	22.93
Spartanburg	Steris-Isomedix Services	2060-0180	NO2	1.78
Spartanburg	Tietex International Ltd	2060-0147	NO2	6.63
Spartanburg	TNS Mills: Spartanburg	2060-0079	NO2	1.17

Table D-1: Cherokee & Spartanburg Counties Point Source NO2 Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-NO2 (Tons Per Year)**
Spartanburg	Transcontinental Gas Pipe Line	2060-0179	NO2	3,881.99
Spartanburg	Transmontaigne: Spartanburg-SE	2060-0134	NO2	2.04
	1999 Spartanburg Co Total			**4,456.92**
	Emissions in Nonattainment Area-Total			**4,420.97**
	Emissions in Nonattainment Area-Percent			**99.2%**

Table D-2 lists the VOC point sources that are in operation in Cherokee and Spartanburg Counties based on the 1999 NO_x and VOC emissions inventory i-Steps data. Cherokee County has 20 NO_x point sources in operation. None of these point sources are located within the nonattainment area. Spartanburg County has 69 VOC point sources in operation and 53 of these point sources are located within the nonattainment area.

Table D-2: Cherokee & Spartanburg Counties Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-VOC (Tons Per Year)**
Cherokee	Alcoa Home Exteriors Inc	0600-0016	VOC	145.00
Cherokee	Boren Clay Products - Blacksburg Plt	0600-0005	VOC	0.74
Cherokee	Broad River Energy LLC	0600-0076	VOC	0.71
Cherokee	Cherokee Cogeneration	0600-0060	VOC	4.30
Cherokee	Core Materials Corp	0600-0068	VOC	9.91
Cherokee	Freightliner Custom Chassis	0600-0049	VOC	0.79
Cherokee	Hamrick Industries: Plant 5	0600-0036	VOC	13.31
Cherokee	Hamrick Mills: Hamrick Plant	0600-0004	VOC	0.66
Cherokee	Hamrick Mills: Musgrove	0600-0062	VOC	0.73
Cherokee	IFCO ICS-South Carolina Inc	0600-0055	VOC	55.00
Cherokee	Industrial Minerals	0600-0039	VOC	0.03
Cherokee	Linpac Paper	0600-0044	VOC	4.33
Cherokee	Milliken Chemical: Cypress	0600-0040	VOC	31.69
Cherokee	Milliken: Magnolia	0600-0007	VOC	133.60
Cherokee	Nestle Frozen Foods	0600-0033	VOC	0.45
Cherokee	Sanders Bros Metals	0600-0052	VOC	5.07
Cherokee	SC Pipeline: Blacksburg	0600-0065	VOC	0.15
Cherokee	Springfield LLC: Limestone	0600-0014	VOC	3.03
Cherokee	Timken Co, The	0600-0009	VOC	1.23
Cherokee	TNS Mills: Gaffney	0600-0054	VOC	1.90
	1999 Cherokee Co Total			**412.63**
	Emissions in Nonattainment Area-Total			**0.0**
	Emissions in Nonattainment Area-Percent			**0.0%**

Table D-2: Cherokee & Spartanburg Counties Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-VOC (Tons Per Year)**
Spartanburg	American Fast Print	2060-0026	VOC	73.35
Spartanburg	Appalachian Engineered Hardwood Flooring	2060-0299	VOC	0.11
Spartanburg	Asphalt Associates	9900-0023	VOC	0.43
Spartanburg	Asphalt Contractors LLC	9900-0152	VOC	0.02
Spartanburg	BASF: Spartanburg	2060-0068	VOC	1.35
Spartanburg	Bayer Corp: Wellford	2060-0055	VOC	7.35
Spartanburg	Blackman Uhler Chemical	2060-0029	VOC	3.72
Spartanburg	BMW Manufacturing Corp	2060-0230	VOC	58.05
Spartanburg	Bommer Industries: Landrum	2060-0119	VOC	5.91
Spartanburg	Citgo: Spartanburg	2060-0101	VOC	26.60
Spartanburg	Color Converting Ind	2060-0199	VOC	7.93
Spartanburg	Conocophillips Company	2060-0096	VOC	13.38
Spartanburg	Cooper Standard Automotive	2060-0088	VOC	2.02
Spartanburg	Crown Central Petroleum	2060-0094	VOC	12.65
Spartanburg	Crown Cork & Seal: Spartanburg	2060-0077	VOC	152.00
Spartanburg	Donnelley, RR & Sons	2060-0081	VOC	137.49
Spartanburg	Dot Packaging-Printpak	2060-0215	VOC	30.49
Spartanburg	Eastman Chemical Company	2060-0051	VOC	0.01
Spartanburg	Exopack LLC	2060-0075	VOC	170.71
Spartanburg	F & R Asphalt: Plant #1	9900-0090	VOC	0.02
Spartanburg	Goodyear: Spartanburg	2060-0035	VOC	154.65
Spartanburg	Hoke Inc	2060-0175	VOC	0.03
Spartanburg	INA USA Corp: Plant IV	2060-0107	VOC	0.00
Spartanburg	Inman Mills: Ramey Plant	2060-0271	VOC	2.01
Spartanburg	Inman Mills: Saybrook	2060-0042	VOC	0.64
Spartanburg	Intelicoat Technologies	2060-0182	VOC	126.34
Spartanburg	ISG Resources Inc	2060-0025	VOC	0.16
Spartanburg	Johns Manville	2060-0344	VOC	0.00
Spartanburg	King Asphalt: # 4 - New	9900-0352	VOC	1.85
Spartanburg	Kohler Co: Plastics Plant	2060-0071	VOC	204.41
Spartanburg	Kosa: Arteva Specialties	2060-0345	VOC	72.89
Spartanburg	Leigh Fibers Inc	2060-0084	VOC	0.00
Spartanburg	Mack Molding Co	2060-0061	VOC	62.75
Spartanburg	Mary Black Memorial Hospital	2060-0121	VOC	0.13
Spartanburg	MEMC Electronic Materials	2060-0070	VOC	0.45
Spartanburg	Metromont: Hwy 101	9900-0166	VOC	0.00
Spartanburg	Metromont: Spartanburg I-85	2060-0038	VOC	0.00
Spartanburg	Michelin: Duncan	2060-0183	VOC	10.41
Spartanburg	Michelin: Spartanburg	2060-0065	VOC	537.00

