Appendix F.3
On-Road Mobile Source Emissions Inventory

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ON-ROAD MOBILE SOURCE EMISSIONS INVENTORY

I. INTRODUCTION

The attainment modeling for the Charlotte-Gastonia-Rock Hill, North Carolina-South Carolina nonattainment area (referred to as the Metrolina area) was performed in conjunction with the regional haze modeling being done by the Southeast Regional Planning Organization, Visibility Improvement State and Tribal Association of the Southeast (VISTAS) and the fine particulate matter (PM2.5) and ozone modeling being done by the Association of Southeastern Integrated Planning (ASIP). VISTAS and ASIP are run by the ten Southeast states (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia). Since the regional haze and PM2.5 modeling uses annual simulations and includes an intermediate year that is the attainment year required for the Metrolina nonattainment area, the South Carolina Department of Health and Environmental Control (SCDHEC) decided to use this modeling for its attainment demonstration.

On-road mobile sources are considered those vehicles that travel on the roadways. On-road mobile source emissions comprise nearly 50 percent of the emissions of the nitrogen oxide (NOx) emissions for most of South Carolina. Emissions from motor vehicles occur throughout the day while the vehicle is in motion, at idle, parked, and during refueling. All of these emissions processes need to be estimated in order to properly reflect the total emissions from this source category. In its simplest terms, emissions from on-road mobile sources are calculated by multiplying an activity level, in this case daily vehicle miles traveled (VMT) as provided by the South Carolina Department of Transportation (SCDOT) and Metropolitan Planning Organization (MPOs), by an emission factor.

The US Environmental Protection Agency (EPA) developed the MOBILE model to estimate emission factors based on information on the way vehicles are driven in a particular area. The newest version of the MOBILE model, MOBILE6.2, was used. In 2004, MOBILE6.2 was incorporated into SMOKEv2.1 which was used in the VISTAS/ASIP modeling. Key inputs for MOBILE6.2 include information on the age of vehicles on the roads, the average speed of those vehicles, what types of roads those vehicles are traveling on, any control technologies in place in an area to reduce emissions for motor vehicles (e.g., emissions inspection programs) and ambient temperature.

A very important component of the on-road mobile emissions estimation process is interagency consultation. The South Carolina transportation partners involved in attainment demonstration State Implementation Plan (SIP) and motor vehicle emission budget (MVEB) development included: the EPA Region 4, the SCDOT, the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), the South Carolina Department of Health and Environmental Control (SCDHEC) and the Rock Hill-Fort Mill Area Transportation Study (RFATS) Metropolitan Planning Organization (MPO). The Charlotte Department of Transportation (CDOT) was consulted for speeds and VMT data derived from the Metrolina travel demand model (TDM).

The documentation for the on-road mobile sources is broken out into two components: 1) how the inventory was developed for the ozone modeling used for the attainment demonstration and 2) how the MVEB was developed for the portion of York County designated as nonattainment.

II. MOBILE6.2 INPUT ASSUMPTIONS FOR VISTAS/ASIP

The MOBILE6 module of SMOKE was used to develop the 2002 and 2009 on-road mobile source emissions estimates for carbon monoxide, ammonia, fine particulate matter, nitrogen oxides (NOx) and volatile organic compounds (VOCs). The MOBILE6 parameters, vehicle fleet descriptions, and VMT estimates were combined with gridded, episode-specific temperature data to calculate the gridded, temporalized emission estimates. Of note, whereas the on-network emissions estimates are spatially allocated based on link location and subsequently summed to the grid cell level, the off-network emissions estimates are spatially allocated based on a combination of the FHWA Version 2.0 highway networks and population. For the VISTAS/ASIP 36/12 km modeling, no link based data was used. The MOBILE6 emissions factors are based on episode-specific temperatures predicted by the meteorological model. Further, the MOBILE6 emissions factors model accounts for the following:

- Hourly and daily minimum/maximum temperatures, relative humidity and barometric pressure;
- Facility speeds;
- Locale-specific inspection/maintenance (I/M) control programs, if any;
- Adjustments for running losses;
- Splitting of evaporative and exhaust emissions into separate source categories;
- VMT, fleet turnover, and changes in fuel composition and Reid vapor pressure (RVP).

A. Speed Assumptions

Emissions from motor vehicles vary with the manner in which the vehicle is operated. Vehicles traveling at 65 miles per hour (mph) emit a very different mix of pollutants than the car that is idling at a stoplight.

B. Vehicle Age Distribution

Emissions vary with the age of a vehicle. Older vehicles have typically been driven more miles and have experienced more deterioration in the emission control systems. Also, older vehicles do not meet newer, more stringent emissions standards. South Carolina does not have state specific data and used default vehicle age distributions built into the MOBILE6 model.

C. Vehicle Mix Assumptions

1. Vehicle Mix

The vehicle mix refers to the percentage of different vehicle types on each of the twelve (12) FHWA road types. These road types are listed below in Table F3-1. It is critical for estimating mobile emissions in an area to use data that accurately reflects the vehicles traveling on each of these different road types. South Carolina does not have state specific data and used default vehicle mix data built into the MOBILE6 model.

Table F3-1: Functional Road Classes in South Carolina

RI	Rural Interstate	UI	Urban Interstate
RPA	Rural Other Principle Arterial	UF	Urban Freeway & Expressway
RMA	Rural Minor Arterial	UPA	Urban Other Principal Arterial
RMjC	Rural Major Collector	UMiA	Urban Minor Arterial
RMiC	Rural Minor Collector	UC	Urban Collector
RL	Rural Local	UL	Urban Local

2. Temperature, Relative Humidity and Barometric Pressure Assumptions

MOBILE6.2 emission factors used by SMOKE are significantly influenced by temperature and to a lesser extent, humidity. The most desirable approach from an accuracy standpoint is to model on-road mobile emissions using gridded, temporalized data from the meteorological model. The VISTAS on-road mobile inventories were developed using this approach.

3. Vehicle Inspection and Maintenance Program Assumptions

South Carolina does not have an inspection and maintenance program in any of its counties.

4. Reid Vapor Pressure Assumptions

The RVP is a measure of gasoline's volatility. The following reflects the RVP settings used in the development of the South Carolina on-road mobile inventory to support the VISTAS/ASIP regional modeling. An RVP of 9.0 pounds per square inch (psi) is required during May through September in all South Carolina counties.

5. Vehicle Miles Traveled Assumptions

In order to calculate emissions from on-road mobile sources, emission factors are developed as discussed throughout this document. The emission factors are then multiplied by an activity level, which for on-road mobile sources is VMT.

For all counties in South Carolina, the 2002 VMT was derived from the 2002 Highway Performance Maintenance System (HPMS) data provided by the SCDOT. The South Carolina 2009 VMT was grown by the VISTAS contractor using growth factors.

