

# Appendix H

## Public Hearing Record

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# MEMORANDUM

TO: Keith Overcash, Director, DAQ

FROM: Robert P. Fisher, RAQS, Washington RO

DATE: November 19, 2009

SUBJECT: Hearing Officer's Report and Recommendations  
The North Carolina 8-Hour Ozone Reasonable Further Progress (RFP)  
Demonstration for the Charlotte-Gastonia-Rock Hill, NC-SC 8-Hour Ozone  
Nonattainment Area

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As requested in an October 9, 2009 email from Keith Overcash, I served as the public hearing officer for the draft North Carolina 8-Hour Ozone RFP Demonstration for the Charlotte-Gastonia-Rock Hill, NC-SC 8-Hour Ozone Nonattainment Area.

The hearing was held on November 13, 2009 at the Mecklenburg County Air Quality Office at 700 N. Tryon Rd in Charlotte, NC. Two (2) people requested time to present oral comments out of approximately 6 people attending the hearing (not including NCDAQ or LUESA DAQ staff). I am recommending that this SIP be submitted to EPA with appropriate consideration of the hearing officer's recommendations.

Four (4) people submitted written comments during the public comment period. As announced at the hearing, the public comment period officially closed on November 13, 2009. All comments are included in the hearing record. These comments and the hearing registration forms have been emailed to Laura Boothe, acting Chief of the DAQ Planning Section.

Attached is a copy of the hearing report for the RFP Demonstration. The report contains a summary of the comments received, responses to the comments, the hearing officer's recommendations, the written comments received, and the public notice.

I wish to thank DAQ staff members who assisted me in my search for information and who assisted in the hearing: Laura Boothe and George Bridgers; also Ron Slack of the Mooresville Regional Office.

cc: Laura Boothe

# Hearing Officer's Report

North Carolina Division of Air Quality

**Public Hearing on November 13, 2009**

For

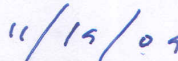
The North Carolina 8-Hour Ozone Reasonable Further  
Progress Demonstration for the Charlotte-Gastonia-Rock  
Hill, NC-SC 8-Hour Ozone Nonattainment Area

November 19, 2009

Robert P. Fisher – Hearing Officer  
Regional Air Quality Supervisor  
Washington Regional Office  
Washington, North Carolina



Robert P. Fisher



Date

## **Overview & Introduction**

On November 13, 2009 a public hearing was held for the draft North Carolina 8-Hour Ozone Reasonable Further Progress (RFP) Demonstration for the Charlotte-Gastonia-Rock Hill, NC-SC 8-Hour Ozone Nonattainment Area (Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan, Union Counties and Coddle Creek and Davidson Townships in Iredell County). The hearing was conducted in Auditorium 1 at the Mecklenburg County Services Center, 700 North Tryon Street, Charlotte, North Carolina. The purpose of the public hearing was to inform interested parties about the RFP Demonstration and solicit comments from the public. The public comment period closed on November 13, 2009.

According to the public hearing registration forms, a total of six (6) people attended the hearing, not including North Carolina Division of Air Quality (NCDAQ) or Land Use and Environmental Services Agency (LUESA) Mecklenburg County Air Quality (MCAQ) staff, and two (2) people requested time to present oral comments. Written comments were received from the Cabarrus Rowan Metropolitan Planning Organization (CRMPO), Charlotte Department of Transportation (CDOT), the United States Environmental Protection Agency (USEPA), Southern Environmental Law Center (SELC), and Clean Air Carolina.

Kenneth Geathers, TAC Chair of CRMPO, submitted written comments received on October 15, 2009. Eldewins M. Haynes, Air Quality Specialist with the CDOT submitted comments via email on November 13, 2009. Also on November 13, 2009, Richard A. Schutt, Chief of Air Planning Branch of USEPA, Region 4, submitted comments via email. June Blotnick, Director of "Clean Air Carolina" submitted two articles directly to the hearing officer at the hearing. J. David Farren, Senior Attorney, Director of Regional Transportation Initiative, with Thomas Gremillion, Associate Attorney, both of the SELC, submitted written comments via email on November 13, 2009.

Based on the information contained in this report, I recommend the following:

I recommend that the "North Carolina 8-Hour Ozone Reasonable Further Progress Demonstration for the Charlotte-Gastonia-Rock Hill, NC-SC 8-Hour Ozone Nonattainment Area (Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan, Union Counties and Coddle Creek and Davidson Townships in Iredell County)" be approved for submittal to the USEPA after addressing the hearing officer's recommendations as described in the body of this report.

Hearing Officer's Report  
For  
The North Carolina 8-Hour Ozone  
Reasonable Further Progress Demonstration for  
the Charlotte-Gastonia-Rock Hill, NC-SC 8-Hour Ozone Nonattainment Area

November 19, 2009

Robert P. Fisher

On November 13, 2009 a public hearing was held for the draft North Carolina 8-Hour Ozone Reasonable Further Progress (RFP) Demonstration for the Charlotte-Gastonia-Rock Hill, NC-SC 8-Hour Ozone Nonattainment Area (Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan, Union Counties and Coddle Creek and Davidson Townships in Iredell County). The hearing was conducted in Auditorium 1 at the Mecklenburg County Services Center, 700 North Tryon Street, Charlotte, North Carolina. The purpose of the public hearing was to inform interested parties about the RFP Demonstration and solicit comments from the public. The public comment period closed on November 13, 2009.

Background (borrowed from the draft plan)

In July 1997, the United States Environmental Protection Agency (USEPA) promulgated a new 8-hour ozone NAAQS, setting a standard at 0.08 parts per million (ppm) averaged over an 8-hour period. Section 182(b)(1) of the Clean Air Act Amendments (CAAA) mandates a 15 percent volatile organic compounds (VOC) emission reduction, accounting for growth, in the first six years after the baseline year (2002) for Moderate and above ozone nonattainment areas. Thus, for the Charlotte-Gastonia-Rock Hill, NC-SC 8-hour ozone nonattainment area (referred to as the Metrolina area), a RFP analysis between 2002 and 2008 is required.

The methodology the North Carolina Division of Air Quality (NCDAQ) used to calculate the RFP target levels of VOC emissions is based on the method developed in the CAAA, while taking into account the restrictions on creditable emissions and the need to use the 2002 inventory as a baseline. Since the actual 2008 VOC emissions were calculated to have been well below the target level, RFP is demonstrated for the Metrolina nonattainment area.

The NCDAQ must also show continued progress from 2008 through the attainment date. To do so, the NCDAQ calculated the expected benefits from the fleet turnover for the on-road and off-road mobile sectors. Based on modeling emissions for 2009 and 2011, the NCDAQ expects approximately 14 tons per day of nitrogen oxides (NOx) emissions reductions from fleet turnover, demonstrating continued reasonable further progress toward attainment beyond 2008.

Another requirement of the RFP demonstration is that VOC motor vehicle emission budgets (MVEBs), for transportation conformity purposes, need to be set for the RFP milestone year 2008. This means that the level of emissions estimated by the North Carolina Department of Transportation or the metropolitan planning organizations for the Transportation Improvement Program and Long Range Transportation Plan must not exceed the MVEBs as defined in this



RFP demonstration. The NCDAQ is setting MVEB, for transportation conformity purposes, as county budgets within the Metrolina nonattainment area. For purposes of SIP strengthening, the NCDAQ has additionally established NO<sub>x</sub> MVEBs for 2008.

### Summary of Public Hearing and Comment Period

According to the public hearing registration forms, a total of six (6) people attended the hearing, not including NCDAQ or Land Use and Environmental Services Agency (LUESA) Mecklenburg County Air Quality (MCAQ) staff, and two (2) people requested time to present oral comments. Written comments were received from the Cabarrus-Rowan Metropolitan Planning Organization (CRMPO), the Charlotte Department of Transportation (CDOT), the USEPA, Southern Environmental Law Center (SELC), and Clean Air Carolina (formerly Carolinas Clean Air Coalition). It is my opinion that the concerns raised by the interested parties can be adequately addressed by the NCDAQ.

The public comment period was open until 11:59PM on November 13, 2009. Two people spoke at the public hearing: June Blotnick, Director of Clean Air Carolina; and Thomas Gremillion, Associate Attorney for the SELC. During the public comment period the Hearing officer did not receive any phone calls commenting on the public notice.

Kenneth Geathers, TAC Chair CRMPO, submitted written comments received on October 15, 2009. Thomas Gremillion, Associate Attorney for the SELC submitted via email a written version of the oral comments he presented on November 13, 2009. June Blotnick, Director of Clean Air Carolina, at the hearing submitted to the Hearing Officer two articles: one about public health effects of long-term ozone exposure; and the other about air pollution levels in the Charlotte area. Eldewins M. Haynes, Air Quality Specialist with the CDOT submitted comments via email on November 13, 2009. Also on November 13, 2009, Richard A. Schutt, Chief of Air Planning Branch of US EPA Region 4 submitted comments via email.

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The following is a summary of the pertinent comments, with regard to NCDAQ's jurisdiction, raised by all parties involved in the public hearing process along with the Hearing Officer's opinions and recommendations. Some comments received were very extensive and touched on a number of somewhat related issues. This report does not attempt to address comments that are not applicable to the RFP demonstration SIP.

**Clean Air Carolina (CAC):** June Blotnick, Director of Clean Air Carolina, provided oral comments at the public hearing. Ms. Blotnick stated that CAC had signed on to the Southern Environmental Law Center's written comments, which are discussed below. The issues raised in the CAC comments were the health issues surrounding ozone and the increase in adult onset asthma. Ms. Blotnick stated that the NCDAQ needed to be much more proactive and that the revised RFP SIP did not establish any new programs. Ms. Blotnick stated that the State needed to do something because what has been done is not working and she provided to articles relating to health issues and ozone. These articles are attached to this report.

**Hearing Officer's Response:** *The CAC were more directed at health issues relating to ozone. The NCDAQ disagrees with Ms. Blotnick's statement that the programs that have been established are not working. North Carolina has continued to see improvements in the air quality due to programs that have been established. When designations were made for the 1997 8-hour ozone standards, the majority of the monitors across the State were violating the standard. Today, only one monitor in the State is slightly above the 1997 standard, and this monitor observed clean data in 2009. Her one comment relevant to the RFP SIP was that the revised RFP SIP did not establish any new programs. This revision was not to address new programs but rather address an issue that the USEPA recently raised with the original RFP SIP. The hearing officer does not believe any action, regarding the RFP SIP, is needed to address the CAC comments.*

**CDOT:** CDOT submitted written comments received on November 13, 2009 that in general supports the RFP SIP. CDOT believes that regional motor vehicle emission budgets (MVEBs) would be more appropriate; however they conceded that they can work with the MVEBs recommended in the RFP SIP.

**Hearing Officer's Response:** *No further action is required by the NCDAQ.*

**CRMPO:** CRMPO submitted written comments received on October 15, 2009, which endorsed the RFP SIP and corresponding county level MVEBs for Cabarrus and Rowan Counties.

**Hearing Officer's Response:** *No further action is required by the NCDAQ.*

**USEPA:** The USEPA submitted written comments received on November 13, 2009. The first comment requested that the NCDAQ provide the source of data used to develop the population estimates for Coddle Creek and Davidson townships used to adjust the partial county estimates for Iredell County. The second comment requested that the NCDAQ indicate the list of specific Maximum Achievable Control Technology standards that were used to develop the 2008 inventory for the nonattainment area.

**Hearing Officer's Response:** *The USEPA comments do not highlight anything controversial that cannot be addressed by the NCDAQ prior to the final submittal. The hearing officer recommends that the NCDAQ address the comments prior to the final submittal.*

**SELC:** SELC submitted written comments received on November 13, 2009 and also spoke at the public hearing reiterating their written comments. Since there were numerous comments from SELC, the comments will be generally grouped and addressed separately by the hearing officer. The first comment incorporated by reference the comments SELC sent to South Carolina officials on their portion of the attainment demonstration.

**Hearing Officer's Response:** *These comments all deal with an attainment demonstration for the area and are not applicable to the RFP SIP. Therefore, these comments will not be addressed in this hearing officer's report.*

**SELC:** SELC stated that the NCDAQ should voluntarily reclassify the Metrolina region to “Serious” nonattainment since the area has effectively failed to meet the applicable attainment date for the 1997 8-hour ozone standard.

**Hearing Officer’s Response:** *This comment is not applicable to the RFP SIP; however, the NCDAQ disagrees that the region should be reclassified to Serious. Although the region’s 3-year design value is slightly over the 1997 8-hour ozone standard, the region has clean data for 2009 and the NCDAQ believes that the area meets the requirements necessary request a 1-year extension of the attainment date. The hearing officer does not believe any action, regarding the RFP SIP, is needed to address this comment.*

**SELC:** The proposed RFP SIP retroactively establishes MVEBs for the year 2008. SELC recommends refocusing air quality resources on prospective strategies to improve air quality and meet future attainment challenges instead of a retrospective analysis that falls outside the regulatory scheme contemplated by the Clean Air Act (CAA).

**Hearing Officer’s Response:** *The CAA requires that volatile organic compounds (VOC) MVEBs be set for the RFP milestone year, which, for a moderate nonattainment area, is 2008. In the original RFP SIP submitted to the USEPA on 6/15/07, the NCDAQ had not set MVEBs since we believed that the mobile source VOC emissions were insignificant to ozone formation. In September 2009, the USEPA informed the NCDAQ that they would not approve the insignificance finding for the Metrolina nonattainment area. Therefore, in order to meet the CAA requirements, the NCDAQ had to revise the RFP SIP to include MVEBs for 2008. The hearing officer does not believe any action, regarding the RFP SIP, is needed to address this comment.*

**SELC:** SELC states “The “purpose of ‘reasonable further progress’ is to ensure attainment by the applicable attainment date. ... But the Metrolina area has now conclusively failed to meet the applicable attainment date for the 1997 effective ozone air quality standard of 84 parts per billion (ppb). Consequently, the proposed RFP-SIP is of questionable relevance to solving the Metrolina area’s ozone problem. ... Submission of the proposed RFP-SIP would not only fail to advance the Metrolina area’s progress in meeting existing legal requirements, it would also delay efforts to attain even stronger anticipated standards, which will be a major challenge for the region.”

**Hearing Officer’s Response:** *The purpose of the RFP SIP is to demonstrate that the region is making progress in reducing ozone precursors and making progress towards attaining the standard. The CAA requires the first RFP SIP to reduce VOC emissions by 15% within six years of the base year. The RFP SIP clearly demonstrates this reduction. The RFP SIP was submitted to the USEPA on time and this revision is to address an issue with the RFP SIP that the USEPA recently informed the NCDAQ about. It is unclear how addressing the USEPA’s concern with the original RFP SIP would fail to advance the Metrolina area’s progress in meeting the standard or delay efforts to attain any future standard. The hearing officer does not believe any action, regarding the RFP SIP, is needed to address this comment.*

**SELC:** The proposed RFP-SIP will not help the state to qualify for an extension of the attainment deadline because it is untimely.

**Hearing Officer's Response:** *The original RFP SIP was submitted to the USEPA on time and has been waiting for action by the USEPA. The intension of the proposed revisions to the RFP SIP are to address issues recently raised by the USEPA on the original submission and not to help the State qualify for an extension of the attainment deadline. The hearing officer does not believe any action, regarding the RFP SIP, is needed to address this comment.*

**SELC:** South Carolina officials' failure to collaborate on the proposed RFP SIP underscores the inappropriateness of the plan as well.

**Hearing Officer's Response:** *The RFP SIP must be submitted by each state for their portion of the nonattainment area. The NCDAQ has decided to move forward with addressing the USEPA concerns with the North Carolina RFP SIP and it will be up to South Carolina to address any comments from the USEPA regarding their RFP SIP. The hearing officer does not believe any action, regarding the RFP SIP, is needed to address this comment.*

**SELC:** The proposed RFP SIP is a distraction from the challenge of cleaning up the Metrolina area's unhealthy air – now the worst smog in the South. North Carolina officials should prepare a new SIP revision consistent with the Metrolina area's legally required bump-up to "Serious" status and the State should focus efforts on actually achieving the tough new standards on the horizon.

**Hearing Officer's Response:** *Although SELC believes the proposed revisions to the RFP SIP is a distraction from the challenge of improving air quality, this revision is required by the USEPA in order for the RFP SIP to be approved. The USEPA is reconsidering what the ozone standard should be set at and it will be 2010 before a new standard is promulgated. However, the NCDAQ is not waiting until a new standard is established before starting the SIP process. The NCDAQ has already started modeling analysis efforts to determine what additional controls will be needed to meet whatever level the standard is established at. Additionally, the NCDAQ has been working to reduce the mobile sector of emissions by developing an idle reduction rule for heavy duty vehicles and applying for and being awarded competitive diesel emission reduction grants from the USEPA. These diesel emission reduction grant funds will be used to reduce the on-road as well as off-road mobile source sector emissions. The hearing officer does not believe any action, regarding the RFP SIP, is needed to address this comment.*

**Recommendation:**

Based on the information contained in this report, I recommend approval of the draft North Carolina 8-Hour Ozone Reasonable Further Progress Demonstration for the Charlotte-Gastonia-Rock Hill, NC-SC 8-Hour Ozone Nonattainment Area (Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan, Union Counties and Coddle Creek and Davidson Townships in Iredell County).