Table D-2: Cherokee & Spartanburg Counties Point Source VOC Emissions				
County	**Plant Name**	**Permit Number**	**Pollutant**	**Point Source-VOC (Tons Per Year)**
Spartanburg	Milliken Chemical: Dewey	2060-0001	VOC	19.31
Spartanburg	Milliken: Cotton Blossom-Plant	2060-0288	VOC	1.26
Spartanburg	Milliken: Research	2060-0022	VOC	0.17
Spartanburg	Mohawk: Landrum	2060-0012	VOC	2.20
Spartanburg	Motiva Enterprises LLC	2060-0097	VOC	46.91
Spartanburg	Mount Vernon Mills: Arkwright	2060-0028	VOC	0.08
Spartanburg	National Starch & Chemical Company	2060-0085	VOC	35.06
Spartanburg	Palmetto Landfill & Recycling Ctr	2060-0221	VOC	9.86
Spartanburg	Palmetto Vermiculite	2060-0181	VOC	0.07
Spartanburg	Phelps Dodge	2060-0086	VOC	0.05
Spartanburg	Phillips Pipeline: Spartanburg	2060-0056	VOC	24.81
Spartanburg	Piedmont Concrete: Duncan	9900-0282	VOC	0.00
Spartanburg	Piedmont Dielectrics	2060-0108	VOC	3.02
Spartanburg	Reeves Brothers: Fairforest	2060-0019	VOC	49.99
Spartanburg	Reeves Brothers: Spartanburg	2060-0262	VOC	0.29
Spartanburg	Saxon Fibers LLC	2060-0039	VOC	39.34
Spartanburg	Sew Eurodrive	2060-0167	VOC	0.00
Spartanburg	Sloan Construction: Lyman	9900-0115	VOC	0.02
Spartanburg	Sloan Construction: Pacolet	9900-0091	VOC	0.03
Spartanburg	Spartanburg Automotive Products	2060-0007	VOC	0.08
Spartanburg	Spartanburg Hospital Restoration Care	2060-0128	VOC	0.02
Spartanburg	Spartanburg Regional Medical Center	2060-0142	VOC	2.00
Spartanburg	Spartanburg Stainless Products	2060-0348	VOC	0.59
Spartanburg	Springs Industries: Lyman	2060-0018	VOC	41.63
Spartanburg	Steris-Isomedix Services	2060-0180	VOC	2.68
Spartanburg	Tietex International Ltd	2060-0147	VOC	25.72
Spartanburg	TNS Mills: Spartanburg	2060-0079	VOC	0.94
Spartanburg	Transcontinental Gas Pipe Line	2060-0179	VOC	144.34
Spartanburg	Transmontaigne: Spartanburg-PD	2060-0098	VOC	26.41
Spartanburg	Transmontaigne: Spartanburg-SE	2060-0134	VOC	33.29
	1999 Spartanburg Co Total			**2,387.48**
	Emissions in Nonattainment Area-Total			**2,330.96**
	Emissions in Nonattainment Area-Percent			**97.6%**

Table D-3 lists the NO_x on-road emissions for Spartanburg County and Table D-4 lists the VOC on-road emissions.

Table D- 3: Spartanburg County On-road NO_x Emissions			
County	**Tier 1**	**Tier 2**	**Highway NO_x (Tons Per Year)**
Spartanburg	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	4,150.00
Spartanburg	11-Highway Vehicles	02-Light-Duty Gas Trucks	2,287.00
Spartanburg	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	604.00
Spartanburg	11-Highway Vehicles	04-Diesels	5,427.00
	1999 Spartanburg Co Total		**12,468.00**

Table D-4: Spartanburg County On-road VOC Emissions			
County	**Tier 1**	**Tier 2**	**Highway VOC (Tons Per Year)**
Spartanburg	11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	4,425.00
Spartanburg	11-Highway Vehicles	02-Light-Duty Gas Trucks	2,516.00
Spartanburg	11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	595.00
Spartanburg	11-Highway Vehicles	04-Diesels	340.00
	1999 Spartanburg Co Total		**7,876.00**

E. Traffic and Commuting Patterns

Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the South Carolina Department of Transportation (SCDOT). SCDOT determines current DVMT by multiplying traffic volume (through traffic counts) and lane miles (determined by the Highway Performance Monitoring System) for each particular area. The South Carolina Department of Public Safety, Division of Motor Vehicles, provided motor vehicle registration data. All other data in this section was obtained from the US Census Bureau. All data is based on the year 2000.

Table E-1 shows that the Spartanburg Nonattainment Area captured 59.37% of the DVMT in 2000 and will capture 57.19% of the DVMT in 2025.

Table E-1: DVMT for Spartanburg Nonattainment Area.[5]				
County	2000 DVMT	2025 DVMT	DVMT Change (2000-2025)	Projected % Annual Change
Spartanburg	8,041,582	13,086,740	5,045,158	2.51
Cherokee	2,063,088	3,303,152	1,240,064	2.40
County Totals	10,104,670	16,389,892	6,285,222	2.49

[5] Data provided from SCDOT.

Table E-1: DVMT for Spartanburg Nonattainment Area.[5]				
County	2000 DVMT	2025 DVMT	DVMT Change (2000-2025)	Projected % Annual Change
Spartanburg Nonattainment Total[6]	5,999,515	9,373,126	3,373,611	2.25
% Captured Inside Nonattainment Boundary	59.37	57.19		

Figure 1 shows the Interstates that are located within the Spartanburg Nonattainment Area. There are two interstates, I-26 and I-85, with I-26 being the major corridor of travel between Spartanburg and Columbia, South Carolina and I-85 being the major corridor of travel between Spartanburg and Greenville, South Carolina. Additionally, there are three other major routes of travel through Spartanburg and Cherokee Counties. They include US Highways 29, 221 and 176. There are also numerous state roads and secondary state roads in the county that connect the larger towns together.

Table E-2 presents the breakdown by road classifications of DVMT traveled in the Spartanburg Nonattainment Area boundary counties from 2000 and projected through 2025.