III. MOBILE6.2 INPUT ASSUMPTIONS FOR MOTOR VEHICLE EMISSION BUDGETS

The purpose of transportation conformity is to ensure that Federal transportation actions occurring in a nonattainment area do not hinder the area from attaining and maintaining the 8-hour ozone standard. This means that the level of emissions estimated by the SCDOT or the MPO's for the Transportation Implementation Plan (TIP) and Long Range Transportation Plan (LRTP) must not exceed the motor vehicle emission budgets (MVEB) as defined in this attainment demonstration SIP.

The sections below describe the MOBILE6.2 input assumptions used to calculate the MVEB. The MOBILE6.2 input files and output files used in the development of the on-road mobile source emissions for the attainment demonstration are compiled in Section V.

A. Speed Assumptions

The MOBILE6.2 command "AVERAGE SPEED" was used to enter the daily speeds. This command replaces the default average speed per roadway classification with a calculated average speed for a given roadway scenario.

This command requires the average speed on a given roadway scenario.

The speeds were generated by the Charlotte Department of Transportation (CDOT) using the Metrolina regional TDM. The speeds provided are based on a daily average.

Table F3-2 below provides a summary of the speeds used for the development of the MVEB. For the VISTAS/ASIP modeling, average county-wide speeds were used. For the setting of the MVEB, average speeds based on just the nonattainment area were used. The column headings in Table F3-2 represent the twelve (12) Federal Highway Administration (FHWA) functional road classes used in the modeling (see Table F3-1).

Table F3-2: Speeds for the York County Nonattainment Area 2009 On-Road Mobile Emissions Inventory

County	RI	RPA	RMA	RMjC	RMiC	RL	UI	UF	UPA	UMiA	UC	UL
York	61.4	46.8	43.8	39.1	24.3	26.9	60.8	39.0	35.3	35.2	25.6	23.1

B. Reid Vapor Pressure Assumptions

York County is required to have an RVP of 9.0 psi. This value was used in calculating the MVEB for the South Carolina portion of the Metrolina nonattainment area (the York County nonattainment area.)

C. Vehicle Miles Traveled Assumptions

In order to calculate emissions from on-road mobile sources, emission factors are developed as discussed throughout this document. The emission factors are then multiplied by an activity level, which for on-road mobile sources is daily VMT.

The daily VMT for the York County nonattainment area was provided by CDOT. While full-county data was used in the attainment demonstration SIP, the VMT used to estimate the MVEB reflects only the VMT associated with the nonattainment portion of York County. Table F3-3 lists the VMT used in the MVEB calculations.

Table F3-3: 2009 York County Nonattainment Area Daily VMT

Road Type	Daily VMT
Rural	
Interstate	852,652
Other Prin. Arterial	77,925
Minor Arterial	272,179
Major Collector	242,554
Minor Collector	27,445
Local	174,246
Urban	
Interstate	791,164

Road Type	Daily VMT
Freeway/Expressway	79,101
Other Prin. Arterial	990,378
Minor Arterial	721,849
Collector	218,491
Local	363,495
Total Daily VMT	4,811,481

IV. MOTOR VEHICLE EMISSIONS BUDGETS FOR CONFORMITY

A. Transportation Conformity

As mentioned earlier, the purpose of transportation conformity is to ensure that Federal transportation actions occurring in a nonattainment area does not hinder the area from attaining and maintaining the 8-hour ozone standard. The level of emissions estimated by the RFATS for the TIP and the LR TP must not exceed the MVEB as defined in this attainment demonstration SIP.

On April 15, 2004, the EPA issued designations and classifications based on the severity of the 8-hour ozone NAAQS in each state with an effective date of June 15, 2004. This included the RFATS MPO boundary for the York County area along with contiguous portions of North Carolina. In making the boundary and classification determinations, the EPA utilized 8-hour ozone monitoring data from the 2001-2003 calendar years. Although the design value for the monitor in York County at that time was 0.084 parts per million (ppm), which was below the 8-hour ozone standard of 0.085 ppm, the EPA determined that a portion of York County contributed to violating monitors in nearby North Carolina. The nonattainment area was classified under Subpart 2 of the Clean Air Act as being a "moderate" nonattainment area for ozone. This was decided based upon the ozone design value of 0.100 ppm at the Rowan County, North Carolina monitor, 43 miles from the South Carolina/North Carolina border.

As a minimum requirement, no later than June 15, 2005, the RFATS area was required to demonstrate transportation conformity, to ensure that all projects utilizing federal funds do not have an adverse impact on the area's air quality. Transportation Conformity consultation procedures as outlined in the South Carolina Transportation Conformity Memorandum of Agreement and endorsed by all parties enabled the nonattainment area to immediately begin the process. The York County Interagency Consultation process was initiated on May 14, 2004 and is ongoing, consisting of representatives from York County, RFATS, the SCDHEC, the SCDOT, the EPA Region 4, the SC Division Office of Federal Highways, the FTA, the City of Rock Hill, and York County.

On September 30, 2004, RFATS sent a memorandum to the FHWA, the EPA Region 4, York County, and the SCDHEC, copying CDOT as formal notification that RFATS had elected, through the York County Interagency Consultation process, to follow procedures for the determination for the conformity of transportation plans, programs and projects in the RFATS Transportation Study Area separately from the area designated as nonattainment in North Carolina. The notice confirmed the intention of RFATS and SCDOT, as partners in the development of the Metrolina Regional TDM, to use the regional travel forecasting model and that model's output as the tool for completing the conformity analysis that applies to the nonattainment area in York County (RFATS MPO) in conjunction with the update of the RFATS LRTP.

On March 30, 2005, the RFATS and the SCDOT sent a memorandum to the CDOT as formal notification that RFATS has elected through the York County Interagency Consultation process, to use

the RFATS TDM for the determination of the air quality conformity of transportation plans, programs and projects. Specifically, RFATS stated that with the assistance from the SCDOT, the RFATS TDM would be used to produce the travel outputs for the Mobile/Air Quality Model and the federally required conformity determination.

As referenced in the following documents, the US Department of Transportation (USDOT) the FTA and the FHWA after recommendation from the EPA Region 4 issued a finding of conformity for the RFATS 2030 LRTP and the FY2006-2008 TIP.

June 13, 2005 - correspondence from the EPA Region 4 to the FHWA Division Administrator of the completed review and recommendation for a finding of conformity.

June 13, 2005 - notification from the USDOT, the FTA and the FHWA to the SCDOT of their finding of conformity.

As a result of modifications to RFATS transportation plans, a second conformity determination was made in early 2007. The USDOT (the FTA and the FHWA) after recommendation from the EPA Region 4 issued a finding of conformity for the RFATS 2030 LRTP and the FY2006-2008 TIP.

February 1, 2007 – The FHWA Division Administrator requested the EPA Region 4 to review and provide comments on the RFATS conformity determination for the 2030 LRTP and FY2007-FY2012 TIP. The correspondence also stated that the opportunity for public review and comment was provided.