Attachments to Report:

- (1) Kenneth Geathers, TAC Chair, CRMPO written comments dated October 15, 2009.
- (2) Eldewins M. Haynes, Air Quality Specialist for the CDOT written comments dated November 13, 2009.
- (3) Richard A. Schutt, Chief of Air Planning Branch of USEPA, Region 4, written comments dated November 13, 2009.
- (4) June Blotnick, Director of “Clean Air Carolina” submitted two articles directly to the hearing officer at the hearing:
  - a. “Long-Term Ozone Exposure and Mortality” (Downloaded from [www.nejm.org](http://www.nejm.org) March 12, 2009)
  - b. “Is Healthy Air in Charlotte's Future?”
- (5) J. David Farren, Senior Attorney, Director of Regional Transportation Initiative, with Thomas Gremillion, Associate Attorney, both of the SELC written comments dated November 13, 2009.

lab/rpf

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**CABARRUS - ROWAN URBAN AREA  
METROPOLITAN PLANNING ORGANIZATION**

**RECEIVED**

OCT 20 2009

NC DAQ  
PLANNING SECTION

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LANDIS • MOUNT PLEASANT • ROCKWELL • ROWAN COUNTY • SALISBURY • SPENCER

October 15, 2009

Ms. Laura Boothe  
Chief of Attainment Planning Branch  
North Carolina Division of Air Quality  
1641 Mail Service Center  
Raleigh, NC 27699-1641

Dear Ms. Boothe:

**Subject: Endorsement of State Implementation Plan (SIP)**

This letter is to transmit the Cabarrus-Rowan MPO endorsement of the Reasonable Further Progress State Implementation Plan (RFP SIP) and corresponding county level emission budgets for Cabarrus and Rowan Counties. On September 23, 2009, the Cabarrus-Rowan Transportation Advisory Committee endorsed the proposed RFP SIP as developed by the North Carolina Division of Air Quality for the Metrolina Region. We appreciate the opportunity to comment on this important State effort and look forward to working with your agency in the near future to fulfill this plan.

If you should have any questions regarding this letter, please contact our staff at (704) 795-7528.

Sincerely,

Kenneth Geathers, TAC Chair  
Cabarrus-Rowan MPO

cc: Secretary Eugene Conti, NCDOT  
Secretary Dee Freeman, NCDENR  
Mr. Bill Feather, TAC Vice-Chair  
Mr. Joe Wilson, TCC Chair

135 CABARRUS AVENUE EAST • SUITE 101 • CONCORD, NC • 28025 • PHONE 704.795.7528 • FAX 704.795.7529



November 13, 2009

Ms. Laura Boothe  
Division of Air Quality  
1641 Mail Service Center  
Raleigh, NC 27699-1641

Dear Ms. Boothe:

Subject: Comments on "The Reasonable Further Progress (RFP) Demonstration State Implementation Plan [(SIP)] for the North Carolina Portion of the Charlotte-Gastonia-Rock Hill, NC-SC 8-Hour Ozone Nonattainment Area"

On behalf of the City of Charlotte I want to thank the Division of Air Quality for allowing this opportunity to comment on the draft of the NC 8-Hr ozone RFP SIP narrative. The RFP SIP affects three important factors in the Metrolina nonattainment area, as follows:

- Ozone is a regional problem, and a problem not to be taken lightly. The health consequences and benefits relevant to the definition and application of the ozone air quality standard are well documented. We also recognize that there are costs to industries emitting NOx and VOC. In addition, there are lost opportunity costs related to businesses not considering locating in the Metrolina area. Since we believe that this is a regional problem, the solutions to that problem must also be regional. The RFP SIP documents the effort toward a regional solution.
- Over the past decade, and especially in 2009, the trend has been toward cleaner air. In the Metrolina area, preliminary ozone monitoring data for 2009 indicated zero exceedances of the 1997 ozone standard of (effectively) 84 ppb, and only 2 exceedances of the 75 ppb prospective standard. On October 5, 2009, the North Carolina Division of Air Quality posted on their web site a press release indicating that ozone in 2009 reached historically low values, recording only 6 exceedances statewide of the 75 ppb level. We believe that the mild summer and, to a lesser extent, the economy played a role in achieving the low ozone readings in 2009. Nevertheless, it is also likely that the downward trend in ozone is related to the steady reduction in VOC and NOx emissions, as documented in the RFP SIP. For example, the NCDAQ press release states that statewide "estimated annual emissions from cars, trucks and other mobile sources declined 38 percent from 2002 to 2009," a reduction of about 126,000 tons. Based on the trend over the past decade, we can now expect that the Metrolina nonattainment area can

DEPARTMENT OF TRANSPORTATION

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Ms. Laura Boothe  
November 13, 2009  
Page 2 of 2

attain the 1997 ozone standard without being reclassified to the next higher level of nonattainment.

The RFP SIP includes motor vehicle emissions budgets (MVEB). The MVEB represent a cap on the average daily NOx and VOC emissions from vehicles traveling on the region's streets and highways. The MVEB provide a valuable benchmark to Metropolitan Planning Organizations (MPOs) responsible for long-range transportation planning. While we continue to believe that regional MVEB would be more appropriate than county-level MVEB, we can work with the MVEB recommended in this RFP SIP. The region needs to expand the multi-modal components of the transportation system, without adversely affecting air quality. For transportation planning purposes, the MVEB in the RFP SIP provide a level of certainty for the transportation planning process that the Metrolina region has lacked since 2004.

Yours truly,

A handwritten signature in black ink, appearing to read "Eldewins M. Haynes". The signature is fluid and cursive, with the first name "Eldewins" written in a larger, more prominent script than the last name "Haynes".

Eldewins M. Haynes, CCM  
Air Quality Specialist  
Charlotte Department of Transportation





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4  
ATLANTA FEDERAL CENTER  
61 FORSYTH STREET  
ATLANTA, GEORGIA 30303-8960

NOV 13 2009

Mr. B. Keith Overcash, P.E., Director  
North Carolina Department of Environment  
And Natural Resources  
Division of Air Quality  
1641 Mail Service Center  
Raleigh, North Carolina 27699-1641

Dear Mr. Overcash:

Thank you for your prehearing package dated October 12, 2009, transmitting a prehearing submittal regarding the Charlotte-Gastonia-Rock Hill, NC-SC 8-Hour Ozone Reasonable Further Progress submission. There is a public hearing scheduled for these rules on November 13, 2009, with written comments due by the close of business on the same date. We have completed our review of the submittal and offer the following comments at this time:

1. Page 5 of the SIP Narrative: Please provide a discussion on the source of data used to:
  - a. Develop the population estimates used to determine the percent population (i.e., 32.6 percent) for Coddle Creek and Davidson townships.
  - b. Adjust the partial county estimates in Iredell County.
2. Due to the number of Maximum Achievable Control Technology (MACT) standards, please indicate the list of specific MACT standards that were used to develop the 2008 SIP inventory for the nonattainment area.

We look forward to continuing to work with you and your staff. If you have any questions, please contact Lynorae Benjamin or have your staff contact Nacosta C. Ward at (404) 562-9140.

Sincerely,

*Michelle L. Notarianne for*

Richard A. Schutt  
Chief  
Air Planning Branch

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ORIGINAL ARTICLE

## Long-Term Ozone Exposure and Mortality

Michael Jerrett, Ph.D., Richard T. Burnett, Ph.D., C. Arden Pope III, Ph.D.,  
Kazuhiko Ito, Ph.D., George Thurston, Sc.D., Daniel Krewski, Ph.D.,  
Yuanli Shi, M.D., Eugenia Calle, Ph.D., and Michael Thun, M.D.

### ABSTRACT

#### BACKGROUND

Although many studies have linked elevations in tropospheric ozone to adverse health outcomes, the effect of long-term exposure to ozone on air pollution-related mortality remains uncertain. We examined the potential contribution of exposure to ozone to the risk of death from cardiopulmonary causes and specifically to death from respiratory causes.

#### METHODS

Data from the study cohort of the American Cancer Society Cancer Prevention Study II were correlated with air-pollution data from 96 metropolitan statistical areas in the United States. Data were analyzed from 448,850 subjects, with 118,777 deaths in an 18-year follow-up period. Data on daily maximum ozone concentrations were obtained from April 1 to September 30 for the years 1977 through 2000. Data on concentrations of fine particulate matter (particles that are  $\leq 2.5 \mu\text{m}$  in aerodynamic diameter [ $\text{PM}_{2.5}$ ]) were obtained for the years 1999 and 2000. Associations between ozone concentrations and the risk of death were evaluated with the use of standard and multilevel Cox regression models.

#### RESULTS

In single-pollutant models, increased concentrations of either  $\text{PM}_{2.5}$  or ozone were significantly associated with an increased risk of death from cardiopulmonary causes. In two-pollutant models,  $\text{PM}_{2.5}$  was associated with the risk of death from cardiovascular causes, whereas ozone was associated with the risk of death from respiratory causes. The estimated relative risk of death from respiratory causes that was associated with an increment in ozone concentration of 10 ppb was 1.040 (95% confidence interval, 1.010 to 1.067). The association of ozone with the risk of death from respiratory causes was insensitive to adjustment for confounders and to the type of statistical model used.

#### CONCLUSIONS

In this large study, we were not able to detect an effect of ozone on the risk of death from cardiovascular causes when the concentration of  $\text{PM}_{2.5}$  was taken into account. We did, however, demonstrate a significant increase in the risk of death from respiratory causes in association with an increase in ozone concentration.

From the University of California, Berkeley (M.J.); Health Canada, Ottawa (R.T.B.); Brigham Young University, Provo, UT (C.A.P.); New York University School of Medicine, New York (K.I., G.T.); the University of Ottawa, Ottawa (D.K., Y.S.); and the American Cancer Society, Atlanta (E.C., M.T.). Address reprint requests to Dr. Jerrett at the Division of Environmental Health Sciences, School of Public Health, University of California, 710 University Hall, Berkeley, CA 94720, or at [jerrett@berkeley.edu](mailto:jerrett@berkeley.edu).

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STUDIES CONDUCTED OVER THE PAST 15 years have provided substantial evidence that long-term exposure to air pollution is a risk factor for cardiopulmonary disease and death.<sup>1-5</sup> Recent reviews of this literature suggest that fine particulate matter (particles that are  $\leq 2.5 \mu\text{m}$  in aerodynamic diameter [ $\text{PM}_{2.5}$ ]) has a primary role in these adverse health effects.<sup>6,7</sup> The particulate-matter component of air pollution includes complex mixtures of metals, black carbon, sulfates, nitrates, and other direct and indirect byproducts of incomplete combustion and high-temperature industrial processes.

Ozone is a single, well-defined pollutant, yet the effect of exposure to ozone on air pollution-related mortality remains inconclusive. Several studies have evaluated this issue, but they have been short-term studies,<sup>8-10</sup> have failed to show a statistically significant effect,<sup>1,3</sup> or have been based on limited mortality data.<sup>11</sup> Recent reviews by the Environmental Protection Agency (EPA)<sup>12</sup> and the National Research Council<sup>13</sup> have questioned the overall consistency of the available data correlating exposure to ozone and mortality. Similar conclusions about the evidence base for the long-term effects of ozone on mortality were drawn by a panel of experts in the United Kingdom.<sup>14</sup>

Nonetheless, previous studies have suggested that a measurable effect of ozone may exist, particularly with respect to the risk of death from cardiopulmonary causes. In one of the larger studies, ozone was significantly associated with death from cardiopulmonary causes<sup>15</sup> but not with death from ischemic heart disease. However, the estimated effect of ozone on the risk of death from cardiopulmonary causes in this study was attenuated when  $\text{PM}_{2.5}$  was added to the analysis in copollutant models. On the basis of suggested effects of ozone on the risk of death from cardiopulmonary causes (which includes death from respiratory causes) but an absence of evidence for effects of ozone on the risk of death from ischemic heart disease, we hypothesized that ozone might have a primary effect on the risk of death from respiratory causes.

## METHODS

### HEALTH, MORTALITY, AND CONFOUNDING DATA

Our study used data from the American Cancer Society Cancer Prevention Study II (CPS II) cohort.<sup>16</sup> The CPS II cohort consists of more than

1.2 million participants who were enrolled by American Cancer Society volunteers between September 1982 and February 1983 in all 50 states, the District of Columbia, and Puerto Rico. Enrollment was restricted to persons who were at least 30 years of age living in households with at least one person 45 years of age or older. After providing written informed consent, the participants completed a confidential questionnaire that included questions on demographic characteristics, smoking history, alcohol use, diet, and education.<sup>17</sup> Deaths were ascertained until August 1988 by personal inquiries of family members by the volunteers and thereafter by linkage with the National Death Index. Through 1995, death certificates were obtained and coded for cause of death. Beginning in 1996, codes for cause of death were provided by the National Death Index.<sup>18</sup>

The study population for our analysis included only those participants in CPS II who resided in U.S. metropolitan statistical areas within the 48 contiguous states or the District of Columbia (according to their address at the time of enrollment) and for whom data were available from at least one pollution monitor within their metropolitan area. The study was approved by the Ottawa Hospital Research Ethics Board, Canada.

Data on "ecologic" risk factors at the level of the metropolitan area representing social variables (educational level, percentage of homes with air conditioning, percentage of the population who were nonwhite), economic variables (household income, unemployment, income disparity), access to medical care (number of physicians and hospital beds per capita), and meteorologic variables were obtained from the 1980 U.S. Census and other secondary sources (see the Supplementary Appendix, available with the full text of this article at NEJM.org). These ecologic risk factors, as well as the individual risk factors collected in the CPS II questionnaire, were assessed as potential confounders of the effects of ozone.<sup>3,5,19,20</sup>

### ESTIMATES OF EXPOSURE TO AIR POLLUTION

Ozone data were obtained from 1977 (5 years before the identification of the CPS II cohort) through 2000 for all air-pollution monitors in the study metropolitan areas from the EPA's Aerometric Information Retrieval System. Ozone data at each monitoring site were collected on an hourly basis, and the daily maximum value for the site was determined. All available daily maximum values for the monitoring site were averaged over

each quarter year. The quarterly average values were reported for each monitor only when at least 75% of daily observations for that quarter were available.

The averages of the second (April through June) and third (July through September) quarters were calculated for each monitor if both quarterly averages were available. The period from April through September was selected because ozone concentrations tend to be elevated during the warmer seasons and because fewer data were available for the cooler seasons.

The average of the second and third quarterly averages for each year was then computed for all the monitors within each metropolitan area to form a single annual time series of air-pollution measurements for each metropolitan area for the period from 1977 to 2000. In addition, a summary measure of long-term exposure to ambient warm-season ozone was defined as the average of annual time-series measurements during the entire period from 1977 to 2000. Individual measures of exposure to ozone were then defined by assigning the average for the metropolitan area to each cohort member residing in that area.

Data on exposure to  $PM_{2.5}$  were also obtained from the Aerometric Information Retrieval System database for the 2-year period from 1999 to 2000 (data on  $PM_{2.5}$  were not available before 1999 for most metropolitan areas).<sup>5</sup> The average concentrations of  $PM_{2.5}$  were included in our analyses to distinguish the effect of particulates from that of ozone on outcomes.

#### STATISTICAL ANALYSIS

Standard and multilevel random-effects Cox proportional-hazard models were used to assess the risk of death in relation to exposures to pollution. The subjects were matched according to age (in years), sex, and race. A total of 20 variables with 44 terms were used to control for individual characteristics that might confound or modify the association between air pollution and death. These variables, which were considered to be of potential importance on the basis of previous studies, included individual risk factors for which data had been collected in the CPS II questionnaire. Seven ecologic covariates obtained from the 1980 U.S. Census (median household income, the proportion of persons living in households with an income below 125% of the poverty line, the percentage of persons over the age of 16 years who were unemployed, the percentage of adults

with less than a high-school [12th-grade] education, the percentage of homes with air conditioning, the Gini coefficient of income inequality [ranging from 0 to 1, with 0 indicating an equal distribution of income and 1 indicating that one person has all the income and everyone else has no income<sup>20</sup>], and the percentage of persons who were white) were also included. These variables were included at two levels: as the average for the metropolitan statistical area and as the difference between the average for the ZIP Code of residence and the average for the metropolitan statistical area. Additional sensitivity analyses were undertaken for ecologic variables that were available for only a subgroup of the 96 metropolitan statistical areas (see the Supplementary Appendix). Models were estimated for either ozone or  $PM_{2.5}$ . In addition, models with both  $PM_{2.5}$  and ozone were estimated.