Table E-2: DVMT Data for Spartanburg Nonattainment Area				
	2000	**Projected 2007**	**Projected 2012**	**Projected 2025**
Spartanburg County				
Rural Interstate (01)	2,395,210	3,044,958	3,509,064	4,715,740
Rural Principal Arterial (02)	137,290	152,821	160,853	188,254
Rural Minor Arterial (03)	984,884	1,096,301	1,153,919	1,350,484
Rural Major Collector (04)	1,194,093	1,329,176	1,399,034	1,637,353
Rural Minor Collector (05)	177,077	197,109	207,468	242,809
Rural Local (09)	264,722	294,669	310,155	362,989
Rural Total	*5,153,275*	*6,115,034*	*6,740,494*	*8,497,628*
Urban Interstate (11)	524,281	754,792	919,442	1,347,534
Urban Freeway/Expressway (12)	162,742	181,152	190,673	223,154
Urban Principal Arterial (13)	871,282	969,847	1,020,819	1,194,711
Urban Minor Arterial (14)	657,734	732,141	770,620	901,892
Urban Collector (15)	565,477	629,448	662,530	775,389
Urban Local (18)	106,791	118,872	125,119	146,433
Urban Total	*2,888,307*	*3,386,253*	*3,689,204*	*4,589,111*
Grand Total DVMT	8,041,582	9,501,287	10,429,698	13,086,740
Cherokee County				
Rural Interstate (01)	700,699	1,022,864	1,248,380	1,409,462
Rural Principal Arterial (02)	29,480	44,911	50,318	53,215
Rural Minor Arterial (03)	197,204	235,062	263,364	278,527

[6] Spartanburg Nonattainment Area totals based on MPO figures and may reflect an underestimation of the total percent captured by the boundary.

Table E-2: DVMT Data for Spartanburg Nonattainment Area				
	2000	**Projected 2007**	**Projected 2012**	**Projected 2025**
Rural Major Collector (04)	262,894	315,400	353,375	373,721
Rural Minor Collector (05)	22,715	31,875	35,713	37,769
Rural Local (09)	116,298	187,725	210,327	222,437
Rural Total	*1,329,289*	*1,837,837*	*2,161,478*	*2,375,132*
Urban Interstate (11)	-	-	-	-
Urban Freeway/Expressway (12)	-	-	-	-
Urban Principal Arterial (13)	62,444	-	-	-
Urban Minor Arterial (14)	90,338	97,669	109,429	115,729
Urban Collector (15)	22,273	67,539	75,671	80,028
Urban Local (18)	33,662	60,043	67,272	71,145
Urban Total	*208,716*	*225,251*	*252,372*	*266,902*
Grand Total DVMT	1,538,006	2,063,088	2,413,849	2,642,034

Table E-3[7] presents the 2000 worker flow data from each of the counties. Some counties that are listed on this table are not being considered for boundary recommendations and are being included on this chart to account for all workers in each county. This table shows that approximately 82% of workers that live in Spartanburg County work inside the county. Of the residents that work outside of Spartanburg County, approximately 76% commute to the neighboring counties of Cherokee or Greenville, and approximately 10% work out of the state. Table E-3 shows that approximately 70% of workers that live in Cherokee County work inside of the county. Of the residents that work outside of Cherokee County, approximately 57% commute to the neighboring county of Spartanburg, and approximately 27% commute out of state.

	TableE-3: Where people work who live in SC			
	County of Residence			
County Worked In	Cherokee	Spartanburg	Out of State	Grand Total
Grand Total	22,999	117,096	6,102	146,197
Aiken	6	20		26
Anderson	31	480		511
Beaufort		16		16
Berkeley	30	15		45
Charleston	52	70		122
Cherokee	16,052	2,029	1,897	19,978
Chester	17	27		44
Colleton		25		25
Darlington	4	8		12
Dorchester	20			20
Fairfield		33		33
Florence	8			8
Georgetown		8		8
Greenville	431	14,586		15,017

[7] Data provided from US Census:2000.

	TableE-3: Where people work who live in SC			
	County of Residence			
County Worked In	Cherokee	Spartanburg	Out of State	Grand Total
Greenwood	18	226		244
Horry		31		31
Kershaw	6			6
Lancaster	25	20		45
Laurens	26	703		729
Lexington	12	23		35
Newberry		22		22
Oconee	11	112		123
Orangeburg		6		6
Out of State	1,874	2,212		4,086
Pickens	16	198		214
Richland	8	71		79
Spartanburg	3,937	95,496	4,205	103,638
Sumter		7		7
Union	141	522		663
York	274	130		404

Figure E-1: Spartanburg and Cherokee Counties: Time Leaving Home to Go to Work

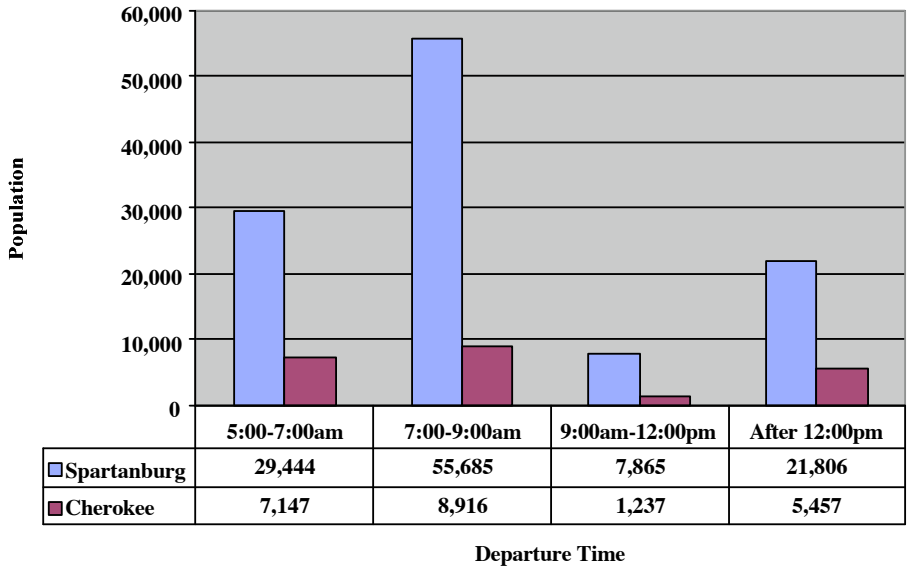
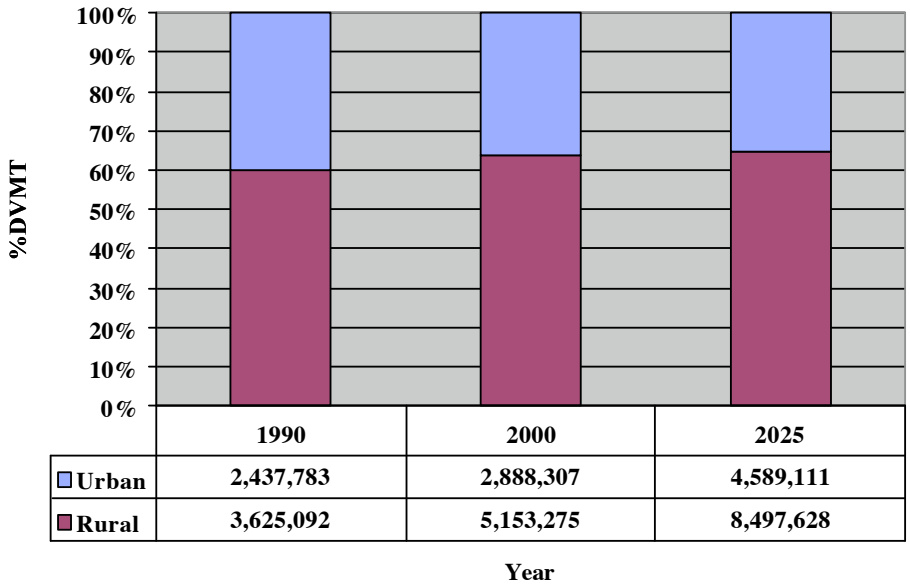