February 26, 2007 - correspondence from the EPA Region 4 to the FHWA Division Administrator of the completed review and recommendation for a finding of conformity.

March 5, 2007 - notification from the USDOT (FTA and FHWA) to the SCDOT of their finding of conformity for the 2030 LRTP and 2006-2012 TIP.

During the development of the MVEBs, the York County Interagency partners including representatives from York County, the RFATS, the SCDHEC, the SCDOT, the EPA Region 4, the SC Division Office of FHWA, the FTA, the City of Rock Hill, and York County were consulted. Future conformity determinations must show that the level of emissions estimated by the RFATS for the TIP and LRTP must not exceed the MVEBs as defined in this attainment demonstration.

Copies of the correspondence are found in Appendix S - RFATS Transportation Conformity.

B. Highway Mobile Source VOC Insignificance

The Transportation Conformity Rule Amendments for the new 8-hour ozone and fine particulate matter NAAQS addresses areas with insignificant motor vehicle emissions in Section 93.109(k) which states:

Notwithstanding the other paragraphs in this section, an area is not required to satisfy a regional emissions analysis for §93.118 and/or §93.119 for a given pollutant/precursor and NAAQS, if EPA finds through the adequacy or approval process that a SIP demonstrates that regional motor vehicle emissions are an insignificant contributor to the air quality problem for that pollutant/precursor and NAAQS. The SIP would have to demonstrate that it would be unreasonable to expect that such an area would experience enough motor vehicle emissions growth in that pollutant/precursor for a NAAQS violation to occur.

The rule explains that such a finding would be based on a number of factors, including the percentage of motor vehicle emissions in the context of the total SIP inventory, the current state of air quality as determined by monitoring data for that NAAQS, the absence of SIP motor vehicle control measures, and historical trends and future projections of the growth of motor vehicle emissions. Also, in the EPA's approval of VOC insignificance for the Triangle area of North Carolina (*http://www.epa.gov/fedrgstr/EPA-AIR/2007/October/Day-03/a19513.htm*), it states that the policy provides flexibility for areas where motor vehicle emissions have little or no impact on an area's air quality problem. Further, EPA states that the policy provides for state and local resources to be directed towards reducing emissions from those sources that contribute the most to an area's air quality problem.

SCDHEC has examined a NCDAQ study designed to determine the sources of VOC emissions and their contribution to ozone formation in North Carolina, since the results of the study would apply to the part of York County included in the Metrolina nonattainment area. Due to the generally warm and moist climate of the Carolinas, vegetation abounds in many forms, and forested lands naturally cover much of each state. The biogenic sector is the most abundant source of VOC emissions in both Carolinas and accounts for approximately 90% of the total VOC emissions across each state. Due to the overwhelming abundance of biogenic VOC emissions, NCDAQ determined the vast majority of North Carolina a NOx limited environment for the formation of ozone. This holds true for the Metrolina nonattainment area counties. Summaries from the VISTAS/ASIP 2002 and 2009 regional modeling effort were used to illustrate the abundance of the biogenic VOC emissions. Figures F3-1 and F3-2 provides the percent contributions from point, on-road mobile, off-road mobile, area, and biogenic sources to the total VOC emissions in the Metrolina nonattainment area in 2002 and 2009, respectively. For the two partial counties in the Metrolina nonattainment area, Iredell and York Counties, the whole county emissions were used since the modeling inventories are for whole counties.

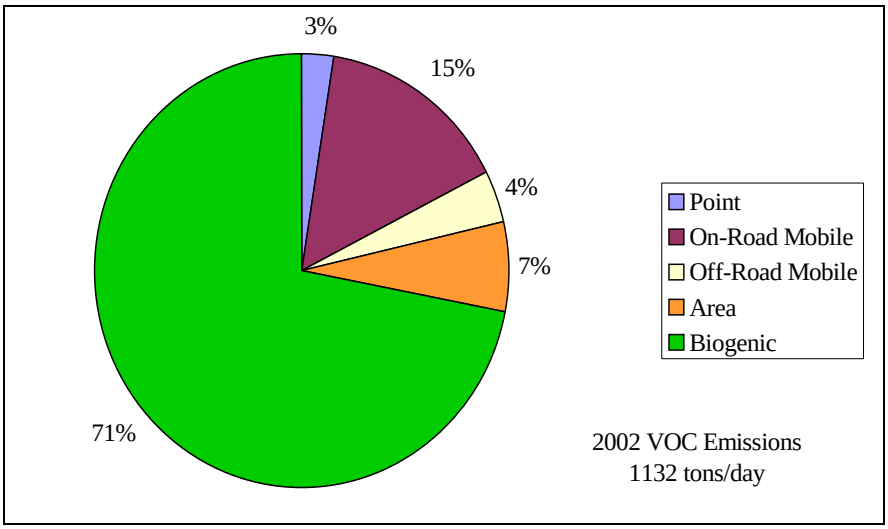

Figure F3-1: Metrolina Area 2002 Daily Summertime VOC Emissions

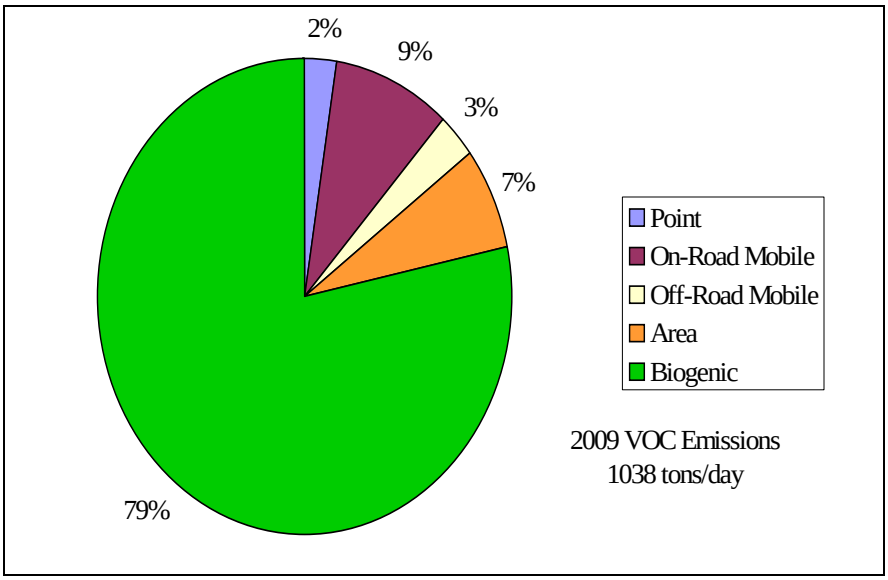

Figure F3-2: Metrolina Area 2009 Daily Summertime VOC Emissions

In the Metrolina nonattainment area, on-road mobile sources contribute only 15 and 9 percent of the 2002 and 2009 total VOC inventories, respectively.