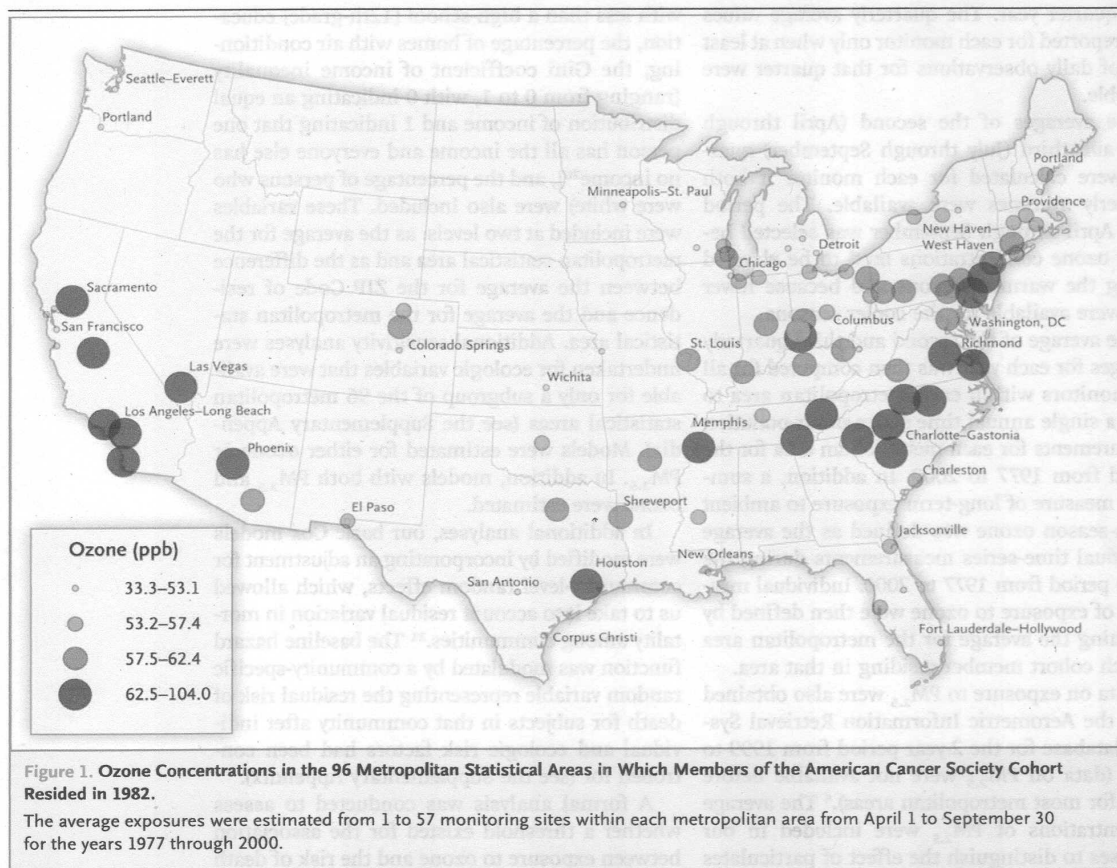
In additional analyses, our basic Cox models were modified by incorporating an adjustment for community-level random effects, which allowed us to take into account residual variation in mortality among communities.<sup>21</sup> The baseline hazard function was modulated by a community-specific random variable representing the residual risk of death for subjects in that community after individual and ecologic risk factors had been controlled for (see the Supplementary Appendix).

A formal analysis was conducted to assess whether a threshold existed for the association between exposure to ozone and the risk of death (see the Supplementary Appendix). A standard threshold model was postulated in which there was no association between exposure to ozone and the risk of death below a specified threshold concentration and a linear association (on the logarithmic scale of the proportional-hazards model) above the threshold.

The question of whether specific time windows were associated with the health effects was investigated by subdividing the follow-up interval into four periods (1982 to 1988, 1989 to 1992, 1993 to 1996, and 1997 to 2000). Exposures were matched for each of these periods and also tested for a 10-year average on the basis of the 5-year follow-up period and the 5 years before the follow-up period (see the Supplementary Appendix).

#### RESULTS

The analytic cohort included 448,850 subjects residing in 96 metropolitan statistical areas (Fig. 1).



In 1980, the populations of these 96 areas ranged from 94,436 to 8,295,900. Data were available on the concentration of ambient ozone from all 96 areas and on the concentration of  $PM_{2.5}$  from 86 areas. The average number of air-pollution monitors per metropolitan area was 11 (range, 1 to 57), and more than 80% of the areas had 6 or more monitors.

The average ozone concentration for each metropolitan area during the interval from 1977 to 2000 ranged from 33.3 ppb to 104.0 ppb (Fig. 1). The highest regional concentrations were in Southern California and the lowest in the Pacific Northwest and parts of the Great Plains. Moderately elevated concentrations were present in many areas of the East, Midwest, South, and Southwest.

The baseline characteristics of the study population, overall and as a function of exposure to ozone, are presented in Table 1. The mean age

of the cohort was 56.6 years, 43.4% were men, 93.7% were white, 22.4% were current smokers, and 30.5% were former smokers. On the basis of estimates from 1980 Census data, 62.3% of homes had air conditioning at the time of initial data collection.

During the 18-year follow-up period (from initial CPS II data collection in 1982 through the end of follow-up in 2000), there were 118,777 deaths in the study cohort (Table 2). Of these, 58,775 were from cardiopulmonary causes, including 48,884 from cardiovascular causes (of which 27,642 were due to ischemic heart disease) and 9891 from respiratory causes.

In the single-pollutant models, exposure to ozone was not associated with the overall risk of death (relative risk, 1.001; 95% confidence interval [CI], 0.996 to 1.007) (Table 3). However, it was significantly correlated with an increase in the risk of death from cardiopulmonary causes. A

10-ppb increment in exposure to ozone elevated the relative risk of death from the following causes: cardiopulmonary causes (relative risk, 1.014; 95% CI, 1.007 to 1.022), cardiovascular causes (relative risk, 1.011; 95% CI, 1.003 to 1.023), ischemic heart disease (relative risk, 1.015; 95% CI, 1.003 to 1.026), and respiratory causes (relative risk, 1.029; 95% CI, 1.010 to 1.048).

Inclusion of the concentration of PM<sub>2.5</sub> measured in 1999 and 2000 as a copollutant (Table 3)

attenuated the association with exposure to ozone for all the end points except death from respiratory causes, for which a significant correlation persisted (relative risk, 1.040; 95% CI, 1.013 to 1.067). The concentrations of ozone and PM<sub>2.5</sub> were positively correlated ( $r=0.64$  at the subject level and  $r=0.56$  at the metropolitan-area level), resulting in unstable risk estimates for both pollutants. The concentration of PM<sub>2.5</sub> remained significantly associated with death from cardio-

Table 1. Baseline Characteristics of the Study Population in the Entire Cohort and According to Exposure to Ozone.\*

Variable	Entire Cohort (N=448,850)	Concentration of Ozone			
		33.3–53.1 ppb (N=126,206)	53.2–57.4 ppb (N=95,740)	57.5–62.4 ppb (N=106,545)	62.5–104.0 ppb (N=120,359)
No. of MSAs	96	24	24	24	24
No. of MSAs with data on PM <sub>2.5</sub>	86	21	20	23	22
Concentration of PM <sub>2.5</sub> (μg/m <sup>3</sup> )		11.9±2.5	13.1±2.9	14.7±2.1	15.4±3.2
<b>Individual risk factors</b>					
Age (yr)	56.6±10.5	56.7±10.4	56.4±10.7	56.3±10.4	56.9±10.5
Male sex (%)	43.4	43.5	43.1	43.5	43.2
White race (%)	93.7	94.3	95.1	93.9	91.8
Education (%)					
Less than high school	12.1	11.5	13.6	12.1	11.6
High school	30.6	30.2	33.6	32.1	27.4
Beyond high school	57.3	58.3	52.8	55.8	61.0
<b>Smoking status</b>					
<b>Current smokers</b>					
Percentage of subjects	22.4	22.0	23.5	22.2	21.9
No. of cigarettes/day	22.0±12.4	22.0±12.3	22.0±12.5	22.2±12.5	21.9±12.4
Duration of smoking (yr)	33.5±11.0	33.4±10.8	33.4±11.1	33.4±11.0	33.9±11.2
Started smoking <18 yr of age (%)	9.6	9.3	10.5	9.4	9.3
Started smoking ≥18 yr of age (%)	13.2	13.3	13.4	13.3	13.0
<b>Former smokers</b>					
Percentage of subjects	30.5	31.2	30.8	29.5	30.4
No. of cigarettes/day	21.6±14.7	21.6±14.6	22.2±15.1	21.6±14.6	21.3±14.6
Duration of smoking (yr)	22.2±12.6	22.1±12.5	22.6±12.6	22.0±12.5	22.4±12.7
Started smoking <18 yr of age (%)	11.9	11.8	12.7	11.5	11.8
Started smoking ≥18 yr of age (%)	18.5	19.3	17.9	17.9	18.5
Exposure to smoking (hr/day)	3.3±4.4	3.2±4.4	3.4±4.5	3.4±4.5	3.1±4.4
Pipe or cigar smoker only (%)	4.1	4.0	4.2	4.3	3.8
<b>Marital status (%)</b>					
Married	83.5	84.2	83.0	83.7	83.1
Single	3.6	3.4	4.0	3.8	3.2
Separated, divorced, or widowed	12.9	12.4	13.0	12.5	13.7



Table 1. (Continued.)

Variable	Entire Cohort (N=448,850)	Concentration of Ozone			
		33.3–53.1 ppb (N=126,206)	53.2–57.4 ppb (N=95,740)	57.5–62.4 ppb (N=106,545)	62.5–104.0 ppb (N=120,359)
Body-mass index†	25.1±4.1	25.1±4.1	25.3±4.2	25.1±4.1	24.8±4.0
Level of occupational exposure to particulate matter (%)‡					
0	50.7	50.9	50.0	50.8	51.0
1	13.3	13.4	13.1	13.3	13.3
2	11.4	11.5	10.8	11.4	11.9
3	4.6	4.7	4.8	4.6	4.5
4	6.1	6.2	6.2	6.1	6.0
5	4.2	4.2	4.3	4.1	4.1
6	1.1	1.0	9.5	1.4	8.4
Not able to ascertain	8.6	8.2	1.2	8.4	0.9
Self-reported exposure to dust or fumes (%)	19.5	19.5	19.8	19.7	19.1
Level of dietary-fat consumption (%)§					
0	14.5	13.7	14.9	14.1	15.3
1	15.9	15.8	16.5	15.6	15.9
2	17.4	17.6	17.7	17.2	17.1
3	21.2	21.8	21.1	21.3	20.8
4	30.9	31.1	29.8	31.9	30.9
Level of dietary-fiber consumption (%)¶					
0	16.6	16.0	17.5	16.7	16.6
1	19.9	19.4	20.5	20.1	19.7
2	18.8	18.6	19.2	19.1	18.5
3	22.8	23.0	22.4	22.8	22.7
4	21.9	23.0	20.4	21.3	22.5
Alcohol consumption (%)					
Beer					
Drinks beer	22.9	24.3	23.2	22.9	21.4
Does not drink beer	9.7	9.5	9.3	9.5	10.2
No data	67.4	66.2	67.5	67.6	68.4
Liquor					
Drinks liquor	28.0	30.4	27.9	25.4	27.9
Does not drink liquor	8.8	8.4	8.5	10.1	9.2
No data	63.2	61.2	63.6	65.5	62.9
Wine					
Drinks wine	23.5	25.4	22.5	21.1	24.3
Does not drink wine	8.9	8.7	8.8	9.3	9.1
No data	67.6	65.9	68.7	69.6	66.6

Table 1. (Continued.)

Variable	Entire Cohort (N=448,850)	Concentration of Ozone			
		33.3–53.1 ppb (N=126,206)	53.2–57.4 ppb (N=95,740)	57.5–62.4 ppb (N=106,545)	62.5–104.0 ppb (N=120,359)
Ecologic risk factors					
Nonwhite race (%)	11.6±16.8	10.5±16.4	9.3±15.5	10.2±16.0	15.9±18.3
Home with air conditioning (%)	62.3±27.0	55.4±31.2	59.4±24.0	65.3±24.8	69.1±24.3
High-school education or greater (%)	51.7±8.2	53.5±7.9	52.4±7.5	50.8±7.2	50.0±9.5
Unemployment rate (%)	11.7±3.1	12.1±3.4	11.3±2.6	11.3±2.9	11.8±3.4
Gini coefficient of income inequality**	0.37±0.04	0.37±0.05	0.37±0.04	0.37±0.04	0.38±0.04
Proportion of population with income <125% of poverty line	0.12±0.08	0.11±0.08	0.12±0.08	0.11±0.07	0.13±0.09
Annual household income (thousands of dollars)††	20.7±6.6	21.9±7.1	19.8±6.0	21.2±6.7	19.7±6.3

\* MSA denotes metropolitan statistical area, and PM<sub>2.5</sub> fine particulate matter consisting of particles that are 2.5  $\mu$ m or less in aerodynamic diameter. Plus-minus values are means  $\pm$ SD. Because of rounding, percentages may not total 100. All baseline characteristics included in the survival model are listed (age, sex, and race were included as stratification factors). The model also includes squared terms for the number of cigarettes smoked per day and the number of years of smoking for both current and former smokers and a squared term for body-mass index.

† The body-mass index is the weight in kilograms divided by the square of the height in meters.

‡ Occupational exposure to particulate matter increases with increasing index number. The index was calculated by assigning a relative level of exposure to PM<sub>2.5</sub> associated with a cohort member's job and industry. These assignments were performed by industrial hygienists on the basis of their knowledge of typical exposure patterns for each occupation and specific job.<sup>22</sup>

§ Dietary-fat consumption increases with increasing index number. Dietary information from cohort members was used to define the level of fat consumption according to five ordered categories.<sup>20</sup>

¶ Dietary-fiber consumption increases with increasing index number. Dietary information from cohort members was used to define the level of fiber consumption according to five ordered categories.<sup>23</sup>

|| For the ecologic variables, the model included terms for influences at the level of the average for the metropolitan statistical area and at the level of the difference between the value for the ZIP Code of residence and the average for the metropolitan statistical area to represent between- and within-metropolitan area confounding influence. Some values for ecologic variables and individual variables differ, although they appear to measure the same risk factor. For example, for the entire cohort, the percentage of whites as listed under individual variables is 93.7, whereas the percentage of nonwhites as listed under ecologic variables is 11.6±16.8. This apparent contradiction is explained by the fact that the former is an exact figure based on the individual reports of the study participants in the CPS II questionnaire, whereas the latter is a mean ( $\pm$ SD) for the population based on Census estimates for each metropolitan statistical area.

\*\* The Gini coefficient is a statistical dispersion measure used to calculate income inequality. The coefficient ranges from 0 to 1, with 0 indicating an equal distribution of income and 1 indicating that one person has all the income and everyone else has no income.<sup>20</sup> A coefficient of 0.37 indicates that on average there is a measurable inequality in the distribution of income among the different income groups within the MSAs.

†† Average household incomes for the cohort and for each quartile of ozone concentration were calculated from the median household income for the metropolitan statistical area.

pulmonary causes, cardiovascular causes, and ischemic heart disease when ozone was included in the model. The association of ozone concentrations with death from respiratory causes remained significant after adjustment for PM<sub>2.5</sub>.

Risk estimates for ozone-related death from respiratory causes were insensitive to the use of a random-effects survival model allowing for spatial clustering within the metropolitan area and state of residence (Table 1S in the Supplementary Appendix). The association between increased ozone concentrations and increased risk

of death from respiratory causes was also insensitive to adjustment for several ecologic variables considered individually (Table 2S in the Supplementary Appendix).

Subgroup analyses showed that environmental temperature and region of the country, but not sex, age at enrollment, body-mass index, education, or concentration of PM<sub>2.5</sub>, significantly modified the effects of ozone on the risk of death from respiratory causes (Table 4).

Figure 2 illustrates the shape of the relation between exposure to ozone and death from re-



Table 2. Number of Deaths in the Entire Cohort and According to Exposure to Ozone.

Cause of Death	Entire Cohort (N = 448,850)	Concentration of Ozone			
		33.3–53.1 ppb (N = 126,206)	53.2–57.4 ppb (N = 95,740)	57.5–62.4 ppb (N = 106,545)	62.5–104.0 ppb (N = 120,359)
		<i>number of deaths</i>			
Any cause	118,777	32,957	25,642	27,782	32,396
Cardiopulmonary	58,775	16,328	12,621	13,544	16,282
Cardiovascular	48,884	13,605	10,657	11,280	13,342
Ischemic heart disease	27,642	7,714	6,384	6,276	7,268
Respiratory	9,891	2,723	1,964	2,264	2,940

Table 3. Relative Risk of Death Attributable to a 10-ppb Change in the Ambient Ozone Concentration.\*

Cause of Death	Single-Pollutant Model†			Two-Pollutant Model‡	
	Ozone (96 MSAs)	Ozone (86 MSAs)	PM <sub>2.5</sub> (86 MSAs) <i>relative risk (95% CI)</i>	Ozone (86 MSAs)	PM <sub>2.5</sub> (86 MSAs)
Any cause	1.001 (0.996–1.007)	1.001 (0.996–1.007)	1.048 (1.024–1.071)	0.989 (0.981–0.996)	1.080 (1.048–1.113)
Cardiopulmonary	1.014 (1.007–1.022)	1.016 (1.008–1.024)	1.129 (1.094–1.071)	0.992 (0.982–1.003)	1.153 (1.104–1.204)
Respiratory	1.029 (1.010–1.048)	1.027 (1.007–1.046)	1.031 (0.955–1.113)	1.040 (1.013–1.067)	0.927 (0.836–1.029)
Cardiovascular	1.011 (1.003–1.023)	1.014 (1.005–1.023)	1.150 (1.111–1.191)	0.983 (0.971–0.994)	1.206 (1.150–1.264)
Ischemic heart disease	1.015 (1.003–1.026)	1.017 (1.006–1.029)	1.211 (1.156–1.268)	0.973 (0.958–0.988)	1.306 (1.226–1.390)

\* MSA denotes metropolitan statistical area, and PM<sub>2.5</sub> fine particulate matter consisting of particles that are 2.5  $\mu$ m or less in aerodynamic diameter. Ozone concentrations were measured from April to September during the years from 1977 to 2000, with follow-up from 1982 to 2000; changes in the concentration of PM<sub>2.5</sub> of 10  $\mu$ g per cubic meter were recorded for members of the cohort in 1999 and 2000. These models are adjusted for all the individual and ecologic risk factors listed in Table 1. For the ecologic variables, the model included terms for influences at the level of the average for the metropolitan statistical area and at the level of the difference between the value for the ZIP Code of residence and the average for the metropolitan statistical area to represent between- and within-metropolitan area confounding influence. The risk of death was stratified according to age (in years), sex, and race.

† The single-pollutant models were based on 96 metropolitan statistical areas for which information on ozone was available and 86 metropolitan statistical areas for which information on both ozone and fine particulate matter was available.

‡ The two-pollutant models were based on 86 metropolitan statistical areas for which information on both ozone and fine particulate matter was available.

spiratory causes. There was limited evidence that a threshold model specification improved model fit as compared with a nonthreshold linear model ( $P=0.06$ ) (Table 3S in the Supplementary Appendix).