Figure E-1[8] presents the departure times for workers in Spartanburg County. The figure shows that the largest amount of traffic occurs between 7:00 am to 9:00 am. It should also be noted that ozone formation is believed to begin formation in this area starting around the morning hours and continuing throughout the day until sunset. This is important (since the majority of the traffic is contributed from Spartanburg County and this traffic occurs during the typical start of ozone formation) because it suggests that the mobile source emission of NO_x and VOC that help contribute to the ozone formation is mainly from the commuters that reside inside the Spartanburg Nonattainment Area.

Figure E-2: Urban vs. Rural DVMT for Spartanburg County

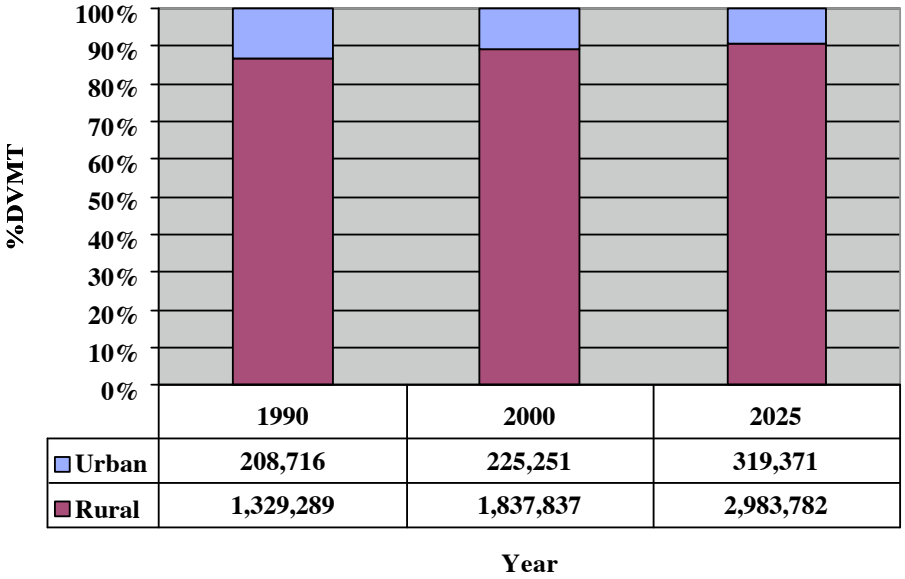


	1990	2000	2025
Urban	2,437,783	2,888,307	4,589,111
Rural	3,625,092	5,153,275	8,497,628

Figures E-2[9] and E-3 show that there are moderate amounts of DVMT in Spartanburg County and minimal amounts in Cherokee County.

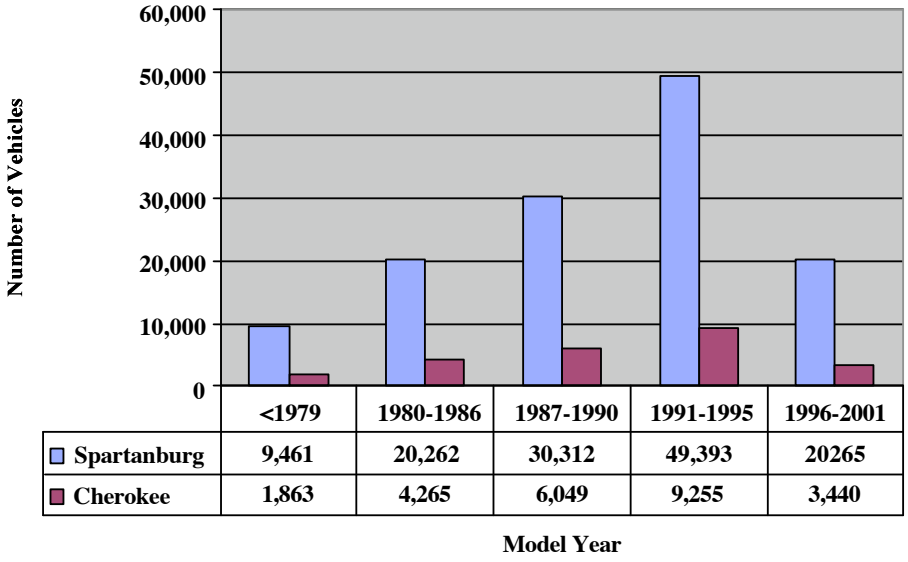
[8] Data provided from US Census:2000.
[9] Data provided from US Census:2000.