Also noteworthy are the projected decreases in on-road mobile VOC emissions, notwithstanding VMT increases. These reductions are due mainly to the retirement of older vehicles and the growing fleet of Tier 2 vehicles on the roads in future years. Some additional reductions are attributable to North Carolina's Inspection and Maintenance program in the Metrolina area.

A recent modeling sensitivity test was performed by ASIP that allows an analysis of VOC contributions to ozone concentrations in the Southeastern United States. One of the analyses conducted by ASIP is a series of emissions sensitivity modeling runs to quantify the contributions of various emission sources to ozone and fine particles. The modeling system used in this analysis consisted of 3 components: 1) the Penn State University/National Center for Atmospheric Research Mesoscale Model (MM5 version 3.6.1+), 2) the Sparse Matrix Operator Kernel Emissions Modeling System (SMOKE version 2.1), and 3) the Community Multiscale Air Quality (CMAQ version 4.4) model. Model configurations, input data, and modeling methods are consistent with those suggested by the EPA in *Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS*.

The emissions sensitivities are calculated by taking the difference between two air quality model simulations: one with base case emissions and another with reduced emissions inputs. The emissions sensitivity discussed here reduces all anthropogenic VOCs in the modeling domain by 30% from projected 2009 emission levels. Translating this to the Metrolina nonattainment area emissions, this 30% anthropogenic VOC reduction is equivalent to about a 70% reduction of all on-road mobile VOC emissions in the Metrolina nonattainment area for 2009. This emissions sensitivity was run for a 39 day period (June 1-July 9). In all 39 days of the modeling simulation, the 8-hour ozone maximum concentrations were unchanged in the Metrolina nonattainment area - a clear indicator that on-road mobile VOC is an insignificant contributor to ozone formation in that area. In fact, there was not an 8-hour ozone response as high as 1 part per billion (ppb) anywhere in either North or South Carolina during the sensitivity simulation. Figure F3-3 provides an example from the 30% anthropogenic VOC reduction modeling illustrating the lack of ozone response for North and South Carolina.

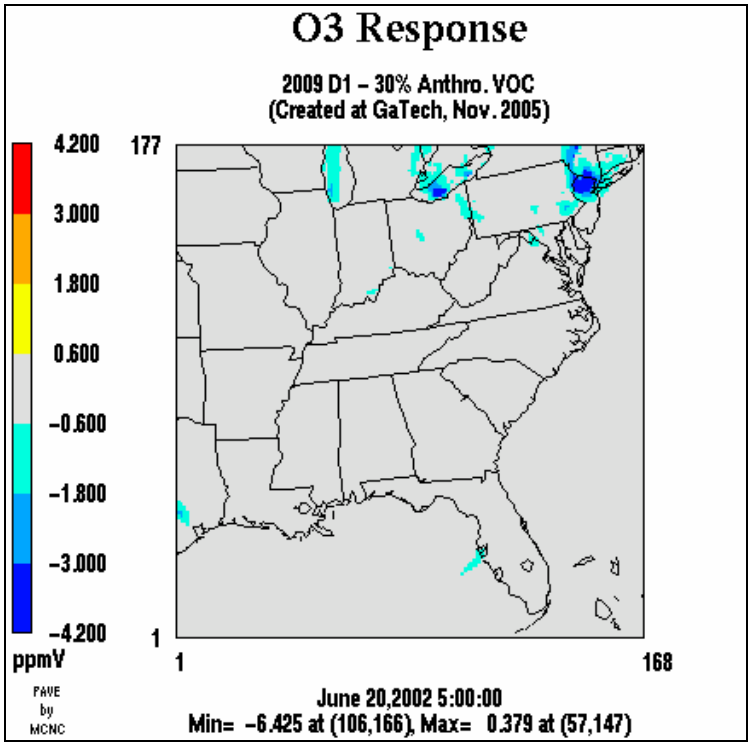

Figure F3-3: 8-hour Ozone response to 30% anthropogenic VOC reductions in 2009

Additional mobile source sensitivity simulations have been conducted by the NCDAQ. Although York County was not included in these model runs, it was determined by NCDAQ and DHEC that the sensitivity simulations would have the same impact in York County. These modeling runs focused specifically on the impact of mobile source VOC emissions on ozone. The sensitivity reduced mobile source VOC by 50% in the North Carolina counties in the Metrolina ozone nonattainment area (Cabarrus, Gaston, Iredell, Lincoln, Mecklenburg, Rowan and Union Counties) in the year 2008. This emissions sensitivity was run for a 7 day period (July 13-19). In all 7 days of the modeling simulation, the 8-hour ozone maximum concentrations were unchanged in the Metrolina nonattainment area, a clear indicator that on-road mobile VOC is an insignificant contributor to ozone formation in that area. Figure F3-4 provides an example of the lack of an 8-hour ozone response from the 50% mobile VOC reduction sensitivity modeling.