Because air-pollution data from 1977 to 2000 were averaged, exposure values for persons who died during this period are based partly on data that were obtained after death had occurred. Further investigation by dividing this interval into specific time windows of exposure revealed no significant difference between the effects of earlier and later time windows within the period of follow-up. Allowing for a 10-year period of exposure to ozone (5 years of follow-up and 5 years

before the follow-up period) did not appreciably alter the risk estimates (Table 4S in the Supplementary Appendix). Thus, when exposure values were matched more closely to the follow-up period and when exposure values were based on data obtained before the deaths, there was little change in the results.

## DISCUSSION

Our principal finding is that ozone and PM<sub>2.5</sub> contributed independently to increased annual mortality rates in this large, U.S. cohort study in analyses that controlled for many individual and ecologic risk factors. In two-pollutant models that

included ozone and PM<sub>2.5</sub>, ozone was significantly associated only with death from respiratory causes.

For every 10-ppb increase in exposure to ozone, we observed an increase in the risk of death from respiratory causes of about 2.9% in single-pollutant models and 4% in two-pollutant models. Although this increase may appear moderate, the risk of dying from a respiratory cause is more than three times as great in the metropolitan areas with the highest ozone concentrations as in those with the lowest ozone concentrations. The effects of ozone on the risk of death from respiratory causes were insensitive to adjustment for individual, neighborhood, and metropolitan-area confounders or to differences in multilevel-model specifications.

There is biologic plausibility for a respiratory effect of ozone. In laboratory studies, ozone can increase airway inflammation<sup>24</sup> and can worsen pulmonary function and gas exchange.<sup>25</sup> In addition, exposure to elevated concentrations of tropospheric ozone has been associated with numerous adverse health effects, including the induction<sup>26</sup> and exacerbation<sup>27,28</sup> of asthma, pulmonary dysfunction,<sup>29,30</sup> and hospitalization for respiratory causes.<sup>31</sup>

Despite these observations, previous studies linking long-term exposure to ozone with death have been inconclusive. One cohort study conducted in the Midwest and eastern United States reported an inverse but nonsignificant association between ozone concentrations and mortality.<sup>1</sup> Subsequent reanalyses of this study replicated these findings but also suggested a positive association with exposure to ozone during warm seasons.<sup>3</sup> A study of approximately 6000 non-smoking Seventh-Day Adventists living in Southern California showed elevated risks among men after long-term exposure to ozone,<sup>11</sup> but this finding was based on limited mortality data.

Previous studies using the CPS II cohort have also produced mixed results for ozone. An earlier examination based on a large sample of more than 500,000 people from 117 metropolitan areas and 8 years of follow-up indicated nonsignificant results for the relation between ozone and death from any cause and a significant inverse association between ozone and death from lung cancer. A positive association between death from cardiopulmonary causes and summertime exposure to ozone was observed in single-pollutant

Table 4. Relative Risk of Death from Respiratory Causes Attributable to a 10-ppb Change in the Ambient Ozone Concentration, Stratified According to Selected Risk Factors.\*

Stratification Variable	% of Subjects in Stratum	Relative Risk (95% CI)	P Value of Effect Modification
Sex			0.11
Male	43	1.01 (0.99–1.04)	
Female	57	1.04 (1.03–1.07)	
Age at enrollment (yr)			0.74
<50	26	1.00 (0.90–1.11)	
50–65	54	1.03 (1.01–1.06)	
>65	20	1.02 (1.00–1.05)	
Education			0.48
High school or less	43	1.02 (1.00–1.05)	
Beyond high school	57	1.03 (1.01–1.06)	
Body-mass index†			0.96
<25.0	53	1.03 (1.01–1.06)	
25.0–29.9	36	1.03 (0.99–1.06)	
≥30.0	11	1.03 (0.96–1.10)	
PM <sub>2.5</sub> (μg/m <sup>3</sup> )‡			0.38
<14.3	44	1.05 (1.01–1.09)	
>14.3	56	1.03 (1.00–1.05)	
Region§			0.05
Northeast	24.8	0.99 (0.92–1.07)	
Industrial Midwest	29.7	1.00 (0.91–1.09)	
Southeast	21.0	1.12 (1.05–1.19)	
Upper Midwest	5.2	1.14 (0.68–1.90)	
Northwest	7.7	1.06 (1.00–1.13)	
Southwest	3.9	1.21 (1.04–1.40)	
Southern California	7.8	1.01 (0.96–1.07)	
External temperature (°C)¶			0.01
<23.3	24	0.96 (0.90–1.01)	
>23.3 to <25.4	29	0.97 (0.87–1.08)	
>25.4 to <28.7	22	1.04 (0.92–1.16)	
>28.7	25	1.05 (1.03–1.08)	

\* PM<sub>2.5</sub> denotes fine particulate matter consisting of particles that are 2.5 μm or less in aerodynamic diameter. Ozone exposures for the cohort were measured from April to September during the years from 1977 to 2000, with follow-up from 1982 to 2000, with adjustment for individual risk factors, and with baseline hazard function stratified according to age (single-year groupings), sex, and race. These analyses are based on the single-pollutant model for ozone shown in Table 3. Because of rounding, percentages may not total 100.

† The body-mass index is the weight in kilograms divided by the square of the height in meters.

‡ Stratum cutoff is based on the median of the distribution at the metropolitan-area level, not at the subject level.

§ Definitions of regions are those used by the Environmental Protection Agency.<sup>3</sup>

¶ External temperature is calculated as the average daily maximum temperature recorded between April and September from 1977 to 2000.

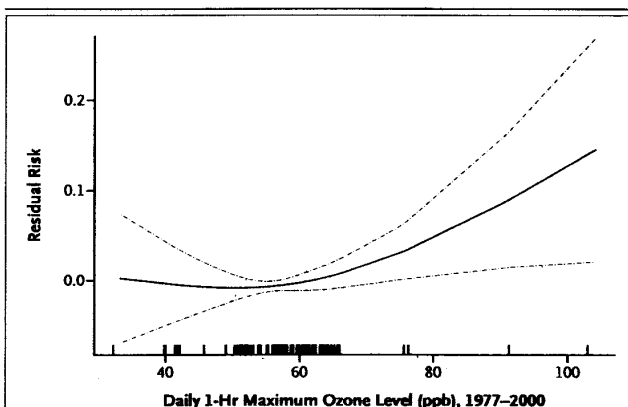


Figure 2. Exposure-Response Curve for the Relation between Exposure to Ozone and the Risk of Death from Respiratory Causes.

The curve is based on a natural spline with 2 df estimated from the residual relative risk of death within a metropolitan statistical area (MSA) according to a random-effects survival model. The dashed lines indicate the 95% confidence interval of fit, and the hash marks indicate the ozone levels of each of the 96 MSAs.

models, but the association with ozone was non-significant in two-pollutant models.<sup>3</sup> Further analyses based on 16 years of follow-up in 134 cities produced similarly elevated but non-significant associations that were suggestive of effects of summertime (July to September) exposure to ozone on death from cardiopulmonary causes.<sup>5</sup>

The increase in deaths from respiratory causes with increasing exposure to ozone may represent a combination of short-term effects of ozone on susceptible subjects who have influenza or pneumonia and long-term effects on the respiratory system caused by airway inflammation,<sup>24</sup> with subsequent loss of lung function in childhood,<sup>32</sup> young adulthood,<sup>33,34</sup> and possibly later life.<sup>35</sup> If exposure to ozone accelerates the natural loss of adult lung function with age, those exposed to higher concentrations of ozone would be at greater risk of dying from a respiratory-related syndrome.

In our two-pollutant models, the adjusted estimates of relative risk for the effect of ozone on the risk of death from cardiovascular causes were significantly less than 1.0, seemingly suggesting a protective effect. Such a beneficial influence of ozone, however, is unlikely from a biologic standpoint. The association of ozone with cardiovascular end points was sensitive to adjustment for exposure to  $PM_{2.5}$ , making it difficult to deter-

mine precisely the independent contributions of these copollutants to the risk of death. There was notable collinearity between the concentrations of ozone and  $PM_{2.5}$ .

Furthermore, measurement at central monitors probably represents population exposure to  $PM_{2.5}$  more accurately than it represents exposure to ozone. Ozone concentration tends to vary spatially within cities more than does  $PM_{2.5}$  concentration, because of scavenging of ozone by nitrogen oxide near roadways.<sup>36</sup> In the presence of a high density of local traffic, the measurement error is probably higher for exposure to ozone than for exposure to  $PM_{2.5}$ . The effects of ozone could therefore be confounded by the presence of  $PM_{2.5}$  because of collinearity between the measurements of the two pollutants and the higher precision of measurements of  $PM_{2.5}$ .<sup>37</sup>

Measurements of  $PM_{2.5}$  were available only for the end of the study follow-up period (1999 and 2000). Widespread collection of these data began only after the EPA adopted regulatory limits on such particulates in 1997. Since particulate air pollution has probably decreased in most metropolitan areas during the follow-up interval of our study, it is likely that we have underestimated the effect of  $PM_{2.5}$  in our analysis.

A limitation of our study is that we were not able to account for the geographic mobility of the population during the follow-up period. We had information on home addresses for the CPS II cohort only at the time of initial enrollment in 1982 and 1983. Census data indicate that during the interval between 1982 and 2000, approximately 2 to 3% of the population moved from one state to another annually (with the highest rates in an age group younger than that of our study population).<sup>38</sup> However, any bias due to a failure to account for geographic mobility is likely to have attenuated, rather than exaggerated, the effects of ozone on mortality.

In summary, we investigated the effect of tropospheric ozone on the risk of death from any cause and cause-specific death in a large cohort, using data from 96 metropolitan statistical areas across the United States and controlling for the effect of particulate air pollutants. We were unable to detect a significant effect of exposure to ozone on the risk of death from cardiovascular causes when particulates were taken into account, but we did demonstrate a significant effect of exposure to ozone on the risk of death from respiratory causes.

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This article is dedicated to the memory of our coauthor and friend, Dr. Jeanne Calle, who died unexpectedly on February 17, 2009.

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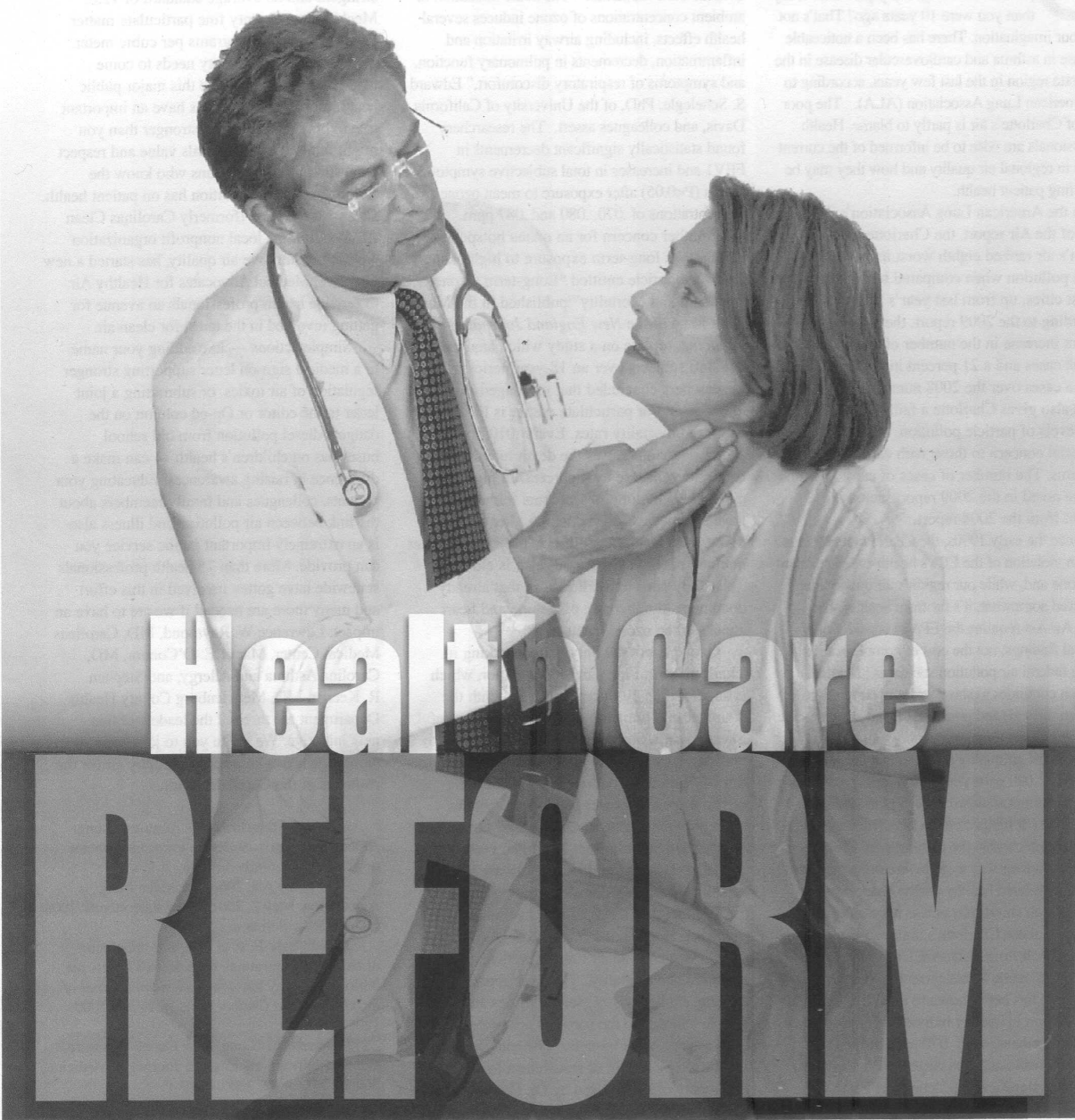
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# Mecklenburg Medicine

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# Is Healthy Air in Charlotte's Future?

By Stephen R. Keener, MD, MPH, and Maeve E. O'Connor, MD

**D**oes it seem like you are seeing more patients with respiratory problems today than you were 10 years ago? That's not just your imagination. There has been a noticeable increase in asthma and cardiovascular disease in the Charlotte region in the last few years, according to the American Lung Association (ALA). The poor state of Charlotte's air is partly to blame. Health professionals are wise to be informed of the current trends in regional air quality and how they may be impacting patient health.

In the American Lung Association's 2009 State of the Air report, the Charlotte metro region's air ranked eighth worst in terms of ozone pollution when compared to the nation's dirtiest cities, up from last year's 13th spot. According to the 2009 report, there was a 5 percent increase in the number of pediatric asthma cases and a 21 percent increase in adult asthma cases over the 2008 numbers. The ALA report also gives Charlotte a failing grade for its high levels of particle pollution. Fine particles are of special concern to those with cardiovascular problems. The number of cases of cardiovascular disease noted in the 2009 report increased 13 percent from the 2008 report.

Since the early 1990s, the Charlotte region has been in violation of the EPA's health-based standard for ozone and, while our region's air quality has improved somewhat, it's far from healthy. The Clean Air Act requires the EPA to consider only medical findings, not the cost of compliance, in setting federal air pollution standards. Medical research continues to show stronger correlations between dirty air and poor health, and standards are beginning to get more stringent.

Regional air quality doesn't meet the 1997 standard of .080 parts per million (ppm), nor does it meet the current standard of .075 ppm set last year by the EPA. It's expected the EPA will adjust the standard again within the coming year. Clearly, our region has a long way to go before our air quality can be considered healthy during ozone season.

Research shows physicians have a right to be concerned about Charlotte's high ozone numbers. New research from Princeton University reveals exposure to ozone levels currently considered safe (.075 ppm) has been shown to significantly impair lung function in healthy individuals. Researchers also found inhalation of .070 ppm ozone for 6.6 hours, well under the current EPA standard, can induce significant reduction in FEV1 — the volume of air a person can forcibly exhale in the first second — according to a report in the Aug. 1

issue of the *American Journal of Respiratory and Critical Care Medicine*. "The acute inhalation of ambient concentrations of ozone induces several health effects, including airway irritation and inflammation, decrements in pulmonary function, and symptoms of respiratory discomfort," Edward S. Schelegle, PhD, of the University of California Davis, and colleagues assert. The researchers found statistically significant decrements in FEV1 and increases in total subjective symptoms scores ( $P < 0.05$ ) after exposure to mean ozone concentrations of .070, .080 and .087 ppm.

Another concern for an ozone hotspot like Charlotte is long-term exposure to high ozone levels. An article entitled "Long-term Ozone Exposure and Mortality" published in the March 2009 issue of the *New England Journal of Medicine*, reports on a study which analyzed 448,850 subjects over an 18-year period. Researchers concluded that prolonged exposure to ozone and/or particulate matter is linked to increased mortality rates. Every .010 ppm of additional ozone raises the death rate due to respiratory disease by 4 percent. In high ozone cities like Charlotte, researchers found citizens have as much as a 30 percent higher chance of dying from respiratory illness. The risk for other nonfatal respiratory diseases also is elevated. This study adds to the literature that already documents the increase of asthma and heart attacks when ozone levels peak.

Ozone is not the only danger lurking in Charlotte's air. Fine particulate matter, which is smaller than 10 microns, or one-tenth the diameter of a human hair, is especially harmful. These microscopic substances are too small to be filtered by the nose and mouth and can enter directly into the bloodstream. The burning of fossil fuels in power plants and vehicles, especially diesel engines, is a major contributor to fine particle pollution. The link between fine particles and cardiopulmonary disease has been established for two decades.

In June, the Health Effects Institute (HEI) published an extended analysis of the American Cancer Society's study linking particulate air pollution and mortality. This new appraisal of existing studies shows mortality rates among people exposed to the particles are twice as high as previously thought. The analysis was conducted by a team of researchers from the University of Ottawa, led by Dr. Daniel Krewski.