Figure E-3: Urban vs. Rural DVMT for Cherokee County



	1990	2000	2025
Urban	208,716	225,251	319,371
Rural	1,329,289	1,837,837	2,983,782

Figure E-4: 2000 Motor Vehicle Registration for Spartanburg and Cherokee Counties



	<1979	1980-1986	1987-1990	1991-1995	1996-2001
Spartanburg	9,461	20,262	30,312	49,393	20265
Cherokee	1,863	4,265	6,049	9,255	3,440

Figure E-4[10] presents the motor vehicle registration data for Spartanburg and Cherokee Counties. Only a small portion of the vehicles are pre-1981 model years. In 1981 new cars were outfitted with three-way catalysts, on-board computers, and oxygen sensors to help increase the efficiency of the catalytic converters. This figure shows that the majority of cars registered are model years 1991-1995. In 1991 the EPA established lower tailpipe standards for hydrocarbons and nitrogen oxides beginning with 1994 model year vehicles.

This data reflects 2000 registration figures, and many vehicle owners will elect to replace vehicles with newer vehicles in the coming years. These vehicle turnovers, combined with future national low sulfur fuel standards, the use of Onboard Diagnostic (OBD) systems, and Onboard Vapor Recovery (ORVR) systems will help to offset any potential impacts from the increased emissions from mobile sources in this area.

F. Expected Growth (Including Extent, Pattern, and Rate of Growth)

Limited data is available in assessing expected growth for Spartanburg and Cherokee Counties, and no data is available for assessing future growth within the recommended area. Conclusions were drawn based on historical data from 1990, current data from 2000, and population projections for 2020 as contained in Table F-1. Economic growth, relative to population growth, is even harder to predict. No knowledge of major economic expansions is available. While it is certain that population counts will grow, it is only assumed that current economic factors will remain stable or that some economic growth will occur. It is reasonable to expect the majority of that growth to be located inside, or at least near, the recommended area boundary.

Table F-1:
Historical and Projected Population and Population Density
for Spartanburg and Cherokee Counties

	Spartanburg County	Cherokee County
Population, 1990[11]	226,793	44,506
Population, 2000[12]	253,791	52,537
Projected Population, 2020[13]	302,500	59,600
Population. Growth Rate, 1990 – 2000 (Persons per 5 Years)	13,499	4,015.5
Projected Population Growth Rate, 2000 – 2020 (Persons per 5 Years)	12,177.25	1,765.8
Land Area (Sq. Miles)	811	393
Persons per Sq. Mile, 2000	313.0	133.8
Projected Persons per Sq. Mile, 2020	373.0	151.7
Urban Population, 2000	164,341	20,307
% Urban Population, 2000	64.8%	38.7%
Rural Population, 2000	89,450	32,230
% Rural Population, 2000	35.2%	61.3%

[10] Data provided from SC Department of Public Safety, Division of Motor Vehicles.
[11] Data provided by US Census: 2000.
[12] Data provided by US Census: 2000.
[13] Data provided by EPA.

Figure F-1:
Population Growth by County, 1990 - 2020

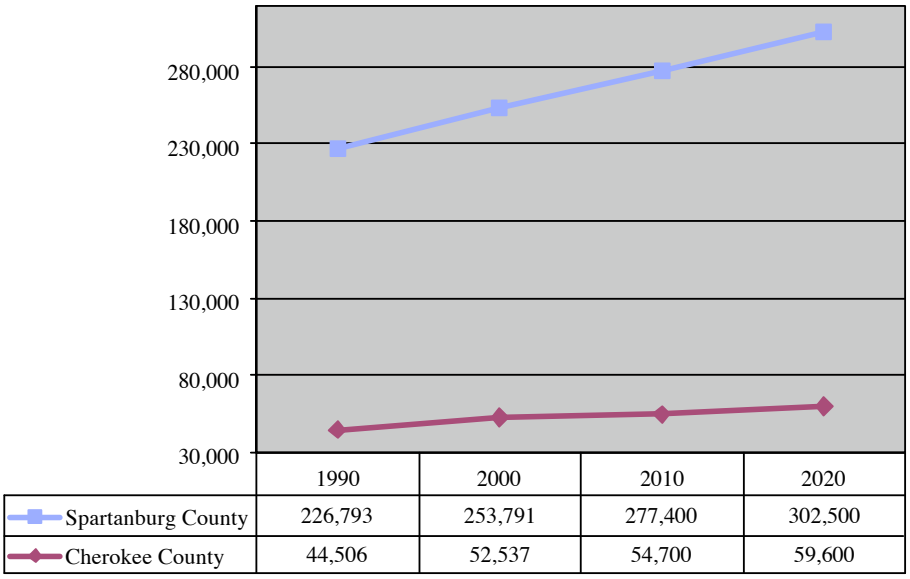


Figure F-2:
Population Growth, 1990 - 2020

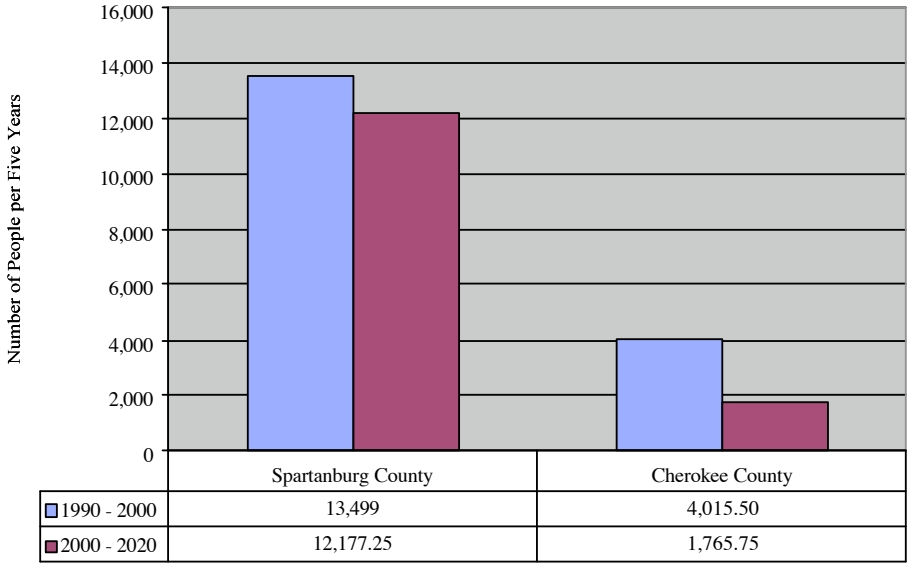
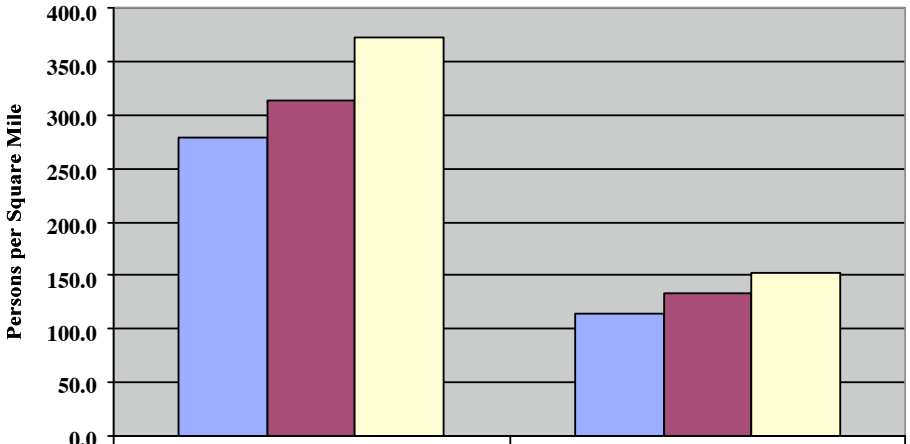