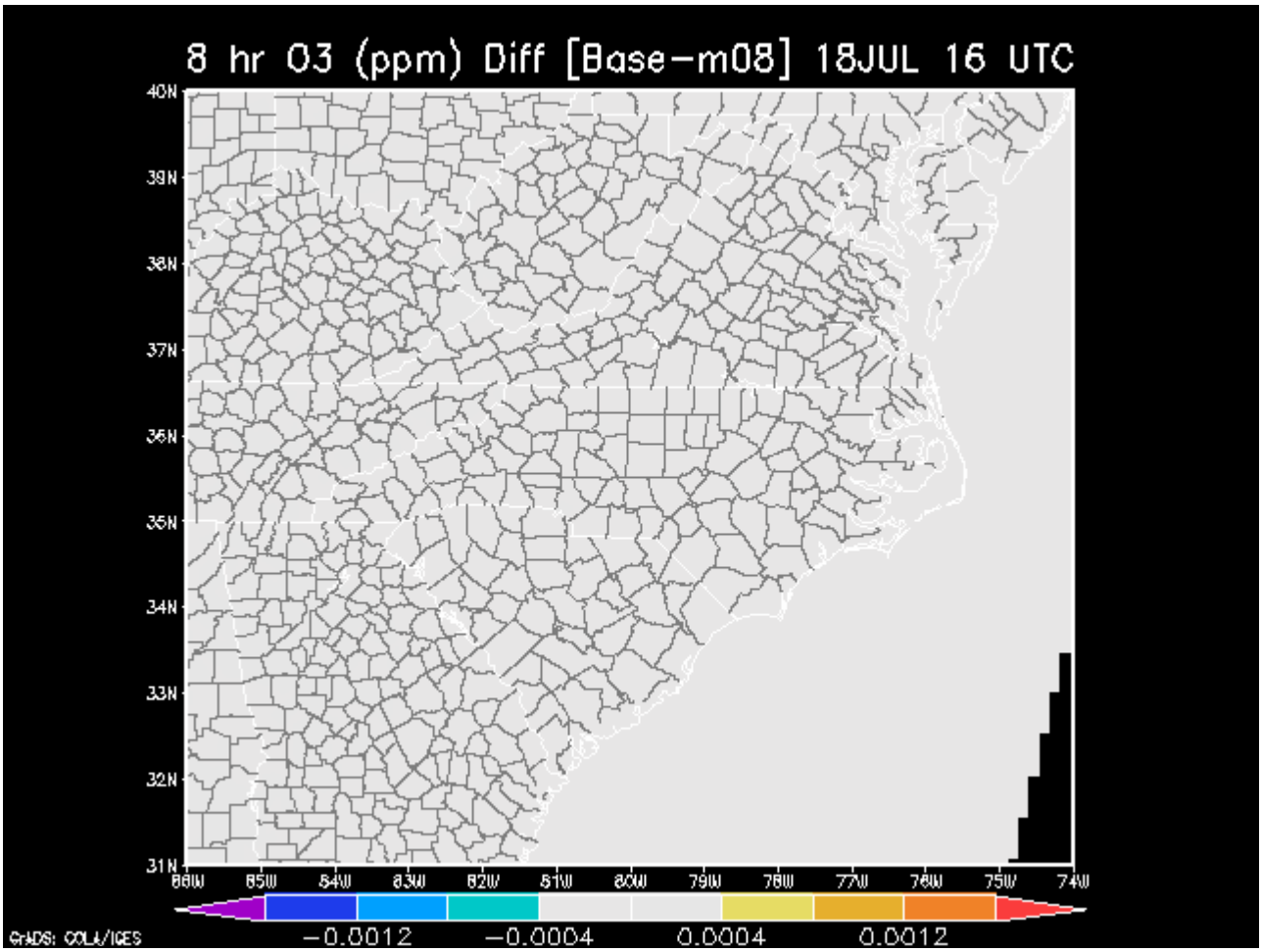

Figure F3-4: 8-hour Ozone Response to 50% mobile VOC decrease in 2008

Based on the information discussed above, the NCDAQ and SCDHEC steadfastly believe on-road mobile VOCs are insignificant contributors to ozone formation in the Metrolina nonattainment area. Emission estimates indicate on-road mobile VOC is a small percentage of the total VOC emissions inventory. On-road mobile VOC emissions are projected to decrease into the future notwithstanding VMT increases. The area is currently below the NAAQS, and emission sensitivity modeling performed by ASIP and the NCDAQ indicates no change in future ozone concentrations when VOC emissions are significantly changed.

Since the NCDAQ considered it unreasonable to expect that the Metrolina nonattainment area would experience enough motor vehicle VOC emissions growth for a future ozone violation to occur, neither the NCDAQ, nor SCDHEC set a MVEB for VOC for the Metrolina nonattainment area in their 2007 SIP submittal. The SCDHEC consulted with its interagency transportation partners prior to reaching this conclusion.

The EPA indicated by email on October 6, 2009, by phone on October 21, 2009 and again by phone on December 9, 2009 that it will not accept the justification presented for VOC insignificance for the Metrolina nonattainment area. **Therefore, the SCDHEC is including a VOC MVEB with this submittal.** Further discussion of the VOC insignificance issue can be found in the supplement to this attainment demonstration.

C. Motor Vehicle Emission Budgets

The MVEBs will be set for the attainment year 2009. By the time the MVEBs are approved by the EPA, the next transportation conformity regional emissions analysis should be for years 2009 and beyond. Therefore, MVEBs will not be set for the baseline year 2002.

Although emissions are usually expressed in terms of tons per day, the MVEBs will be set in terms of kilograms (kg) per day. The reason for the change is because the MOBILE model generates emissions factors in grams per mile. In past conformity exercises, there have been issues with conversion to tons per day, as well as concerns with how MVEBs were rounded to the hundredth place. Setting the MVEBs in kilograms per day will avoid these issues in future conformity determinations. During the development of the MVEBs, the interagency partners for the York County nonattainment area were consulted.

Table F3-4 shows the York County nonattainment area on-road mobile NOx and VOC emissions expressed in tons per day and the corresponding kilograms per day values for 2009.

Table F3-4: 2009 On-Road Mobile Source NO_x and VOC Emissions for the York County Nonattainment Area

	Tons/day	Kg/day
NO_x	8.04	7,299
VOC	4.563	4,141

Upon the EPA's affirmative adequacy finding for the York County nonattainment area MVEBs, as shown in Table F3-5, they will become the applicable MVEBs for the nonattainment portion of York County.

Table F3-5: York County Nonattainment Area NO_x and VOC MVEBs for 2009

	MVEB (Kilograms/day)
NO_x	7,299
VOC	4,141

The supporting data used to develop the MVEBs and the attainment demonstration is consistent. The data used for the attainment demonstration included all of York County, while the data used for the development of the MVEBs was for the nonattainment portion of York County only. Table F3-6 shows a comparison of daily VMT, including the York County VMT from the VISTAS modeling, the estimated VMT assigned to the nonattainment area, and the VMT for the Rock Hill-Fort Mill Area Transportation Study (RFATS) Metropolitan Planning Organization (MPO) obtained through the Metrolina model. The estimated VMT assigned to the York County nonattainment area is based on a percentage of York County's population living in that area. The boundary for the York County nonattainment area is also the area known as the RFATS MPO, therefore, the population was verified by the RFATS MPO. While there is considerable variation in the VMT for the various road types between the models, the total vehicle miles traveled (VMT) from the Metrolina model and the estimated nonattainment area from the VISTAS model are relatively close, at 4.81 million and 4.06 million VMT respectively.

Table F3-6: Comparison of 2009 York County Daily VMT used in the VISTAS(attainment demonstration) and the Metrolina (MVEB) models

Roadway Classifications	VMT for York County (VISTAS)	Estimated VMT for Nonattainment Area (VISTAS)	RFATS VMT (Metrolina)
Rural Interstate	891,084	646,901	852,652
Rural Other Principle Arterial	247,127	179,407	77,925
Rural Minor Arterial	1,063,487	772,060	272,179
Rural Major Collector	594,593	431,657	242,554
Rural Minor Collector	103,452	75,103	27,445
Rural Local	298,868	216,970	174,246
Urban Interstate	749,844	544,365	791,164
Urban Freeway & Expressway	36,449	26,461	79,101
Urban Other Principal Arterial	2,607,735	1,893,140	990,378
Urban Minor Arterial	425,266	308,731	721,849
Urban Collector	279,561	202,953	218,491
Urban Local	86,647	62,904	363,495
Total	5,601,945	4,066,850	4,811,481

V. MOBILE6.2 DATA USED IN SETTING THE MVEBS

A. MOBILE Input Files

**********HEADER SECTION**********

YORK SIP - INTERAGENCY

MOBILE6 INPUT FILE :
POLLUTANTS : HC NOX
WITH FIELDNAMES :
SPREADSHEET :
RUN DATA :