The current EPA maximum annual average standard for fine particles is 15.0 micrograms

per cubic meter. California has set a more stringent annual average standard of 12.0. Mecklenburg County fine particulate matter levels are 14.9 micrograms per cubic meter.

Our entire community needs to come together if we are to solve this major public health problem. Physicians have an important role to play. Your voice is stronger than you might think! Public officials value and respect the testimony of physicians who know the serious impact air pollution has on patient health. Clean Air Carolina (formerly Carolinas Clean Air Coalition), a local nonprofit organization working to improve air quality, has started a new initiative, Medical Advocates for Healthy Air, to provide health professionals an avenue for getting involved in the quest for clean air.

Simple actions — like adding your name to a medical sign-on letter supporting stronger regulation of air toxics, or submitting a joint letter to the editor or Op-ed column on the dangers diesel pollution from old school buses has on children's health — can make a difference in raising awareness. Educating your patients, colleagues and family members about the link between air pollution and illness also is an extremely important public service you can provide. More than 75 health professionals statewide have gotten involved in this effort and many more are needed if we are to have an impact. Lawrence W. Raymond, MD, Carolinas Medical Center, Maeve E. O'Connor, MD, Carolina Asthma and Allergy, and Stephen R. Keener, MD, Mecklenburg County Health Department are three of the leaders of this new initiative. We invite you to join us as we work together to help restore healthy air for the residents of the Charlotte region.

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*VIA EMAIL AND US MAIL*

Re: The North Carolina Reasonable Further Progress (RFP) Demonstration State Implementation Plan for the North Carolina portion of the Charlotte-Gastonia-Rock Hill, NC-SC 8 Hour Ozone Nonattainment Area

Dear Ms. Boothe:

On behalf of Clean Air Carolina and the Central Piedmont Group of the Sierra Club, the Southern Environmental Law Center (SELC) submits these comments in response to the invitation of the North Carolina Department of Air Quality (DAQ) to comment on the proposed Reasonable Further Progress State Implementation Plan (the "RFP-SIP") for the North Carolina portion of the Charlotte-Gastonia-Rock Hill ("Metrolina") Ozone Nonattainment Area. These comments incorporate by reference previous comments on the proposed SIP revision issued by South Carolina officials (see attached Exhibit 1). As we explained in our previous comments, the law requires reclassification or "bump-up" of the Metrolina area to "serious" nonattainment status. Instead of submitting the proposed RFP-SIP and continuing to prepare SIP revisions predicated on an extension of the attainment deadline, NCDAQ should voluntarily reclassify the Metrolina area to "serious" nonattainment, as EPA directed it to do almost a year ago, and take advantage of the opportunity to implement needed control measures that will clean up the Metrolina area's unhealthy air, including strategies to better integrate land use, transportation, and air quality planning in the region.

The current seven county bi-state Metrolina nonattainment area's ozone problem is chronic and significant. The American Lung Association's 2009 "State of the Air" report ranks Charlotte as the 8th most ozone polluted city in the country, an even higher ranking than the year before, and the worst in the Southeast. Metrolina air quality showed improvement during the most recent ozone season, but the past summer's extraordinary weather and depressed economic conditions will not likely repeat themselves in 2010. To effectively safeguard residents' health and welfare, state officials must build on the success of the Clean Smokestacks Act and better control motor vehicle emissions, the primary source of the Metrolina area's smog. The proposed RFP-SIP retroactively establishes motor vehicle emissions budgets (MVEBs) for the year 2008. Rather than a retrospective analysis that falls outside the regulatory scheme contemplated by the

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Clean Air Act, SELC recommends refocusing air quality resources on prospective strategies to improve air quality and meet future attainment challenges.

The “purpose of ‘reasonable further progress’ is to ensure attainment by the applicable attainment date.” *Sierra Club v. United States EPA*, 99 F.3d 1551, 1557 (10th Cir. 1996) (citing 42 U.S.C. 7511a(b)(1).) But the Metrolina area has now conclusively failed to meet the applicable attainment date for the 1997 effective ozone air quality standard of 84 parts per billion (ppb). Consequently, the proposed RFP-SIP is of questionable relevance to solving the Metrolina area’s ozone problem. As we noted in our letter to South Carolina officials, air quality standards will soon become more stringent, a reflection of the devastating health consequences that high ozone levels cause. Submission of the proposed RFP-SIP would not only fail to advance the Metrolina area’s progress in meeting existing legal requirements, it would also delay efforts to attain even stronger anticipated standards, which will be a major challenge for the region.

The proposed RFP-SIP will not help the state to qualify for an extension of the attainment deadline under 42 U.S.C. § 7511(a)(5) because it is untimely. To qualify for an extension, North Carolina must show that “the State has complied with all requirements and commitments pertaining to the area in the applicable implementation plan.” *Id.* at § 7511(a)(5)(A). As we explained in our letter to South Carolina officials, the Metrolina states have failed to meet this requirement because no “applicable implementation plan” exists. And the time for creating such a plan has long since passed. The proposed RFP-SIP makes this all too apparent, reporting that “NCDAQ is setting MVEB, for transportation conformity purposes, as county budgets within the Metrolina nonattainment area for 2008.”<sup>1</sup> The Clean Air Act requires each state to demonstrate, based on the adoption of adequate control measures, including MVEBs, that it will achieve adequate emissions reductions in the future. *See generally* 42 U.S.C. § 7511a. North Carolina has failed to meet these requirements for the 1997 ozone standard.

South Carolina officials’ failure to collaborate on the proposed RFP-SIP underscores the inappropriateness of the plan as well. According to the recent SIP revision issued for public comment, South Carolina officials continue to “steadfastly believe on-road mobile VOCs are insignificant contributors to ozone formation in York County,”<sup>2</sup> and they have therefore declined to establish any VOC motor vehicle emissions budgets for the Metrolina nonattainment area within South Carolina. But EPA has rejected North Carolina’s application of that theory to the Metrolina area, in part because “historical data” now shows that VOC emissions exceeded the regulatory “significance” threshold in the 2009 attainment year.<sup>3</sup> *See* 40 CFR 93.109(k). Of

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<sup>1</sup> The Charlotte-Gastonia-Rock Hill, NC-SC 8-Hour Ozone Pre-Hearing Draft – North Carolina Reasonable Further Progress Demonstration (October 12, 2009) at 13 (emphasis added).

<sup>2</sup> “Amendment of the South Carolina Air Quality Implementation Plan” as Referenced in the South Carolina State Register Vol. 33, Issue 9 (September 25, 2009). “DRAFT Appendix F.3 On-Road Mobile Source Emissions Inventory” at 10, available at: <http://www.scdhec.gov> (last visited November 13, 2009).

<sup>3</sup> North Carolina’s June 15, 2007 SIP submission omitted MVEBs for volatile organic compounds (VOCs) in 2008 because it reasoned that “mobile source VOC emissions are insignificant to ozone formation in the Metrolina nonattainment area.” The Charlotte-Gastonia-Rock Hill, NC-SC 8-Hour Ozone North Carolina Attainment Demonstration (June 15, 2007), p. 65. Over two years later, on September 30, 2009, EPA officials wrote to explain that the agency “does not support an on-road VOC insignificance finding for the North Carolina portion of [the Metrolina area].” E-mail. Dianna Smith, EPA to Laura Boothe, NCDAQ (September 30, 2009).

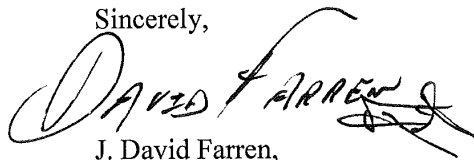


course, if South Carolina officials sought to craft a revision similar to the proposed RFP-SIP, establishing retroactive MVEB's for the year 2008 in York County, they would have to confront the awkward fact that transportation conformity determinations have already been approved there on the basis of the interim emissions test. As we explained in our letter to South Carolina officials, those transportation conformity determinations further demonstrate that the states do not qualify for an attainment deadline extension under 42 U.S.C. § 7511(a)(5)(A).

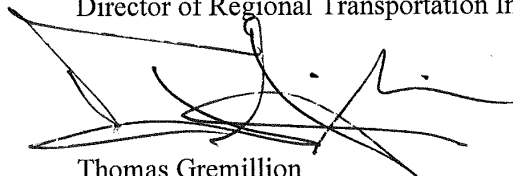
A voluntary "bump-up" to "serious" nonattainment status will allow North Carolina to come back into compliance with the law and focus on the control measures necessary to ensure that the Metrolina area does not repeat its failure to attain ozone standards in the future. As we detailed in our letter to South Carolina officials, "bump-up" will create important opportunities to integrate transportation and land use planning across the Metrolina area, consistent with the strengthened transportation conformity provisions of the 1990 Amendments to the Clean Air Act. The requirements applicable to "serious" areas will usher in better developed travel models, helping to avoid the unrealistically optimistic MVEBs that have plagued previous SIPs for the Metrolina area. *See* 40 CFR § 93.122. And the requirements will encourage the effective, regional level coordination of transportation and growth planning, as contemplated by the Act, in order to make VMT, emissions and congestion levels consistent with air quality plans. *See* 42 U.S.C. Sec. 7504(a); 23 U.S.C. § 134. Coupled with the tremendous strides that North Carolina has made in reducing emissions from stationary sources, the development of strategies to rein in mobile source emissions, consistent with the "serious" area requirements, will signify a lasting solution to the Metrolina area's ongoing ozone problem.

The proposed RFP-SIP is a distraction from the challenge of cleaning up the Metrolina area's unhealthy air – now the worst smog in the South. North Carolina officials should prepare a new SIP revision consistent with the Metrolina area's legally required bump-up to "serious" status, and the State should focus efforts on actually achieving the tough new standards on the horizon. Clean air will require increased regional coordination and integration of land use, transportation and air quality planning. Development of these solutions will take time, requiring prompt and decisive action.

Sincerely,



J. David Farren,  
Senior Attorney,  
Director of Regional Transportation Initiative



Thomas Gremillion  
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Enclosure

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*VIA EMAIL AND US MAIL*

Re: Amendment of the South Carolina Air Quality Implementation Plan as Referenced in the South Carolina State Register Vol. 33, Issue 9 (September 25, 2009)

Dear Mr. Hollis:

On behalf of Clean Air Carolina and the Central Piedmont Group of the Sierra Club, the Southern Environmental Law Center (SELC) submits these comments in response to the invitation of the South Carolina Department of Health and Environmental Control (DHEC) to comment on the proposed revision to the Metrolina-Gastonia-Rock Hill, North Carolina-South Carolina (Metrolina) State Implementation Plan (SIP) for ozone, as referenced in the South Carolina State Register Vol. 33, Issue 9 (September 25, 2009). Instead of submitting the proposed ozone SIP for EPA approval, state officials should develop a new proposed SIP revision that reflects the legally required reclassification or "bump-up" of the Metrolina area to "serious" nonattainment status. As our comments explain, bump-up will usher in needed control measures to clean up the Metrolina area's unhealthy air, including strategies to better integrate land use, transportation, and air quality planning in the region. Because the law requires bump-up, the proposed SIP revision will only delay the inevitable and waste limited state resources that could be focused on achieving air quality standards.

The current seven county bi-state Metrolina nonattainment area's ozone problem is chronic and significant. The American Lung Association's 2009 "State of the Air" report ranks Charlotte as the 8th most ozone polluted city in the country, an even lower ranking than the year before, and the worst in the Southeast. Metrolina air quality showed improvement during the most recent ozone season, but the past summer's extraordinary weather and depressed economic conditions will not likely repeat themselves in 2010. To effectively safeguard residents' health and welfare, state officials must better control motor vehicle emissions, the primary source of the

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Metrolina area's smog. This will require coordination with local and federal transportation officials on a regional basis, development of more realistic travel and land use modeling, and revisiting the area's recent flawed transportation conformity determinations.

The Metrolina area has now conclusively failed to meet the attainment deadline for the effective 1997 ozone air quality standard of 84 parts per billion (ppb). Federal authorities are now considering rescission and strengthening of the recently adopted standard of 75 ppb, assessing whether a lower threshold is needed to adequately protect public health. Even at levels well below the current standard, studies have shown that ozone exposure causes asthma attacks, lung cancer, heart disease, and even death.<sup>1</sup> An expert advisory panel to the EPA has unanimously agreed that a standard between 60 and 70 ppb is necessary to protect human health, and the World Health Organization has endorsed a standard of 51 ppb.<sup>2</sup> The Metrolina area's three-year average ozone "design value" currently exceeds 86 ppb.<sup>3</sup> Thus, the region has a long way to go towards cleaning up its air. The proposed SIP revision and deadline extension would not only violate federal law, as discussed in detail below, but also would delay efforts to attain the even stronger anticipated standard, which will be a major challenge for the Metrolina region.

#### The Metrolina Area's History of Non-Attainment

EPA first designated the Metrolina area as nonattainment for ozone in 1980, almost three decades ago.<sup>4</sup> In response, North Carolina authorities pledged to undertake controls on stationary sources of more than 100 tons per year of VOC and NO<sub>x</sub> emissions. The state implementation plan largely ignored motor vehicle emissions.<sup>5</sup> Not surprisingly, during the 1980's, air quality remained poor, with monitors in the Metrolina metropolitan area regularly recording design values in excess of one hundred ppb.<sup>6</sup>

When the 1990 Clean Air Act Amendments were passed, including the revised transportation conformity provisions in Section 176(c), Metrolina was classified as a "moderate" nonattainment area, the same designation that applies to it today. By 1995, air quality had improved enough to qualify the Metrolina area for re-designation to attainment under the old "one-hour" ozone standard. But when EPA revised the ozone standard in 1997 to 80 ppb,<sup>7</sup> Metrolina once again faced a nonattainment designation. The area's lack of progress in

<sup>1</sup> See, e.g., Chan C-C, Wu T-H. Effects of Ambient Ozone Exposure on Mail Carriers' Peak Expiratory Flow Rates. *Environ Health Perspect* 2005; 113:735-738. Tager IB, Balmes J, Lurmann F, Ngo L, Alcorn S, and Ktuenzli N. Chronic Exposure to Ambient Ozone and Lung Function in Young Adults. *Epidemiology* 2005; 16:751-759. Ruidavets J-B, Cournot M, Cassadou S, Giroux M, Meybeck M, Ferrières J. Ozone Air Pollution is Associated with Acute Myocardial Infarction. *Circulation* 2005; 111:563-569.

<sup>2</sup> See Bob Weinhold. "Ozone Nation: EPA Standard Panned by the People" *Environ. Health Perspect.* 2008 July; 116(7): A302-A305.

<sup>3</sup> Even with the past summer's favorable weather conditions and the worst economic slump in recent history, the three-year average of the 4<sup>th</sup> highest readings at the "County Line" monitor in Mecklenburg County, from 2007 to 2009, was 86.7 ppb.

<sup>4</sup> See 45 FR 26038 (April 17, 1980); 45 FR 59578 (September 10, 1980).

<sup>5</sup> See *id.*

<sup>6</sup> According to the latest tally, 65% of NO<sub>x</sub> emissions in Mecklenburg County in 2002 came from "mobile" sources. NCDAQ, "Emissions Inventory Summary," Preliminary Draft SIP, Appendix E-2 (Table 1) (August 14, 2009).

<sup>7</sup> In practice, the standard is 84 ppb by virtue of the rounding convention.

achieving healthy air quality is largely explained by comparing its propitious forecasts of motor vehicle emissions to later observation-based estimates. For example, North Carolina's 1995 maintenance plan prescribed no more than 33.5 tons of NO<sub>x</sub> to be emitted each day in Mecklenburg County in 1999, and no more than 33.0 tons per day in 2005.<sup>8</sup> By 2002, however, mobile source emissions of NO<sub>x</sub> had reached 78.7 tons per day, roughly two and a half times the level prescribed by the maintenance plan budget for 1999. The same story held in outlying areas. Gaston County's mobile source NO<sub>x</sub> emissions were projected in the Motor Vehicle Emissions Budget ("MVEB") to drop from 9.3 tons per day in 1999 to 8.7 tons per day by 2005, but actual emissions reported to be 20 tons per day in 2002, the "baseline inventory year" for the proposed SIP revision.

When EPA again designated the Metrolina area as nonattainment in 2004, the ozone design value was at one hundred ppb. Following its designation as a moderate nonattainment area, state officials had to submit a SIP to "provide for attainment of the national primary ambient air quality standards," 42 U.S.C. § 7502(c)(1). North and South Carolina made the required submissions in 2007 but that very same year the ozone design value spiked to 96 ppb, casting doubt on the adequacy of the SIPs. North Carolina air quality officials notified EPA that they were considering a SIP revision in order to adequately address emissions from the transportation sector: new data showed that motor vehicle emissions in Mecklenburg County would exceed the NO<sub>x</sub> motor vehicle emissions budget amount by 2.82 tons per day.<sup>9</sup> This prompted the federal agency to suspend its review of the submitted plan.<sup>10</sup>

But on May 15, 2008, the North Carolina Department of Air Quality notified area transportation officials that it would not submit a SIP revision.<sup>11</sup> State officials decided to "request that the USEPA continue with the approval process of the plan already submitted on June 15, 2007," in part due to "concern whether such a change to the SIP would be able to be approved by the USEPA given the current state of air quality," and anticipation that "all areas in the Metrolina nonattainment area would be able to demonstrate conformity by the end of [a one-year transportation conformity lapse grace period]." In other words, rather than potentially impact local transportation planning, state officials apparently decided to take the status quo approach of hoping that nationwide automobile efficiency trends would eventually reduce ozone concentrations enough to barely meet the current standard.<sup>12</sup>

Almost a year and a half after the states submitted their SIPs, on November 17, 2008, EPA wrote to notify North and South Carolina that it intended to disapprove their plans. The agency advised the states to adopt a voluntary bump-up to "serious" nonattainment status for the Metrolina area. "Bump-up" or reclassification, would extend the attainment deadline for the Metrolina area for two years to June 2012, but impose more stringent controls on sources of ozone precursor emissions, including mobile sources. As EPA explained in its letter, the Metrolina area had run out of time to meet the attainment standard: "The Clean Air Act and EPA

<sup>8</sup> See 60 FR 34859 (July, 5 1995).