Figure F-3
Historical and Projected Population Density



	Spartanburg County	Cherokee County
1990	279.6	113.2
2000	313.0	133.8
2020	373.0	151.7

Figures F-1, F-2, and F-3 show historical and projected data for total population, rate of growth, and population density, respectively, for Spartanburg and Cherokee Counties. Since the recommended area already captures the area's urban population and contains portions of the manufacturing and retail trade, it is reasonable to conclude that the recommended area boundary at least approximates, if not contains, the expected population growth, and hence the economic growth, for the area in the coming years.

It should be noted that trends are based on projected data for 2020. The population will grow in each county; however, comparing the population increase per five years over the last ten years (1990 – 2000) to the projected population increase per five years over the next twenty years (2000 – 2020) shows that the rate of growth slows for the counties. Since the recommended area includes the urbanized portion of Spartanburg County, it is assumed that the Spartanburg Nonattainment Area will encompass the majority of expected population growth.

The largest employment sector in both Spartanburg and Cherokee Counties is the manufacturing sector. Retail trade is the second largest employer in each county.[14] The third largest in Spartanburg County is the health care and social assistance sector while the third largest in Cherokee County is construction.

G. Meteorology

See Section V - G of Introduction.

[14] Data provided by US Census: 2000.

H. Topography

See Section V - H of Introduction.

I. Jurisdictional Boundaries

The Spartanburg Nonattainment Area boundary includes all portions of the Spartanburg MPO and additional (contiguous) portions within Spartanburg County. It also encompasses the area around the Cowpens National Battleground ozone monitoring site, which is located in Cherokee County.

Starting Point is at the Greenville - Spartanburg County Line at SC 296 and the Enoree River.
Follows Greenville - Spartanburg County Line north to Beaverdam Creek.
Follows Beaverdam Creek southeast for 1.7 miles to SC 357.
Follows SC 357 northeast for 1.7 miles to Holly Springs Road (SC 358) and Greer Road.
Follows Greer Road northeast for 1.0 mile to Hampton Road.
Follows Hampton Road north for 0.2 miles to Montgomery Road.
Follows Montgomery Road east for 0.8 miles to North Tyger River.
Follows North Tyger River southeast for 2.3 miles to Inman Road (SC 292).
Follows Inman Road (SC 292) North for 1.5 miles to Little Mountain Road (S-217).
Follows Little Mountain Road (S-217) southeast for 0.3 miles to Israel Drive.
Follows Israel Drive northeast for 0.5 miles to Lake Cooley.
Follows Lake Cooley northeast for 0.1 miles to Waterford Drive.
Follows Waterford Drive northeast for 1.0 mile to Lismore Drive.
Follows Lismore Drive east for 0.8 miles to Blackstock Road (S-40).
Follows Blackstock Road (S-40) northwest for 0.3 miles to Old Settle Road.
Follows Old Settle Road northeast for 1.2 miles to Lawson Fork Road.
Follows Lawson Fork Road north for 0.2 miles to Lawsons Fork Creek.
Follows Lawsons Fork Creek east for 1.8 miles to I-26.
Follows I-26 north for 1.0 mile to Greene Creek.
Follows Greene Creek east for 0.1 miles to Meadow Creek.
Follows Meadow Creek north for 2.2 miles to Calvery Road (S-977).
Follows Calvery Road (S-977) northeast for 0.1 miles to Gate Road.
Follows Gate Road north for 1.7 miles to Chapman Road (S-54).
Follows Chapman Road (S-54) east for 0.3 miles to SC 9.
Follows SC 9 southeast for 0.3 miles to Lake Bowen Dam Road (S-213).
Follows Lake Bowen Dam Road (S-213) northeast for 1.9 miles to Municipal Reservoir.
Follows Municipal Reservoir east for 3.4 miles to Pacolet River.
Follows Pacolet River southeast for 3.4 miles to Taylor Blaylock Lake.
Follows Taylor Blaylock Lake southeast for 5.9 miles to the Pacolet River.
Follows Pacolet River southeast to US 221.
Follows US 221 north to SC 146 in Cherokee County.
Follows SC 146 south to SC 11.
Follows SC 11 east to SC 372.
Follows SC 372 south to SC 36.
Follows SC 36 west to New Pleasant Road.
Follows New Pleasant Road northwest to SC 110.
Follows SC 110 south to Cherokee / Spartanburg County Line.
Follows Cherokee / Spartanburg County Line southeast to Mill Branch
Follows Mill Branch southwest for 1.8 miles to Pacolet River