**********RUN SECTION #1**********
MIN/MAX TEMP : 66.0 92.0
FUEL RVP : 9.0
NO REFUELING :

**********SCENARIO SECTION #1*********
SCENARIO RECORD : YORK COUNTY 2009 - RURAL INTERSTATE
CALENDAR YEAR : 2009
EVALUATION MONTH : 7
AVERAGE SPEED : 61.4 FREEWAY

**********SCENARIO SECTION #2**********
SCENARIO RECORD : YORK COUNTY 2009 - RURAL PRINCIPAL ARTERIAL
CALENDAR YEAR : 2009
EVALUATION MONTH : 7
AVERAGE SPEED : 46.8 ARTERIAL

**********SCENARIO SECTION #3**********
SCENARIO RECORD : YORK COUNTY 2009 - RURAL MINOR ARTERIAL
CALENDAR YEAR : 2009
EVALUATION MONTH : 7
AVERAGE SPEED : 43.8 ARTERIAL

**********SCENARIO SECTION #4*********
SCENARIO RECORD : YORK COUNTY 2009 - RURAL MAJOR COLLECTOR
CALENDAR YEAR : 2009
EVALUATION MONTH : 7
AVERAGE SPEED : 39.1 ARTERIAL

**********SCENARIO SECTION #5**********
SCENARIO RECORD : YORK COUNTY 2009 - RURAL MINOR COLLECTOR
CALENDAR YEAR : 2009
EVALUATION MONTH : 7
AVERAGE SPEED : 24.3 ARTERIAL

**********SCENARIO SECTION #6**********
SCENARIO RECORD : YORK COUNTY 2009 - RURAL LOCAL
CALENDAR YEAR : 2009
EVALUATION MONTH : 7
VMT BY FACILITY : YKFVMT.DEF

**********SCENARIO SECTION #7**********
SCENARIO RECORD : YORK COUNTY 2009 - URBAN INTERSTATE
CALENDAR YEAR : 2009
EVALUATION MONTH : 7
AVERAGE SPEED : 60.8 FREEWAY

**********SCENARIO SECTION #8**********
SCENARIO RECORD : YORK COUNTY 2009 - URBAN FREEWAY-EXPRESSWAY
CALENDAR YEAR : 2009
EVALUATION MONTH : 7
AVERAGE SPEED : 39.0 FREEWAY

**********SCENARIO SECTION #9**********
SCENARIO RECORD : YORK COUNTY 2009 - URBAN PRINCIPAL ARTERIAL
CALENDAR YEAR : 2009
EVALUATION MONTH : 7
AVERAGE SPEED : 35.3 ARTERIAL

**********SCENARIO SECTION #10**********
SCENARIO RECORD : YORK COUNTY 2009 - URBAN MINOR ARTERIAL
CALENDAR YEAR : 2009
EVALUATION MONTH : 7
AVERAGE SPEED : 35.2 ARTERIAL

**********SCENARIO SECTION #11*********
SCENARIO RECORD : YORK COUNTY 2009 - URBAN COLLECTOR
CALENDAR YEAR : 2009
EVALUATION MONTH : 7
AVERAGE SPEED : 25.6 ARTERIAL

**********SCENARIO SECTION #12**********
SCENARIO RECORD : YORK COUNTY 2009 - URBAN LOCAL
CALENDAR YEAR : 2009
EVALUATION MONTH : 7
VMT BY FACILITY : YKFVMT.DEF

END OF RUN :

B. MOBILE Output Files

****
* MOBILE6.2.03 (24-Sep-2003) *
* Input file: MVEBLOC.IN (file 1, run 1). *
****
M603 Comment:
User has disabled the calculation of REFUELING emissions.

* #
* YORK COUNTY 2009 - RURAL INTERSTATE
* File 1, Run 1, Scenario 1.
* #

M515 Warning:
The combined freeway and ramp average speed entered
cannot be greater than 60.7 miles per hour.
The average speed will be reset to this value.
M582 Warning:
The user supplied freeway average speed of 60.7
will be used for all hours of the day. 100% of VMT
has been assigned to a fixed combination of freeways
and freeway ramps for all hours of the day and all
vehicle types.
M 48 Warning:
there are no sales for vehicle class HDGV8b

Calendar Year: 2009
Month: July
Altitude: Low
Minimum Temperature: 66.0 (F)
Maximum Temperature: 92.0 (F)
Absolute Humidity: 75. grains/lb
Nominal Fuel RVP: 9.0 psi
Weathered RVP: 8.6 psi
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:	<6000	>6000	(All)							
VMT Distribution:	0.3597	0.3800	0.1306		0.0360	0.0003	0.0019	0.0860	0.0055	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.680	0.711	1.170	0.828	0.720	0.180	0.374	0.276	2.88	0.734
Composite NOX :	0.649	0.827	1.211	0.925	3.065	0.815	1.263	12.390	1.62	1.893

* #
* YORK COUNTY 2009 - RURAL PRINCIPAL ARTERIAL
* File 1, Run 1, Scenario 2.
* #
M583 Warning:
The user supplied arterial average speed of 46.8
will be used for all hours of the day. 100% of VMT
has been assigned to the arterial/collector roadway
type for all hours of the day and all vehicle types.
M 48 Warning:
there are no sales for vehicle class HDGV8b

Calendar Year: 2009
Month: July
Altitude: Low
Minimum Temperature: 66.0 (F)
Maximum Temperature: 92.0 (F)
Absolute Humidity: 75. grains/lb
Nominal Fuel RVP: 9.0 psi
Weathered RVP: 8.6 psi
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:	<6000	>6000	(All)							
VMT Distribution:	0.3597	0.3800	0.1306		0.0360	0.0003	0.0019	0.0860	0.0055	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.728	0.753	1.258	0.882	0.781	0.188	0.391	0.297	2.33	0.780
Composite NOX :	0.612	0.773	1.146	0.868	2.758	0.492	0.762	7.076	1.21	1.380

* #
* YORK COUNTY 2009 - RURAL MINOR ARTERIAL
* File 1, Run 1, Scenario 3.
* #
M583 Warning:
The user supplied arterial average speed of 43.8
will be used for all hours of the day. 100% of VMT
has been assigned to the arterial/collector roadway
type for all hours of the day and all vehicle types.
M 48 Warning:
there are no sales for vehicle class HDGV8b

Calendar Year: 2009
Month: July
Altitude: Low
Minimum Temperature: 66.0 (F)
Maximum Temperature: 92.0 (F)
Absolute Humidity: 75. grains/lb
Nominal Fuel RVP: 9.0 psi
Weathered RVP: 8.6 psi
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No

Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:	<6000	>6000	(All)							
VMT Distribution:	0.3597	0.3800	0.1306		0.0360	0.0003	0.0019	0.0860	0.0055	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.743	0.764	1.279	0.896	0.808	0.193	0.401	0.311	2.35	0.794
Composite NOX :	0.607	0.766	1.137	0.861	2.699	0.469	0.725	6.737	1.18	1.342

* #
* YORK COUNTY 2009 - RURAL MAJOR COLLECTOR
* File 1, Run 1, Scenario 4.
* #

M583 Warning:
The user supplied arterial average speed of 39.1
will be used for all hours of the day. 100% of VMT
has been assigned to the arterial/collector roadway
type for all hours of the day and all vehicle types.