<sup>9</sup> Laura A. Boothe, N.C. Division of Air Quality, Letter to Metrolina Transportation Partners (May 15, 2008).

<sup>10</sup> See Eldewyns Haynes, "Information Items: Effects on Transportation of State Implementation Plan for Ozone" (July 9, 2008) available at: [www.charneck.org](http://www.charneck.org)

<sup>11</sup> *Supra* note 9.

<sup>12</sup> *Id.*

rules for implementation of the 1997 ozone standard require that . . . the area will achieve ozone levels consistent with the ozone standard by the end of the 2009 ozone season.” EPA pointed out, correctly, that in the Metrolina region “attainment will not be achieved by the required moderate area deadline.”<sup>13</sup> EPA also advised state officials that “the area will not meet the requirements for a one-year extension of the attainment date.” Accordingly, the agency recommended that state officials “request to reclassify the . . . Metrolina nonattainment area to a higher classification”—i.e. a voluntary bump-up—because “if we are required to take rulemaking action on the SIP, we see no alternative to proposing disapproval of the SIP’s attainment demonstration.”

By December of 2008, however, state and federal officials appear to have collaborated to find a way around the law. In December of 2008, DHEC requested “that EPA return the attainment demonstration originally submitted on June 15, 2007, so that the State may improve the demonstration and submit an updated plan.” State authorities pledged to “submit a revised attainment demonstration for the Metrolina region by November 2009.” Notably, this date falls after the conclusion of the 2009 ozone season, and therefore the SIP and related attainment demonstration cannot lay claim to any intention to “provide for attainment of the national primary ambient air quality standards” by the June 15, 2010 nonattainment date. 42 U.S.C. § 7502(c)(1).

EPA has nevertheless acquiesced to the new timeline, taking “a final action finding that North Carolina and South Carolina have failed to submit [SIP] revisions,” which they “were required to submit by June 15, 2007.” 74 FR 21550 (May 8, 2009). State officials now propose to submit a new SIP premised on a yet to be granted attainment deadline extension. As discussed below, the requested extension would violate the Clean Air Act.

#### The Deadline Extension Requested by South Carolina is Illegal

The Clean Air Act grants the EPA limited authority to extend the nonattainment deadline for an area that violates air quality standards:

Upon application by any State, the Administrator may extend for 1 additional year (hereinafter referred to as the “Extension Year”) the date specified in table 1 of paragraph (1) of this subsection if—(A) the State has complied with all requirements and commitments pertaining to the area in the applicable implementation plan, and (B) no more than 1 exceedance of the national ambient air quality standard level for ozone has occurred in the area in the year preceding the Extension Year. No more than 2 one-year extensions may be issued under this paragraph for a single nonattainment area. 42 U.S.C. § 7511(a)(5).

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<sup>13</sup> Already in November of 2008, attainment was clearly impossible. The “County Line” monitor in Metrolina would have had to record a fourth highest ozone value of less than 65 ppb in 2009—a 30% decline from 2008—in order to meet the standard. Even in the mild weather and economic torpor of the 2009 ozone season, the fourth highest value on that monitor has since repeatedly exceeded 65 ppb. Proposed SIP Revision, Appendix C - Air Quality Data – DRAFT C-2 (Table 1).

The proposed SIP revision labors under the assumption that the Metrolina area will qualify for an extension because “no more than 1 exceedance” of the 84 ppb standard “has occurred in the area” in the past year. But the law requires more than a fortuitous dip in ozone levels.

In addition, states must “comply with all requirements and commitments pertaining to the area in the applicable implementation plan.” The statute’s dual conditions for an extension serve a clear objective. The possibility of an extension gives states an incentive to file a plan that meets Clean Air Act requirements—a plan which EPA can approve—and to comply with that plan’s “requirements and commitments.” By taking such deliberate actions to reduce ozone precursor emissions, states can effectively qualify for a reprieve from the law’s requirement that the three-year average ozone design value meets the current standard. *See* 42 U.S.C. § 7511(a). But states that simply take a wait-and-see approach—states that never have a viable plan approved or which do not comply with the “requirements and commitments” of the plan that is submitted—do not fit within this statutory scheme. Without a track record of planning and compliance, a state cannot credibly claim responsibility for one year of fortuitous air quality, or reliably predict that poor air quality will not return under less extraordinary economic and weather conditions.

Beyond these common sense policy rationales, no plausible reading of 42 U.S.C. § 7511(a)(5)(A)&(B) allows South Carolina to qualify for an extension. On the one hand, EPA’s finding that South Carolina failed to submit a SIP indicates that no “applicable implementation plan” has ever existed in the area. To the extent that the SIP submitted in 2007 could be interpreted to qualify as “the applicable implementation plan,” South Carolina has not complied with “requirements and commitments pertaining to the area in the applicable implementation plan.” Either way, the proposed extension fails to meet the statutory requirements.

Indeed, the plain language of the Clean Air Act indicates that the SIP submitted in 2007 should have already prompted administrative action. EPA lacks authority to accept a SIP submission and then make a finding of failure to submit more than 22 months later. South Carolina officials were required to submit a SIP by June 15, 2007. *See* 74 FR 21550 (May 8, 2009). EPA was then required to make a “completeness finding” of the plan “no later than 6 months after” the submission deadline— i.e. by December 15, 2007—or the plan would be “deemed by operation of law to meet [the] minimum criteria.” 42 USCS § 7410(k)(1)(b). After the plan was deemed complete, “EPA had 12 months to approve or disapprove it, either in whole or in part.” *Sierra Club v. Johnson*, 374 F. Supp. 2d 30, 31 (D.D.C. 2005) (citing 42 USCS § 7410(k)(2)).

As the case law makes clear, EPA had to approve or disapprove the Metrolina area SIP by December 15, 2008. At that time, 42 USCS § 7410(k)(2) mandates that “the Administrator shall act on the submission in accordance with paragraph (3).” Paragraph (3) says nothing about a third option to allow the state to withdraw a SIP and thereby extend the deadline for taking action:

In the case of any submittal on which the Administrator is required to act under paragraph (2), the Administrator shall approve such submittal as a whole if it meets all of the applicable requirements of this Act. If a portion of the plan revision meets all the

applicable requirements of this Act, the Administrator may approve the plan revision in part and disapprove the plan revision in part. The plan revision shall not be treated as meeting the requirements of this Act until the Administrator approves the entire plan revision as complying with the applicable requirements of this Act. *Id.* at 7410(k)(3).

But by allowing North and South Carolina to “withdraw” their SIP submissions, EPA is effectively treating the submissions as meeting the requirements of the Act without approving them.

When EPA disapproves a SIP, or “finds that the applicable implementation plan for any area is substantially inadequate to attain or maintain the relevant national ambient air quality standard,” it must make a call for plan revisions and establish “reasonable deadlines” for the SIP revisions “necessary to correct such inadequacies.” 42 USCS § 7410(k)(5). While the statute gives EPA authority to “adjust any dates applicable” under the Act, it carves out an exception for nonattainment deadlines, providing that the agency “may not adjust any attainment date prescribed under part D [42 USCS §§ 7501 et seq.], unless such date has elapsed.” The statute contemplates a “conditional approval,” but neither state nor federal officials have characterized the “SIP withdrawal” for the Metrolina area under this provision, and in any event, the D.C. Circuit has held that EPA is “not authorized to grant conditional approval to plans that did nothing more than promise to do tomorrow what the Act requires today.” *Sierra Club v. EPA*, 356 F.3d 296 (D.C. Cir. 2004).

Granting North and South Carolina the option to “withdraw” their SIPs furthers the same purpose of “postponing SIP deadlines” that the D.C. Circuit Court of Appeals rebuked in *Sierra Club*. Having delayed the approval decision of the SIPs in violation of the law, EPA has no basis for granting an extension under 42 U.S.C. § 7511(a)(5). The states have either submitted SIPs that must be disapproved, or they have failed to submit a SIP. The latter interpretation is most consistent with the sanctions clock that currently applies to North and South Carolina for failing to meet their SIP submission deadlines. But whichever the case, the states cannot have “complied with all requirements and commitments pertaining to the area in the applicable implementation plan,” 42 U.S.C. § 7511(a)(5)(A), because no “applicable implementation plan” exists.

#### A Deadline Extension Would Delay the Adoption of Needed Implementation Strategies

Based on the past three years of monitoring data, the Metrolina area has failed to meet the June 2010 deadline for the 1997 ozone standard. This failure to proactively address air quality has resulted in dirty air that compromises public health and also threatens to shroud the Metrolina area in legal and regulatory uncertainty for the foreseeable future.

The proposed SIP revision depends on not just one but two extensions of the attainment deadline. To arguably qualify, ozone levels must also remain below 84 ppb next summer. Historical data, however, strongly discounts the likelihood of that occurring. Ozone levels have dipped before: the fourth highest exceedances (the basis for the three year average) recorded in 1992 and 2004 were just 85 ppb, nearly meeting the standard. But these dips were followed by



peaks—100 ppb in 1993, 96 ppb in 2007—that reflect variable weather and other factors contributing to ozone formation. (See graph depicting yearly levels attached as Exhibit A). If ozone levels rise back up closer to levels experienced in the Metrolina area in recent years, EPA will have “6 months following the applicable attainment date (including any extension thereof)” to find that the Metrolina area has failed to timely attain the standard and to reclassify the area as “serious.” 42 U.S.C. § 7511(b)(2). The uncertainty of the future regulatory landscape is not beneficial from a planning standpoint for either local officials or private industry.

And this uncertainty would continue even if Charlotte manages, against all odds, to attain the 1997 standard by the requested deadline extension. Last year, EPA strengthened the ozone standard to 75 ppb, a political compromise that prompted EPA’s own scientific advisory committee to submit a unanimous protest letter. The letter reiterated the members’ agreement that maximum ozone levels should lie below 70 ppb, and possibly as low as 60 ppb, in order to be “sufficiently protective of public health.”<sup>14</sup> On September 16, 2009, EPA announced that it would reconsider its decision to set the standard at 75 ppb, which it conceded was “not as protective as recommended by EPA’s panel of science advisors.”<sup>15</sup> The agency expects to propose the new, lower standard in December of this year.<sup>16</sup> Meeting the more stringent standard for smog in the Metrolina area will be a daunting challenge, whether its 75, 70 or 65 ppb, and the challenge will only grow more difficult the longer officials delay in implementing the “serious” area control measures required by law today.

#### The “Serious” Control Strategies are Appropriate for the Metrolina Area

In its December 22, 2008 letter to EPA, the South Carolina DHEC noted that “after much consultation and discussion with stakeholders in the area and with the NC Department of Environment and Natural Resources, we have determined that it is in the best interest of all parties involved” to withdraw the previously submitted SIP rather than follow EPA’s recommendation to bump-up. South Carolina officials have not explained the state’s opposition to a voluntary bump-up. But in light of DHEC’s consultation and discussion with North Carolina officials, the North Carolina Division of Air Quality’s draft proposed SIP revision is instructive.

It indicates that bump-up of the Metrolina non-attainment area from “moderate” to “serious” status would impose what it claims to be inappropriate additional controls on the area:

Many of the control requirements in the Clean Air Act as amended for a “serious” nonattainment area focus on reducing VOC emissions. For example, stationary sources with potential annual VOC emissions greater than 50 tons per year must implement reasonable available control technology or RACT. The Metrolina region is NO<sub>x</sub> limited, so reductions in VOC emissions will not result in the reductions in ozone needed to meet the standard. North Carolina believed that in these difficult economic times, it was

<sup>14</sup> Clean Air Scientific Advisory Committee letter to Stephen L. Johnson, EPA Administrator (April 7, 2008).

<sup>15</sup> See “EPA to Reconsider National Standards for Ground-Level Ozone: Fact Sheet” (September 16, 2009) available at: [www.epa.gov](http://www.epa.gov).

<sup>16</sup> *Id.*

unreasonable to require business and industry to go through a resource intensive and burdensome process and implement costly controls when the needed air quality results would not be achieved.

This greatly oversimplifies the control requirements for "serious" nonattainment areas. For one, the Act contemplates substitution of NO<sub>x</sub> emission controls that "would result in a reduction in ozone concentrations at least equivalent to that which would result from the amount of VOC emission reductions required." 42 U.S.C. 7511a(c)(2). But regardless, other requirements for "serious" areas expressly target NO<sub>x</sub> emissions, including those from mobile sources, which emit over half of the Metrolina area's ozone precursor emissions.

The Clean Air Act outlines ten general requirements for "serious" areas. 42 U.S.C. 7511a(c). Many of these build on existing requirements for "moderate" areas. The Act requires the Metrolina area to "improve monitoring" of ozone precursor emissions, *id.* at 7511a(c)(1); show deeper cuts in emissions in demonstrations of "reasonable further progress," *compare id.* at 7511a(c)(2) *with id.* at 7511a(b)(1); conduct enhanced vehicle inspection and maintenance, *id.* at 7511a(c)(3); and adopt more stringent offset requirements to new stationary sources of emissions. *Compare id.* at 7511a(c)(10) *with id.* at 7511a(b)(5). Other "serious" area requirements are new. The Metrolina area will have to adopt "clean-fuel vehicle programs," or substitute measures which equally "in the Administrator's judgment will achieve long-term reductions in ozone-producing and toxic air emissions," *id.* at 7511a(c)(4). In light of the heavy contribution of motor vehicle emissions to the area's smog, these regulations would have significant health benefits.

The most important effects of bump-up, however, are the effects that it will have on transportation and land use planning in the Metrolina area, consistent with strengthened transportation conformity provisions of the 1990 Amendments to the Clean Air Act. The Act requires each "serious" area, based on forecasted growth in vehicle miles traveled, to periodically "submit a demonstration as to whether current aggregate vehicle mileage, aggregate vehicle emissions, congestion levels, and other relevant parameters are consistent with those used for the area's demonstration of attainment." *Id.* at 7511a(c)(5)(A). If the demonstration is not consistent with attainment, state officials must submit plan revisions that include transportation control measures such as "programs for improved public transit," designation of special lanes for "passenger buses or high occupancy vehicles," "programs for secure bicycle storage facilities and . . . bicycle lanes" and other strategies that must be considered by law to provide options to single-occupant driving. 42 U.S.C. 7408(f). These requirements will help to achieve healthy air and avoid the unrealistically optimistic MVEBs that have plagued previous SIPs for the Metrolina area. And they will encourage the effective coordination at a regional level of transportation and growth planning, as contemplated by the Act, in order to make VMT, emissions and congestion levels consistent with the air quality plans. 42 U.S.C. Sec. 7504(a); 23 U.S.C. Sec. 134.

Finally, and of particular relevance to the Metrolina area, EPA regulations require that transportation planners in "serious" nonattainment areas, use the latest procedures and methodologies that are "available and in practice" for travel models. In addition, they require that "model forecasts must be analyzed for reasonableness and compared to historical trends." 40

CFR 93.122. As discussed below, the Metrolina area's transportation conformity-related planning efforts do not pass muster even under the most permissive "reasonableness" standard. Improved modeling in the Metrolina area as a result of "bump up" will represent a major advance in achieving healthy air quality.

The Requested Deadline Extension is Illegal Because State and Local Officials Have Not Complied with Commitments to Reduce Mobile Source Emissions

The Metrolina area has fared poorly in its efforts to control ozone pollution primarily because it has not adequately addressed emissions from motor vehicles, the source of over half of all smog precursor emissions. In a December 22, 2008 letter to EPA, South Carolina officials intimated that repeal of the Clean Air Interstate Rule caused EPA to question the adequacy of the previously submitted SIP. The letter claims that "all of the requirements that were included in the original SIP will continue to be implemented."<sup>17</sup> But the evidence does not support this claim, certainly not as it applies to one of the most critical requirements in the original SIP: the motor vehicle emissions budget.

Motor vehicle emissions budgets ("MVEB") provide a crucial link between transportation and air quality planning. As noted above, Congress amended the Clean Air Act in 1990 to strengthen this link, mandating that "no Federal agency may approve, accept or fund any transportation plan, program or project," unless it "has been found to conform" to the applicable SIP. 42 U.S.C. 7206. The Act defines "conformity" with the SIP as:

"conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of [air quality standards] and achieving expeditious attainment of such standards; and (B) that such activities will not--(i) cause or contribute to any new violation of any standard in any area;(ii) increase the frequency or severity of any existing violation of any standard in any area; or (iii) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

Metropolitan Planning Organizations (MPOs) must submit an updated Transportation Improvement Program and Long Range Transportation Plan to federal officials at least every four years to demonstrate that it conforms to the SIP. 42 U.S.C. 7506(c)(4)(D).