Follows Pacolet River southeast for 2.5 miles to Richland Creek
Follows Richland Creek southwest for 2.6 miles to Pine St (US 176)
Follows Pine St (US 176) southeast 1.2 miles to Southport Road (SC 295)
Follows Southport Road (SC 295) northeast for 2.7 miles to Dairy Ridge Road
Follows Dairy Ridge Road southwest for 2.4 miles to S-321
Follows S-321 southwest for 0.3 miles to SC 56
Follows SC 56 south for 1.1 miles to Fairforest Creek
Follows Fairforest Creek west for 1.3 miles to Foster Creek
Follows Foster Creek southwest for 2.2 miles to Freedom Trail
Follows Freedom Trail northwest for 0.4 miles to Independence Drive
Follows Independence Drive southwest for 0.4 miles to Patriot Road
Follows Patriot Road west for 0.3 miles to Stone Station Road (SC 215)
Follows Stone Station Road (SC 215) northwest for 1.0 mile to US 221
Follows US 221 southwest for 5.0 miles to South Tyger River
Follows South Tyger River northwest for 5.1 miles to SC 417
Follows SC 417 southwest for 0.1 miles to Lightwood Knot Road
Follows Lightwood Knot Road northwest for 2.5 miles to Greenpond Road (S-62)
Follows Greenpond Road (S-62) north for 0.3 miles to Gaston Drive
Follows Gaston Drive north for 0.3 miles to John B White Sr Boulevard (SC 296)
Follows John B White Sr Boulevard (SC 296) southwest for 5.4 miles back to the starting point on the Greenville - Spartanburg County Line at the Enoree River.

J. Level of Control of Emission Sources

Through their participation with the Early Action Compact, Spartanburg and Cherokee Counties are exploring local control strategies such as an ozone action coordinator, low sulfur fuels, alternative fuels, hybrid vehicles, high occupancy vehicle lanes, modified speed limits, open burning restrictions, congestion management and an Intelligent Transportation System.

K. Regional Emissions Reductions

See Section V of the Introduction.

BOARD:
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ward L. Brilliant, MD
retary

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

BOARD:
Carl L. Brazell

Louisiana W. Wright

L. Michael Blackmon

Coleman F. Buckhouse, MD

October 27, 2003

Mr. J. I. Palmer, Jr., Regional Administrator
USEPA, Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

RE: Revision to South Carolina 8-hour Ozone Non-attainment Boundary Recommendations

Dear Mr. Palmer:

The South Carolina Department of Health and Environmental Control (Department), on behalf of Governor Mark Sanford, submitted non-attainment boundary recommendations on July 14, 2003, for the 8-hour ozone standard. The areas recommended were derived after careful review of monitored ozone data for the years 2000 through 2002. At the time of our submittal we respectfully requested that we be allowed to update our submittal should additional data become available prior to EPA making final designations, which we understand should occur sometime in April of 2004. We are now revising our earlier submittal to reflect changes in ozone design values from the 2003 ozone season.

The 2003 ozone season has been very mild. In fact, during 2003 there have been no fourth-high readings above 0.083 parts per million (ppm) anywhere in the state (see Attachment). This more recent data has lowered each of the three-year design values by which compliance with the ozone standard is measured. This accomplishment was primarily the result of weather patterns over our state during the summer but was also aided by statewide efforts of those participating in the Ozone Early Action Process.

In our earlier submittal, the Department recommended that portions of Darlington and Florence Counties be included as a boundary area. Given that the ozone design value for the Pee Dee monitor (Darlington County) is now 0.082 ppm, we would like for this area to be removed as a recommended non-attainment area. Additionally, we recommended that a portion of Aiken County be included as a non-attainment area; however, the design value for the Jackson monitor (Aiken County) is now 0.080 ppm. A change in the Augusta-Aiken Metropolitan Statistical Area is further supported by a design value of 0.079 ppm at the Trenton monitor (Edgefield County) and 0.082 ppm at the monitor in Richmond County, Georgia according to EPA's AQS database. Given this new data we request that the Aiken County portion be removed as a recommended non-attainment boundary.

Previously we had recommended that the area surrounding the Due West monitor (Abbeville County) be recommended as a rural transport boundary. The design value for that monitor is now 0.082 ppm, so this area should be removed as a recommended non-attainment area.

The upstate of South Carolina also had improved ozone values. Some of those improvements led to new design values being measured below the standard. Our request is to modify the scope of two of the recommended areas so that they reflect the most recent ozone data. Specifically, we had recommended that a portion of Anderson and Pickens Counties become one non-attainment area; however, the Clemson monitor (Pickens County) now has a design value of 0.084 ppm. We are requesting that the portion of Pickens County that was included with our recommendation be removed. In a similar situation, a portion of Spartanburg and Cherokee Counties was recommended. The most recent design value for the Cowpens monitor (Cherokee County) is 0.084 ppm. We are requesting that the portion of Cherokee County that was included with our recommendation be removed as well.

Ozone monitoring data through the end of September 2003 has been verified and is available in AQS. We are aware that the 2003 ozone season does not officially end until October 31 but our history of ozone monitoring data shows that the likelihood of having an ozone value that would trigger a change in current design values is highly unlikely. During the last ten years we have only experienced two values that exceeded 0.085 ppm during the month of October, therefore we feel confident that our most recent design values will not change. If, however, a reading occurs that would require a change in our recommendations, be assured that we will act quickly to update our recommendations.

We will continue to work towards providing additional information on any issues that EPA may have with our remaining recommended boundaries for non-attainment as well as any other areas that EPA feels we need to address. We, again, respectfully request that you allow us to provide revised information if we see further changes are necessary or we develop additional supporting information. We look forward to reviewing your comments on our boundary recommendations and the revisions that were included in this letter. If there are any questions please contact Renee Shealy at (803) 898-4299 or by e-mail at shealyrg@dhec.sc.gov.

Sincerely,

R. Lewis Shaw

R. Lewis Shaw, P.E., Deputy Commissioner
Environmental Quality Control
South Carolina Department of Health and Environmental Control

cc: Kay Prince, EPA Region 4
Jim Joy, Bureau of Air Quality

Attachment

BOARD:
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Secretary

D H E C

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C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

BOARD:
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L. Michael Blackmon

Coleman F. Buckhouse, MD

November 10, 2003

Ms. Kay Prince, Chief
Air Planning Branch
U.S. EPA, Region 4
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

Re: 2003 Ozone Data for Aiken and Darlington Counties

Dear Ms. Prince:

Monitoring data for 2003 for the Aiken County (45-003-0003) and Darlington County (45-031-0003) ozone monitors has been verified and entered into AQS. The 8-hour ozone design value for Aiken is 0.080ppm and the 8-hour ozone design value for Darlington is 0.082ppm. Please let me know if you need any additional information. I can be reached at (803) 898-4299 or by e-mail at shealyrg@dhec.sc.gov.