M 48 Warning:
there are no sales for vehicle class HDGV8b

Calendar Year: 2009
Month: July
Altitude: Low
Minimum Temperature: 66.0 (F)
Maximum Temperature: 92.0 (F)
Absolute Humidity: 75. grains/lb
Nominal Fuel RVP: 9.0 psi
Weathered RVP: 8.6 psi
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:	<6000	>6000	(All)							
VMT Distribution:	0.3597	0.3800	0.1306		0.0360	0.0003	0.0019	0.0860	0.0055	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.768	0.782	1.312	0.918	0.858	0.202	0.422	0.339	2.40	0.819
Composite NOX :	0.600	0.754	1.125	0.849	2.606	0.446	0.690	6.408	1.16	1.302

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* YORK COUNTY 2009 - RURAL MINOR COLLECTOR
* File 1, Run 1, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # #
 M583 Warning:
        The user supplied arterial average speed of 24.3
        will be used for all hours of the day.  100% of VMT
        has been assigned to the arterial/collector roadway
        type for all hours of the day and all vehicle types.
 M 48 Warning:
         there are no sales for vehicle class HDGV8b

             Calendar Year:  2009
                   Month:  July
                Altitude:  Low
          Minimum Temperature:  66.0 (F)
          Maximum Temperature:  92.0 (F)
           Absolute Humidity:   75. grains/lb
            Nominal Fuel RVP:   9.0 psi
              Weathered RVP:   8.6 psi
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  No
            Evap I/M Program:  No
               ATP Program:  No
            Reformulated Gas:  No

     Vehicle Type:     LDGV    LDGT12    LDGT34     LDGT     HDGV     LDDV     LDDT     HDDV       MC
All Veh
          GVWR:            <6000    >6000    (All)
                ------   ------   ------   ------   ------   ------   ------   ------   ------   ------
 VMT Distribution:   0.3597   0.3800   0.1306          0.0360   0.0003   0.0019   0.0860   0.0055   1.0000
 ---------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
   Composite VOC :     0.906    0.894    1.511    1.052    1.167    0.260    0.547    0.505     2.78    0.965
   Composite NOX :     0.651    0.796    1.185    0.895    2.317    0.464    0.718    6.665     1.02    1.355
 ---------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* YORK COUNTY 2009 - RURAL LOCAL
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading Hourly Roadway VMT distribution from the following external
* data file: YKFVMT.DEF

 Reading User Supplied ROADWAY VMT Factors
 M 48 Warning:
         there are no sales for vehicle class HDGV8b