For a SIP to be approved, it must identify how pollution from all sources will be reduced sufficiently to meet the federal air quality standards. To reduce emissions from the transportation sector, the SIP establishes MVEBs or caps for each county. Local transportation authorities can then demonstrate the "conformity" of local transportation plans by showing that the plans will not cause motor vehicle emissions to exceed the budget in the SIP. A transportation plan may demonstrate conformity even without an approved SIP, but the standard is higher, requiring that the plan actually reduce emissions, rather than simply keep motor vehicle emissions within an MVEB. EPA may approve MVEBs without approving an entire

<sup>17</sup> Letter from Robert W. King, SCDHEC, to J.I. Palmer, US EPA (December 22, 2008) available at: [http://www.scdhec.gov/environment/baq/docs/YorkSIP/DHEC%20letter%20to%20EPA-RFATS%20SIP%20Withdrawal\\_12-22-2008.pdf](http://www.scdhec.gov/environment/baq/docs/YorkSIP/DHEC%20letter%20to%20EPA-RFATS%20SIP%20Withdrawal_12-22-2008.pdf)

SIP, but the budgets must meet certain requirements. EPA will not find an MVEB “adequate for transportation conformity purposes” unless it is “clearly identified and precisely quantified,” “consistent with applicable requirements for reasonable further progress, attainment, or maintenance,” and “consistent with and clearly related to the emissions inventory and the control measures” in the SIP, among other requirements. 40 CFR 93.118(e)(4).

State officials submitted MVEBs as part of their SIPs in 2007, but EPA declined to find the budgets adequate, for reasons which later became painfully obvious. By May 15, 2008, North Carolina officials had calculated that Mecklenburg County emissions would rise to 35.09 tons per day in 2009, nearly three tons over the amount budgeted in the North Carolina SIP. Similarly, the South Carolina SIP budgeted motor vehicle emissions in York County to decline to a level of 8.01 tons of NO<sub>x</sub> emissions per day by 2009, but when the Rock Hill-Fort Mill MPO (RFATS) issued its conformity determination in June 2009, it estimated that 2010 emissions, which should be lower than the previous year's, will actually exceed the MVEB by nearly half a ton per day.

EPA regulations require that “revisions to previously submitted control strategy implementation plans or maintenance plans” must “explain and document any changes to previously submitted budgets and control measures,” and they must document “reasons for the changes (including the basis for any changes related to emission factors or estimates of vehicle miles traveled).” 40 CFR 93.118(e)(4)(vi). But no such explanation or documentation can be found in the proposed SIP revision. The revision estimates “on-road” NO<sub>x</sub> emissions in York County at 10.2 tons per day for 2009.<sup>18</sup> This estimate includes emissions from parts of York County that fall outside of the non-attainment area, and so it does not permit a precise comparison with the previously submitted motor vehicle emissions budget. But judging from the RFATS transportation conformity determination, the previously submitted budget significantly understates emissions, and by failing to address that inaccuracy, and to explain and document how the currently proposed budget will avoid the same mistake, the proposed SIP fails to comply with federal regulations.

#### Metrolina Transportation Conformity Determinations Made Without an Approved Motor Vehicle Emissions Budgets Lack a Sound Legal Basis

If EPA declines to approve a submitted plan's MVEB, a Metropolitan Planning Organization such as RFATS may nevertheless demonstrate that its transportation program, plan or project will contribute “to an implementation plan's purpose of eliminating or reducing the severity and number of violations” in the non-attainment area by means of the “interim emissions” test. 42 U.S.C. 7506(c); 40 CFR 93.119. To demonstrate conformity under the test, modeling must demonstrate that “the transportation plan, [improvement program], and project not from a conforming transportation plan and [improvement program] must contribute to emissions reductions.” 40 CFR 93.119(a). This requires an estimate of emissions under two scenarios: building the proposed transportation projects, or not building them. The “build” scenario emissions must be lower than the “no-build” scenario emissions. Emissions under the “action” or “build” scenario must also be “lower than 2002 emissions by any nonzero amount,”

<sup>18</sup> BAQ. Proposed SIP Revision. DRAFT Appendix E: Emissions Inventory Summary (2009) at 89.

*Id.* at 93.119(b). Although this additional requirement has become largely superfluous because of automobile gas mileage and tailpipe improvements in recent years.

The “interim emissions” test, or as it sometimes called, the “build/no-build” test, is intended to provide some limit on the amount of additional highway capacity in a nonattainment area where no MVEB is available to demonstrate conformity. Increasing the supply of highway capacity tends to increase associated demand, as measured by vehicle miles traveled (VMT).<sup>19</sup> And more VMT generally means more emissions of ozone precursors. On the other hand, the build/no-build test should encourage so-called transportation control measures, such as carpool lanes, transit improvements, and vanpooling programs, because these measures help to reduce VMT and associated emissions. Instead, it is being applied in the Metrolina area to green-light new highway capacity under a standard that is perversely *less* stringent than for areas with an established MVEB limit.

Unfortunately, the Metrolina area’s traffic forecasting model, as currently applied, indicates that virtually any planned highway capacity addition will reduce VMT. The recent conformity determination for the Rock Hill – Fort Mill Area Transportation Study’s (RFATS’s) transportation plan illustrates the fallibility of the build/no-build test using this model. As discussed earlier, the determination estimates that emissions under the “build” scenario will exceed the previously submitted MVEB for York County. Remarkably, the determination also predicts that the RFATS long-range transportation plan—a plan that adds over fifty lane miles of new highway capacity by 2015, and over a hundred more by 2025<sup>20</sup> - will reduce VMT compared to the “no-build” scenario. In other words, these transportation plans conform to Clean Air Act requirements to reduce smog because the model predicts that building dozens of miles of new highway capacity would help to reduce driving rather than increase VMT as predictably occurs under basic laws of supply and demand.

This conclusion relies on assumptions and modeling distortions that are arbitrary and contrary to law. *See* 5 U.S.C. § 706. The determination itself, moreover, undermines a critical component of air quality regulation in the Metrolina area and is a throwback to an air quality planning era that was rejected as ineffective almost thirty years ago. The 1990 Amendments to the Clean Air Act condition transportation funding on compliance with SIP obligations because in the past, transportation conformity was “largely ignored by agencies required to apply it.”<sup>21</sup> Before the 1990 Clean Air Act Amendments, uneven efforts to reduce emissions from stationary sources alone led to predictably modest gains. Conditioning federal transportation funding on

<sup>19</sup> A meta-analysis of over fifty traffic studies concludes: “There is no question that road improvements prompt traffic increases.” Robert Cervero, “Induced Travel Demand: Research Design, Empirical Evidence, and Normative Policies,” *Journal of Planning Literature* 17:3 (2002) at 17. *See also* Goodwin, P., C. Haas-Klua, and S. Cairns, 1998. Evidence on the effects of road capacity reduction on traffic levels. *Journal of Transportation Engineering + Control* 39, 6: 348-54 (analyzing over 100 cases of road-capacity reductions in Europe, North America, Japan and Australia, and finding that “the average overall reduction in traffic was 25 per cent of that which used to use the affected road or area.”).

<sup>20</sup> *See* “RFATS Conformity Determination Report”, at 9-10 (Appendix B: Project Description Table); *see also* FHWA/FTA 2009 Conformity Letter (June 10, 2009) available at <http://www.ci.rock-hill.sc.us/dynSubPageSub.aspx?deptID=9999&pLinkID=412&parentID=14> (finding that the MPO’s 2035 LRTP and 2009-2015 TIP “conform to the purpose of the State Implementation Plan in accordance with 40 CFR Part 93.”).

<sup>21</sup> 136 Cong. Rec. S16972 (Daily Ed. October 27, 1990) (Statement of Senator Baucus).

compliance with the Clean Air Act gives local, state, and federal authorities a mandate to coordinate planning efforts and pursue innovative strategies for reducing emissions. The essentially meaningless conformity determination conducted by RFATS threatens to break down that incentive structure, and to revive the piecemeal air quality regulation that preceded the 1990 Clean Air Act Amendments.

The Requested Deadline Extension Would Validate Arbitrary, Illegal Planning Approvals Based on the Metrolina Regional Travel Demand Model

The RFATS conformity determination relies on the Metrolina Regional Travel Demand Model (MRM) to arrive at its conclusion that new highway capacity will cause VMT to decline.<sup>22</sup> This outcome clashes with an established body of empirical research<sup>23</sup> and underscores the need to improve on the current version of the MRM. The four MPOs and two rural planning organizations in the Metrolina nonattainment area all use the MRM to project travel patterns and prepare transportation plans. As a regional model, the MRM serves as a better planning tool than the various MPO-level travel demand models that preceded it. But serious flaws persist that distort the transportation planning process. Most importantly, the MRM assumes a single land use scenario regardless of the transportation investments made. It also assumes that highway improvements will be built as currently planned and that growth in the Metrolina region will continue to concentrate along the outer edges of existing urbanized areas-again, regardless of the nature of future transportation investments.<sup>24</sup>

With these rigid assumptions embedded in the model, the “build/no-build” test is in reality a “build/un-built” test. The modeling essentially compares the transportation planning status quo and its resulting predictable development patterns against a scenario in which the planned roads have been built, population and employment have shifted to new development along the new road capacity, and then the planned roads are closed, forcing drivers to find whatever routes remain available, however circuitous, to connect their implausible origins and destinations. Given this approach to modeling, the MRM’s prediction that the RFATS’ transportation plan will reduce VMT is unsurprising. For example, the North Carolina Turnpike Authority recently used the MRM to assert that the Monroe Connector/Bypass—a 22-mile, four

<sup>22</sup> The determination projects, for example, that VMT under the 2025 “No Build” scenario will exceed VMT under the 2025 “Build” scenario by over 100,000 miles. “Rock Hill-Fort Mill Area Transportation Study Conformity Determination Report” at 14. It is worth noting that this decline will not occur as a result of new transit, bicycle and pedestrian, ride-share, or other projects typically associated with reduced single-occupancy vehicle travel; such projects are exempt from the emissions analysis. See 40 CFR 93.126. The reduction in emissions flows directly from the highway construction and widening projects listed in the conformity determination. See Report at 9-10.

<sup>23</sup> See Cervero, *supra* note 19.

<sup>24</sup> Land use and socio-economic projections are determined partly on the basis of census data, and partly on the basis of “local expert judgment as to rates, spatial location, and likelihood of development occurring.” This “local expert judgment” reflects anticipated roadway improvements. For example, the MRM land use data projects that the residential population will more than double and 300 new retail jobs—almost a 600% increase above current levels—will be added in the area surrounding the intersection of NC 274 and Union New Hope Road, where real estate developers have planned a subdivision and shopping mall complex along an exit planned for the Garden Parkway toll road. See Steve Harrison, “Hoyle stands to profit off parkway” *Charlotte Observer*, (Sept. 7, 2008). By contrast, the MRM projects that Gastonia’s city center will languish, growing just over 5% between 2000 and 2030.

lane freeway that extends from the metro fringe to rural Union County—will reduce VMT in the region,<sup>25</sup> a conclusion that even local transportation planning officials found lacking in credibility.<sup>26</sup>

The MRM produces these distorted forecasts because its singular vision of the region's growth permeates the model, validating investments that become a self-fulfilling prophecy. The MRM uses a four-stage process that dates back to the 1962 Highway Act.<sup>27</sup> The very first step of this process—trip generation—translates socioeconomic predictions into a fixed number of trips to and from an area smaller than a census block, designating the number of work, shopping, and other types of trips that will begin and end in that area. Although these “trips” depend at least in part on the availability of surrounding transportation infrastructure, the MRM holds them constant, regardless of the transportation network that is programmed into it.

These fixed assumptions make the model poorly equipped to evaluate alternative transportation plans and programs, including a “no-build” scenario.<sup>28</sup> The *Charlotte Observer* has pointed out that the traffic projections produced by the MRM “look just plain silly.”<sup>29</sup> And federal courts have discredited the MRM's simplistic modeling protocol, rejecting an “arbitrary and capricious” analysis of the Federal Highway Authority which “relies on only one socioeconomic forecast in examining the effect construction would have on ozone production,” and which “does not accurately depict the true ozone-producing effect” of the project. *Sierra Club v. USDOT*, 962 F.Supp. 1037, 1043 (N.D. Ill. 1997); see also *Mullin v. Skinner*, 756 F. Supp. 904, 920 (E.D.N.C. 1990) (holding that analysis of a transportation project's impacts may not ignore the “irrefutable reality that the easier it is to get somewhere, the more people will be inspired to do so.”).

Federal regulations impose more exacting requirements for travel demand models like the MRM in “serious” nonattainment areas. See 40 CFR 93.122(b)(1)-(3). “Serious” area models must incorporate the latest “procedures and methods that are available and in practice,” they “must be validated against observed counts,” and “scenarios of land development and use must be consistent with the future transportation system alternatives for which emissions are being estimated.” *Id.* at 93.122(b)(1)(i-iii). Reforming the MRM to meet these requirements would represent a significant improvement. According to a Federal Highway Administration sponsored study, scenario planning techniques, in which different transportation improvements are evaluated against different land use scenarios, “may be considered part of the state of the practice

<sup>25</sup> See Draft Environmental Impact Statement for the Monroe Connector/Bypass, Appendix E, available at: [www.ncturnpike.org](http://www.ncturnpike.org).

<sup>26</sup> See Steve Harrison, “CDOT: Toll road would worsen ozone woes,” *Charlotte Observer* (June 28, 2009).

<sup>27</sup> See, e.g., David F. Pearson and Patricia L. Ellis, “Recommendations for Examining Texas Travel Demand Models,” (2002) available at: [ftp://ftp.dot.state.tx.us/pub/txdot-info/rti/psr/4198-s.pdf](http://ftp.dot.state.tx.us/pub/txdot-info/rti/psr/4198-s.pdf); Keith Bartholomew, Integrating Land Use Issues into Transportation Planning: Scenario Planning, Summary Report (2005) at 7 available at the Federal Highway Administration website: [www.fhwa.dot.gov](http://www.fhwa.dot.gov).

<sup>28</sup> The MRM's proponents point out that the model's subsequent steps adjust to different assumptions about the transportation network, pairing up origins and destinations based on how accessible they are to one another, and projecting that “trips” be made via transit rather than a single-occupancy vehicle where transit is available and convenient. But these steps do not correct the foundational distortion in the model, as its recent output has made all too apparent.

<sup>29</sup> <http://www.Metrolinaobserver.com/opinion/story/939560.html>

in land use-transportation planning.”<sup>30</sup> Preliminary studies using these techniques are already being explored in the Metrolina area.<sup>31</sup> Bump-up provides an opportunity to transform the deficient MRM into an exemplar of modeling that incorporates the transportation system’s interaction with land use trends. The result will be improved transportation-related air quality results.

### Conclusion

Metrolina residents have been breathing unhealthy air – now the worst smog in the South – for far too long. This comes at great cost to public health including not only medical bills but also worker productivity, school attendance, the economy, and overall quality of life in the greater Charlotte region. Local, state and federal officials in North and South Carolina have failed to undertake the measures necessary to meet the attainment deadline for the 1997 ozone standard. The states have failed to submit a plan that merits approval, and, therefore, failed to establish a legal basis for the state’s proposed extension of the attainment deadline. The states’ belated SIP withdrawal similarly lacks any basis in the Clean Air Act. And transportation planners have evaded emissions limitations through the use of unrealistic budgets, antiquated modeling and unexamined assumptions.

State officials must recognize that federal law requires re-designation of Metrolina as a “serious” nonattainment area. As South Carolina spearheads efforts to streamline the SIP process on a regional and national level, the state should also demonstrate leadership in taking its existing SIP obligations seriously. The state should focus its efforts on the actual achievement of the tough new standards on the horizon and encourage local controls, including those necessary to address transportation ozone precursors.

Voluntary bump-up now will avoid much unneeded legal uncertainty and greatly improve the long-term outlook of the region’s air quality. State and local officials also should begin to work together to develop scenario-based modeling and create incentives for reducing transportation emissions throughout the greater Charlotte region. Further, South Carolina should call on federal and local officials to restore credibility to the transportation conformity process by withdrawing the conformity approvals based on the ‘build/no build’ test and reassess the RFATS Transportation Improvement Program and long-range plan in a truly regional context. Regional planning, at new levels of cooperation and integration of air quality, transportation and land use planning, will be necessary to achieve healthy air quality in the Metrolina area and avoid further potential sanctions under the Clean Air Act.

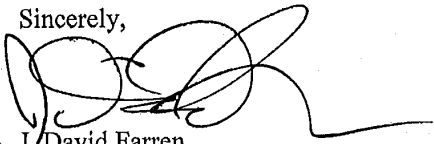
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<sup>30</sup> Keith Bartholomew. Integrating Land Use Issues into Transportation Planning: Scenario Planning, Summary Report (2005) at 7 *available at* the Federal Highway Administration website: [www.fhwa.dot.gov](http://www.fhwa.dot.gov).