Sincerely,

Renee G. Shealy, Director
Division of Air Planning, Development & Outreach
Bureau of Air Quality

cc: Scott Reynolds, DAQA

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November 13, 2003

Ms. Kay Prince, Chief
Air Planning Branch
U.S. EPA, Region 4
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

Re: 2003 Ozone Data for Abbeville

Dear Ms. Prince:

The 2003 ozone monitoring data for the Abbeville monitor has been verified and entered into AQS. The 2003 8-hour ozone design value for this monitor is 0.082 ppm and the site ID is 45 001 0001. Please let me know if you need any additional information. I can be reached at (803) 898-4299 or by e-mail at shealyrg@dhec.sc.gov.

Sincerely,

Renee G. Shealy

Renee G. Shealy, Director
Division of Air Planning, Development & Outreach
Bureau of Air Quality

cc: Scott Reynolds, DAQA

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November 14, 2003

Ms. Kay Prince, Chief
Air Planning Branch
U.S. EPA, Region 4
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

Re: 2003 Ozone Data for South Carolina

Dear Ms. Prince:

The 8-hour ozone monitoring data for 2003 for South Carolina has been verified and entered into the U. S. Environmental Protection Agency's Air Quality System (AQS) database. Any detailed or summary reports generated by AQS will be based on a complete data set for the period. Attached is a table with the associated design values.

Please let me know if you need any additional information. I can be reached at (803) 898-4299 or by e-mail at shealyrg@dhec.sc.gov.

Sincerely,

Renee G. Shealy, Director
Division of Air Planning, Development & Outreach
Bureau of Air Quality

cc: Scott Reynolds, DAQA

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State of South Carolina 2001-2003 Design Values						
County	Site ID	Site Name	4th Maximum 8-Hr. (ppm)			Design Value (ppm)
			2001	2002	2003	
Abbeville Co	45-001-0001	Due West	0.082	0.088	0.077	0.082
Aiken Co	45-003-0003	Jackson	0.081	0.092	0.069	0.080
Anderson Co	45-007-0003	Powdersville	0.088	0.093	0.078	**0.086**
Barnwell Co	45-011-0001	Barnwell	0.074	0.086	0.073	0.077
Berkeley Co	45-015-0002	Bushy Park	0.071	0.074	0.070	0.071
Charleston Co	45-019-0042	Army Reserve	0.068	0.074	0.070	0.070
Charleston Co	45-019-0046	Cape Romain	0.068	0.074	0.074	0.072
Cherokee Co	45-021-0002	Cowpens	0.080	0.093	0.079	0.084
Chester Co	45-023-0002	Chester	0.083	0.093	0.078	0.084
Colleton Co	45-029-0002	Ashton	0.076	0.085	0.069	0.076
Darlington Co	45-031-0003	Pee Dee	0.081	0.090	0.075	0.082
Edgefield Co	45-037-0001	Trenton	0.077	0.094	0.068	0.079
Oconee Co	45-073-0001	Long Creek	0.079	0.094	0.079	0.084
Pickens Co	45-077-0002	Clemson	0.088	0.088	0.078	0.084
Richland Co	45-079-0007	Parklane	0.082	0.084	0.075	0.080
Richland Co	45-079-0021	Congaree Bluff	0.076	0.082	0.074	0.077
Richland Co	45-079-1001	Sandhill	0.091	0.093	0.083	**0.089**
Spartanburg Co	45-083-0009	N. Spartanburg FD	0.090	0.093	0.079	**0.087**
Union Co	45-087-0001	Delta	0.079	0.085	0.078	0.080
Williamsburg Co	45-089-0001	Indiantown	0.067	0.077	0.069	0.071
York Co	45-091-0006	York	0.080	0.096	0.076	0.084

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Coleman F. Buckhouse, MD

Air
cc Allen

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2003 NOV 19 P 12: 12

Dick
cc: Kay

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November 14, 2003

Mr. J. I. Palmer, Jr., Regional Administrator
U.S. EPA, Region 4
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

Re: Updated Boundary Recommendations for South Carolina Based on 2003 Ozone Monitoring Data

Dear Mr. Palmer:

On October 27, 2003, a letter was submitted to the U. S. Environmental Protection Agency (EPA) concerning a revision to South Carolina's July 14, 2003 8-hour ozone boundary recommendations submittal (copy enclosed). At that time the 8-hour ozone data had been verified through September 30 and entered into EPA's Air Quality System (AQS) database. The review of the 8-hour ozone data through October 31 (the end of South Carolina's ozone season) has now been completed. A copy of the letter to EPA concerning the verification of the 2003 8-hour ozone data is enclosed.

Please consider this letter a formal request to remove from the South Carolina 8-hour ozone boundary recommendations those portions of the following counties that were included in the July 14, 2003 submittal: Darlington, Florence, Aiken, Abbeville, Pickens, and Cherokee. These areas should be designated as attainment. Enclosed as Attachment 1 please find an updated Table 1 that should replace Table 1 in the Introduction section of the *Boundary Recommendations for the 8-Hour Ozone Standard in South Carolina* document that was submitted to EPA on July 14, 2003. Also enclosed is a table with the 2003 8-hour ozone design values.

Please feel free to contact Renee Shealy of my staff at (803) 898-4299 or by e-mail at shealyrg@dhec.sc.gov should you have questions or desire additional information.

Sincerely,

R. Lewis Shaw

R. Lewis Shaw, P.E., Deputy Commissioner
Environmental Quality Control

Enclosures (4)

cc: Kay Prince, EPA Region 4
Jim Joy, DHEC Bureau of Air Quality
Renee Shealy, DHEC Bureau of Air Quality

Attachment 1

Table 1 South Carolina Recommended Area Designations Ozone (8 Hour Standard)		
Area, or portion thereof	Designation Type	Classification Type*
Anderson	Non-attainment	
Columbia	Non-attainment	
Greenville	Non-attainment	
Spartanburg	Non-attainment	
Remainder of State	Attainment/ Unclassifiable	

** Classification type cannot be determined because the federal 8-hour ozone implementation rule has not been finalized. The Department respectfully requests that EPA not finalize designations until the implementation rule has been finalized. States should be provided the opportunity to fully understand what implementation of the 8-hour ozone standard means to a given area and given the opportunity to update these recommendations accordingly.*