             Calendar Year:  2009
```

Month: July
Altitude: Low
Minimum Temperature: 66.0 (F)
Maximum Temperature: 92.0 (F)
Absolute Humidity: 75. grains/lb
Nominal Fuel RVP: 9.0 psi
Weathered RVP: 8.6 psi
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:	<6000	>6000	(All)							
VMT Distribution:	0.3597	0.3800	0.1306	0.0360	0.0003	0.0019	0.0860	0.0055	1.0000	
Composite Emission Factors (g/mi):										
Composite VOC :	1.267	1.203	2.016	1.411	1.931	0.358	0.758	0.786	3.54	1.334
Composite NOX :	0.624	0.752	1.121	0.846	2.090	0.587	0.908	7.885	0.91	1.417

* #
* YORK COUNTY 2009 - URBAN INTERSTATE
* File 1, Run 1, Scenario 7.
* #
M515 Warning:
The combined freeway and ramp average speed entered
cannot be greater than 60.7 miles per hour.
The average speed will be reset to this value.
M582 Warning:
The user supplied freeway average speed of 60.7
will be used for all hours of the day. 100% of VMT
has been assigned to a fixed combination of freeways
and freeway ramps for all hours of the day and all
vehicle types.
M 48 Warning:
there are no sales for vehicle class HDGV8b

Calendar Year: 2009
Month: July
Altitude: Low
Minimum Temperature: 66.0 (F)
Maximum Temperature: 92.0 (F)
Absolute Humidity: 75. grains/lb
Nominal Fuel RVP: 9.0 psi
Weathered RVP: 8.6 psi
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:	<6000	>6000	(All)							
VMT Distribution:	0.3597	0.3800	0.1306	0.0360	0.0003	0.0019	0.0860	0.0055	1.0000	

Composite Emission Factors (g/mi):

Composite VOC :	0.680	0.711	1.170	0.828	0.720	0.180	0.374	0.276	2.88	0.734
Composite NOX :	0.649	0.827	1.211	0.925	3.065	0.815	1.263	12.390	1.62	1.893

* #
* YORK COUNTY 2009 - URBAN FREEWAY-EXPRESSWAY
* File 1, Run 1, Scenario 8.
* #
M582 Warning:
The user supplied freeway average speed of 39.0
will be used for all hours of the day. 100% of VMT
has been assigned to a fixed combination of freeways
and freeway ramps for all hours of the day and all
vehicle types.
M 48 Warning:
there are no sales for vehicle class HDGV8b

Calendar Year: 2009
Month: July
Altitude: Low
Minimum Temperature: 66.0 (F)
Maximum Temperature: 92.0 (F)
Absolute Humidity: 75. grains/lb
Nominal Fuel RVP: 9.0 psi
Weathered RVP: 8.6 psi
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:	<6000	>6000	(All)							
VMT Distribution:	0.3597	0.3800	0.1306	0.0360	0.0003	0.0019	0.0860	0.0055	1.0000	

Composite Emission Factors (g/mi):

Composite VOC :	0.774	0.788	1.321	0.924	0.859	0.203	0.422	0.340	2.40	0.825
Composite NOX :	0.608	0.764	1.140	0.860	2.605	0.446	0.689	7.101	1.16	1.370

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* #
* YORK COUNTY 2009 - URBAN PRINCIPAL ARTERIAL
* File 1, Run 1, Scenario 9.
* #

M583 Warning:
The user supplied arterial average speed of 35.3
will be used for all hours of the day. 100% of VMT
has been assigned to the arterial/collector roadway
type for all hours of the day and all vehicle types.

M 48 Warning:
there are no sales for vehicle class HDGV8b

Calendar Year: 2009
Month: July
Altitude: Low
Minimum Temperature: 66.0 (F)
Maximum Temperature: 92.0 (F)
Absolute Humidity: 75. grains/lb
Nominal Fuel RVP: 9.0 psi
Weathered RVP: 8.6 psi
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:	<6000	>6000	(All)							
VMT Distribution:	0.3597	0.3800	0.1306	0.0360	0.0003	0.0019	0.0860	0.0055		1.0000

Composite Emission Factors (g/mi):

Composite VOC :	0.792	0.799	1.343	0.938	0.911	0.213	0.444	0.369	2.47	0.843
Composite NOX :	0.597	0.748	1.119	0.843	2.531	0.437	0.677	6.287	1.13	1.284

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* #
* YORK COUNTY 2009 - URBAN MINOR ARTERIAL
* File 1, Run 1, Scenario 10.
* #

M583 Warning:
The user supplied arterial average speed of 35.2
will be used for all hours of the day. 100% of VMT
has been assigned to the arterial/collector roadway

type for all hours of the day and all vehicle types.
M 48 Warning:
there are no sales for vehicle class HDGV8b

Calendar Year: 2009
Month: July
Altitude: Low
Minimum Temperature: 66.0 (F)
Maximum Temperature: 92.0 (F)
Absolute Humidity: 75. grains/lb
Nominal Fuel RVP: 9.0 psi
Weathered RVP: 8.6 psi
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:	<6000	>6000	(All)							
VMT Distribution:	0.3597	0.3800	0.1306	0.0360	0.0003	0.0019	0.0860	0.0055	1.0000	
Composite Emission Factors (g/mi):										
Composite VOC :	0.792	0.799	1.344	0.938	0.912	0.213	0.445	0.370	2.47	0.843
Composite NOX :	0.597	0.747	1.119	0.842	2.529	0.437	0.676	6.283	1.13	1.284

* #
* YORK COUNTY 2009 - URBAN COLLECTOR
* File 1, Run 1, Scenario 11.
* #
M583 Warning:
The user supplied arterial average speed of 25.6
will be used for all hours of the day. 100% of VMT
has been assigned to the arterial/collector roadway
type for all hours of the day and all vehicle types.
M 48 Warning:
there are no sales for vehicle class HDGV8b

Calendar Year: 2009
Month: July
Altitude: Low
Minimum Temperature: 66.0 (F)
Maximum Temperature: 92.0 (F)
Absolute Humidity: 75. grains/lb
Nominal Fuel RVP: 9.0 psi
Weathered RVP: 8.6 psi
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:	<6000	>6000	(All)							
VMT Distribution:	0.3597	0.3800	0.1306		0.0360	0.0003	0.0019	0.0860	0.0055	1.0000

Composite Emission Factors (g/mi):

Composite VOC :	0.887	0.878	1.484	1.033	1.125	0.253	0.531	0.484	2.73	0.945
Composite NOX :	0.641	0.786	1.172	0.885	2.342	0.457	0.707	6.567	1.04	1.339

* #
* YORK COUNTY 2009 - URBAN LOCAL
* File 1, Run 1, Scenario 12.
* #

* Reading Hourly Roadway VMT distribution from the following external
* data file: YKFVMT.DEF

Reading User Supplied ROADWAY VMT Factors
M 48 Warning:
there are no sales for vehicle class HDGV8b

Calendar Year: 2009
Month: July
Altitude: Low
Minimum Temperature: 66.0 (F)
Maximum Temperature: 92.0 (F)
Absolute Humidity: 75. grains/lb
Nominal Fuel RVP: 9.0 psi
Weathered RVP: 8.6 psi
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:	<6000	>6000	(All)							
VMT Distribution:	0.3597	0.3800	0.1306		0.0360	0.0003	0.0019	0.0860	0.0055	1.0000

Composite Emission Factors (g/mi):

Composite VOC :	1.267	1.203	2.016	1.411	1.931	0.358	0.758	0.786	3.54	1.334
Composite NOX :	0.624	0.752	1.121	0.846	2.090	0.587	0.908	7.885	0.91	1.417

C. 2009 Metrolina Vehicle Mix

Table F3-7: 2009 Metrolina Model Vehicle Mix

Table F3-7:
2009 Metrolina Vehicle Mix

LDV	LDT1	LDT2	LDT3	LDT4	HDV2B	HDV3	HDV4
HDV5	**HDV6**	**HDV7**	**HDV8a**	**HDV8b**	**HDBS**	**HDBT**	**MC**
Urban Interstate							
0.3418	0.081	0.2696	0.0831	0.0382	0.0581	0.0057	0.0048
0.0036	0.013	0.0154	0.0167	0.0595	0.003	0.0015	0.005
Urban Freeway							
0.3718	0.0881	0.2934	0.0904	0.0416	0.035	0.0034	0.0029
0.0022	0.0078	0.0093	0.0101	0.0358	0.0018	0.0009	0.0055
Urban Principal Arterial							
0.3919	0.0929	0.3092	0.0953	0.0438	0.0292	0.0029	0.0024
0.0018	0.0066	0.0027	0.0029	0.0103	0.0016	0.0008	0.0057
Urban Minor Arterial							
0.3898	0.0924	0.3076	0.0948	0.0436	0.0334	0.0032	0.0027
0.0021	0.0075	0.0024	0.0026	0.0094	0.0018	0.0009	0.0058
Urban Collector							
0.3906	0.0925	0.308	0.0949	0.0436	0.0348	0.0034	0.0028
0.0021	0.0077	0.0019	0.0021	0.0073	0.0017	0.0009	0.0057
Urban Local							
0.3905	0.0925	0.308	0.0949	0.0437	0.0347	0.0034	0.0028
0.0021	0.0077	0.0019	0.0021	0.0073	0.0018	0.0009	0.0057
Rural Interstate							
0.2848	0.0675	0.2247	0.0692	0.0318	0.1019	0.01	0.0084
0.0063	0.0228	0.027	0.0293	0.1043	0.0052	0.0026	0.0042
Rural Principal Arterial							
0.3554	0.0843	0.2805	0.0865	0.0397	0.0453	0.0044	0.0037
0.0028	0.0101	0.0132	0.0144	0.0509	0.0023	0.0012	0.0053
Rural Minor Arterial							
0.3742	0.0886	0.2951	0.0909	0.0418	0.043	0.0042	0.0036
0.0026	0.0096	0.0063	0.0069	0.0244	0.0022	0.0011	0.0055
Rural Major Collector							
0.3784	0.0897	0.2987	0.0921	0.0423	0.0426	0.0042	0.0036
0.0027	0.0095	0.0046	0.005	0.0178	0.0022	0.001	0.0056
Rural Minor Collector							
0.376	0.0889	0.2963	0.0913	0.0419	0.0449	0.0043	0.0037
0.0028	0.0101	0.0052	0.0056	0.0201	0.0023	0.0011	0.0055
Rural Local							
0.3753	0.0889	0.2962	0.0913	0.042	0.0451	0.0044	0.0037
0.0029	0.0102	0.0052	0.0057	0.0201	0.0024	0.0011	0.0055