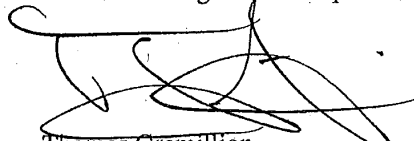
<sup>31</sup> See, e.g., Brian J. Morton, et al. “Advanced Modeling System for Forecasting Regional Development, Travel Behavior, and the Spatial Pattern of Emissions.” (July 13, 2005) *available at* [epastar.unc.edu/Metrolina%20July-13-2005.ppt](http://epastar.unc.edu/Metrolina%20July-13-2005.ppt)



Sincerely,



J. David Farren,  
Senior Attorney,  
Director of Regional Transportation Initiative



Thomas Gremillion  
Associate Attorney

Enclosure

CC (via US Mail):

Beverly Bannister, Director, Air, Pesticides & Toxics Management Div., EPA, Reg. 4  
June Blotnick, Director, Clean Air Coalition  
Laura Booth, Attainment Planning Branch Supervisor, NCDENR, Div. of Air Quality  
The Honorable Richard Boyce, Mayor of Belmont  
Ronnie Bryant, President and CEO, Charlotte Regional Partnership  
Jackie Butch, Union County Asthma Coalition  
The Honorable Becky Carney, NC House of Representatives  
Beth Clark, Sierra Club  
The Honorable Daniel G. Clodfelter, NC Senate  
John Collett, NC Board of Transportation  
Robert A. Collier, Jr., NC Board of Transportation  
Phil Conrad, Executive Director, Cabarrus Rowan MPO  
Eugene Conti, Secretary, North Carolina Department of Transportation  
Bob Cook, Secretary, MUMPO  
Leslie Coolidge, Conformity, SC DHEC, Bureau of Air Quality  
J. Keith Crisco, NC Secretary of Commerce  
Unwanna Dabney, FHWA, North Carolina Division, Planning and Program Dev.  
Edward Dancausse, Conformity, FHWA, North Carolina Division  
Audrey Davis, FHWA, North Carolina Division  
Molly Diggins, Sierra Club  
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Nathalie English, Senior VP of Public Policy, Charlotte Chamber of Commerce  
Anthony Foxx, MUMPO, Charlotte Transportation Committee  
Dee Freeman, Secretary, NC DENR  
The Honorable Danny P. Funderburk, Mayor of Fort Mill  
Hank Graham, AICP, Principal Trans. Planner/MPO Coordinator, City of Gastonia  
Bjorn Hansen, Transportation Planner, Lake Norman RPO  
Eldewins Haynes, Charlotte Department of Transportation

C. Earl Hunter, Commissioner, DHEC  
 Randy Imler, Executive Director, Catawba Regional COG  
 Carol L. Kemker, Deputy Director, Air, Pesticides & Toxics Management, EPA, Reg. 4  
 Stephen Kenner, Director, Mecklenburg County Health Department  
 Fran Koster, Catawba College, Center for the Environment  
 Bob Lee, Administrator, FHWA, South Carolina Division  
 H.B. "Buck" Limehouse, Transportation Secretary, SC Department of Transportation  
 Scott Matthias, EPA – OAQPS  
 A. Stanley Meiburg, Acting Regional Administrator, US EPA, Region 4  
 Joseph McClelland, Senior Transportation Planner, Charlotte DOT  
 The Honorable Pat McCrory, Mayor of Charlotte  
 Melba McGee, Environmental Coordinator, NCDENR  
 Bob Morgan, President, Charlotte Chamber of Commerce  
 Sarah B. Nuckles, Commissioner, SCDOT  
 B. Keith Overcash, Director, NC Division of Air Quality  
 Andrew Perkins, NC Board of Transportation  
 Rob Phocas, Charlotte Assistant City Attorney  
 Danny Pleasant, Director, Charlotte Department of Transportation  
 Heidi Pruess, Environmental Policy Administrator, Land Use and Environmental  
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 Myra Reece, Bureau Chief, SC DHEC, Bureau of Air Quality  
 Jennifer Roberts, Mecklenburg County Commissioner  
 L. Nelson Roberts, Manager, Air Planning & Assessment/Bureau of Air Quality  
 Rick Roti II, Sierra Club  
 Cary Saul, Environmental Policy Administrator, Land Use and Environmental Services,  
 Mecklenburg County  
 Kimber Scavo, EPA – OAQPS  
 Bobby Shields, General Manager, Mecklenburg County  
 Norm Steinman, Manager of Planning and Design, Charlotte DOT  
 The Honorable Jennie Stultz, Mayor of Gastonia  
 John F. Sullivan, III, Division Administrator, FHWA North Carolina Division  
 Nina Szlosberg, NC Board of Transportation  
 Frances Thomas, Planning Director, RFATS  
 Don Willard, Air Quality Director, Mecklenburg County Air Quality  
 Rebecca Yarbrough, SEQL Program Administrator, Centralina COG

# Fourth Highest 8-Hour Ozone Exceedance Values Measured in Charlotte Nonattainment Area (1980-2008)

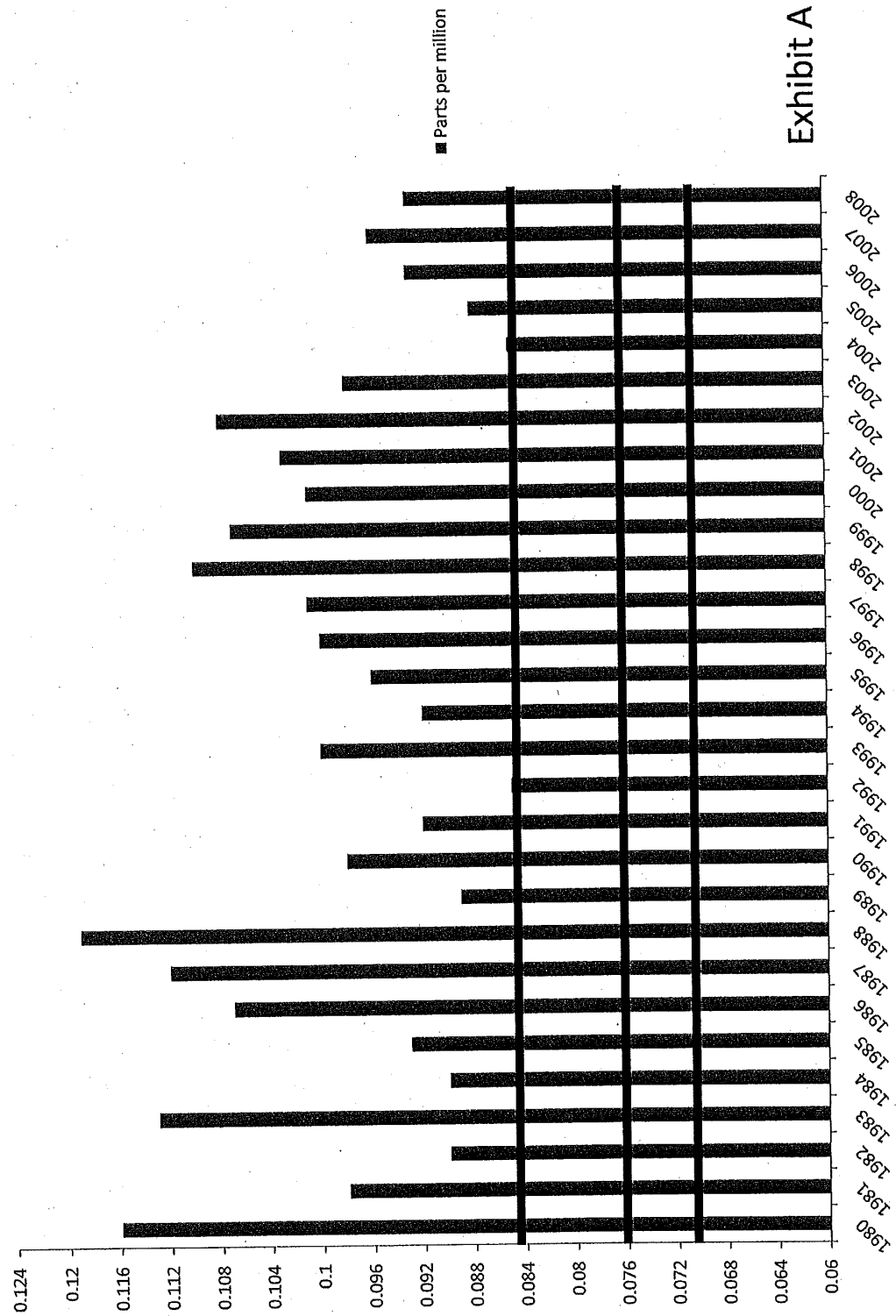


Exhibit A



North Carolina Department of Environment and Natural Resources

Division of Air Quality  
B. Keith Overcash, P.E.  
Director

Beverly Eaves Perdue  
Governor

Dee Freeman  
Secretary

November 24, 2009

Richard A. Schutt  
Air Planning Branch Chief  
U.S. Environmental Protection Agency, Region 4  
Atlanta Federal Center  
61 Forsyth Street  
Atlanta, GA 30303-8960

Dear Mr. Schutt:

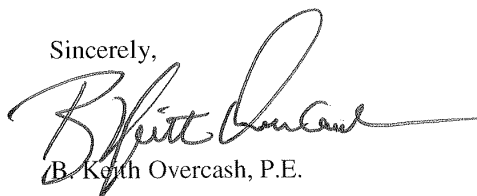
Thank you for your letter dated November 13, 2009, transmitting EPA Region 4's comments on the pre-hearing draft of the North Carolina portion of the Charlotte-Gastonia-Rock Hill, NC-SC 8-hour ozone Reasonable Further Progress State Implementation Plan (SIP) demonstration. This letter is to provide the North Carolina Division of Air Quality's (NCDAQ's) response to those comments.

Upon clarification from your staff, it was determined that your first comment was requesting that the NCDAQ state the source of data used to determine the fraction of Iredell County's population that is in the two townships designated as nonattainment, which was used to adjust the County's area source and non-road mobile source emissions for just the nonattainment area. Section 3.5 of the Narrative has been updated to state that the fraction of the County's population in the two nonattainment townships was obtained from the U.S. Census data.

The second comment requested that the NCDAQ list the specific MACT standards that were used to develop the 2008 SIP inventory for the nonattainment area. The NCDAQ has added a table in Appendix B (the point source emissions inventory documentation) Section 3.2.2.2 to list out the MACT standards that were applied in the Metrolina nonattainment area and the control efficiencies that were applied.

Thank you for your review of the pre-hearing draft. We look forward to working with EPA Region 4 during your review of our official SIP submittal for this area. If you have any questions, please contact Laura Boothe of my staff at (919) 733-1488.

Sincerely,



B. Keith Overcash, P.E.

BKO:lab

cc: Laura Boothe  
Lynorae Benjamin

1641 Mail Service Center, Raleigh, North Carolina 27699-1641  
2728 Capital Blvd., Raleigh, NC 27604  
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North Carolina Department of Environment and Natural Resources

Division of Air Quality  
B. Keith Overcash, P.E.  
Director

Beverly Eaves Perdue  
Governor

Dee Freeman  
Secretary

November 30, 2009

J. David Farren & Thomas Gremillion  
Southern Environmental Law Center  
200 West Franklin Street, Suite 330  
Chapel Hill, NC 27516

Dear Mr. Farren and Mr. Gremillion:

This letter is in response to your comments on the Reasonable Further Progress (RFP) demonstration for the North Carolina portion of the Charlotte-Gastonia-Rock Hill, NC-SC 8-hour ozone nonattainment area (referred to as the Metrolina area). The North Carolina Division of Air Quality (NCDAQ) disagrees with your assertion that the law requires reclassification of the Metrolina area to a "Serious" nonattainment status and that the area will not qualify for a one year extension of the attainment date.

A reclassification of the area to Serious could further economically depress the smaller stationary sources in the Metrolina area and would not advance attainment of the 1997 8-hour ozone standard. Based upon the 2009 ozone data, the NCDAQ believes that the area will attain the standard next year. Reclassifying the area to Serious would allow up to an additional 3 years to attain the standard and many of the additional controls that come with reclassification could not be implemented until the final attainment year of 2012.

Additionally, your statement that a reclassification to Serious status would usher in better developed travel models to avoid the unrealistically optimistic motor vehicle emission budgets that have plagued previous State Implementation Plans for the Metrolina area is unfounded. The attainment demonstration submitted in June 2007, as well as this revision to the RFP demonstration, have both utilized data provided by the same type of travel demand model that would be required for a Serious nonattainment area.

The Clean Air Act states that in order for an area to qualify for a one-year extension, the State has to comply with all requirements and commitments in the applicable implementation plan. It does not state that the applicable implementation plan has to be approved by the U. S. Environmental Protection Agency (USEPA) prior to qualifying for the one year extension. The NCDAQ submitted an attainment demonstration plan for the Metrolina area in June 2007. This plan was submitted on time and demonstrated that the area would attain the standard by its designated attainment date. This plan has continued to be implemented by the NCDAQ, even after the plan was withdrawn in December 2008. Based upon the USEPA's recommendation, the original attainment demonstration plan has been re-submitted and will be supplemented to demonstrate that the area is expected to attain the 1997 8-hour ozone standard with a one-year extension of the attainment date.

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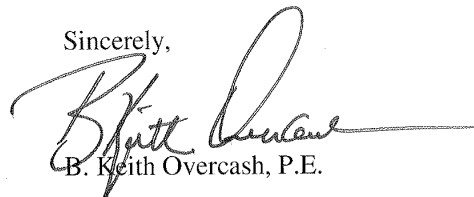
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The NCDAQ also disagrees with your assertion that the air quality improvement demonstrated during the 2009 ozone season was due solely to extraordinary weather and depressed economic conditions. In its preliminary review of the 2009 meteorology, the NCDAQ has determined that the average temperature and precipitation were in line with the 30-year average values. Although there were not many stagnation events that can lead to elevated ozone levels, on days when the weather patterns were conducive for ozone formation, exceedances of the 1997 ozone standard were not observed. The NCDAQ believes that the final installation of nitrogen oxide controls to meet the Clean Smokestacks Act, the implementation of the Clean Air Interstate Rule regionally, and emission reductions due to the federal tailpipe and fuel standards have lowered background ozone levels and ozone transport to the area.

Finally, the NCDAQ continues to look at what is needed to meet the national ambient air quality standards and acknowledges that in order to meet tighter ozone standards, additional emission reductions in the mobile source sector are needed. For this reason, the Division has developed an idle reduction rule for heavy duty vehicles. Additionally, the NCDAQ is using Diesel Emission Reduction Act funds to target emission reductions in the on-road and off-road mobile sector. We have actively pursued the competitive Diesel Emission Reduction Act funding as well and the NCDAQ was awarded funding to target reducing emissions from diesel construction equipment. Additionally, Mecklenburg County Air Quality was awarded American Recovery and Reinvestment Act funding for their Grants to Replace Aging Diesel Equipment plus (GRADE+) program.

North Carolina has demonstrated through the passing of the Clean Smokestacks Act and the Clean Air Bill its commitment to improving air quality. The Division has started the modeling analysis, in coordination with nine other southeastern states, to determine what additional controls may be needed to meet the 8-hour ozone standard the USEPA is expected to promulgate in August 2010. I invite you to participate in the stakeholder process for this modeling analysis. Please contact Laura Boothe of my staff if you wish to be added to the Southeast Analysis, Modeling and Planning stakeholder distribution list.

Sincerely,



B. Keith Overcash, P.E.

BKO/lab

cc: Sheila Holman, NCDAQ  
Laura Boothe, NCDAQ  
Don Willard, MCAQ  
Myra Reece, SCDHEC  
June Blotnick, Clean Air Carolina  
Rick Roti, Sierra Club

The Charlotte Observer Publishing Co.  
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North Carolina } ss  
Mecklenburg County}

Affidavit of Publication

THE CHARLOTTE OBSERVER

OCT 20 2009

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1641 MAIL SERVICES CENTER  
RALEIGH NC 27699-1641

REFERENCE: 30056358

6396897 air quality hearing

Before the undersigned, a Notary Public of said County and State, duly authorized to administer oaths affirmations, etc., personally appeared, being duly sworn or affirmed according to law, doth depose and say that he/she is a representative of The Charlotte Observer Publishing Company, a corporation organized and doing business under the laws of the State of Delaware, and publishing a newspaper known as The Charlotte Observer in the city of Charlotte, County of Mecklenburg, and State of North Carolina and that as such he/she is familiar with the books, records, files, and business of said Corporation and by reference to the files of said publication, the attached advertisement was inserted. The following is correctly copied from the books and files of the aforesaid Corporation and Publication.

PUBLISHED ON: 10/12

AD SPACE: 144 LINE  
FILED ON: 10/16/09

NAME: Shadrach Jackson TITLE: Act Clerk  
DATE: OCT 16 2009

In Testimony Whereof I have hereunto set my hand and affixed my seal, the day and year aforesaid. My Commission Expires May 17, 2011

Notary: Judith M. Sears My Commission Expires: 11/11

**NORTH CAROLINA DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES**  
**PUBLIC NOTICE**

The North Carolina Department of Environment and Natural Resources, Division of Air Quality (NCDAQ) hereby gives notice of a public hearing regarding the proposed Reasonable Further Progress State Implementation Plan for the North Carolina portion of the Charlotte-Gastonia-Rock Hill, NC-SC 8-hour Ozone Nonattainment Area.

**PURPOSE:** The public hearing is intended to inform interested parties on the Reasonable Further Progress State Implementation Plan for the North Carolina portion of the Charlotte-Gastonia-Rock Hill, NC-SC 8-hour Ozone Nonattainment Area.

**DATE AND LOCATION:** Friday, November 13, 2009 from 3:00-4:00pm in Auditorium 1 at the Mecklenburg County Services Center, 700 North Tryon Street, Charlotte, NC 28202.

**COMMENT PROCEDURES:** All persons interested in these matters are invited to attend the public hearing. Any person wishing to comment is requested to submit a written statement for inclusion in the record of proceedings at the public hearing. The hearing officer may limit oral presentation length if many people want to speak. The hearing record will close on Friday, November 13, 2009.

**INFORMATION:** Copies of the proposed Reasonable Further Progress State Implementation Plan will be made available starting Monday, October 12, 2009 and may be downloaded from the NCDAQ web site at <http://www.ncdaq.org/planning/hc.sip.shtml>. Copies of the proposal may also be reviewed in person during normal business hours at the following offices:

NCDAQ, Raleigh Central Office, Planning Section 919-733-1115  
NCDAQ, Mooresville Regional Office 704-663-1699  
Mecklenburg County Air Quality Office 704-336-5500

Comments should be sent to and additional information concerning the hearing or the proposal may be obtained by contacting:

Ms. Laura Boothe  
NC Division of Air Quality  
1641 Mail Services Center  
Raleigh, NC 27699-1641  
Phone: (919) 733-1488  
Fax: (919) 715-7476  
dcaq.publiccomments@ncdent.gov  
(Note: In the subject line type Metrolina RFP SIP)

Date: LP6396897  
B. Keith Overcash, PE., Director