Appendix J

Mobile Source Emissions Modeling for Macon PM2.5 Attainment Demonstration Motor Vehicle Emissions Budgets

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1.0 Overview

The Georgia Environmental Protection Division (EPD) worked with the Georgia Department of Transportation (GDOT) and the Macon Area Transportation Study (MATS), the Metropolitan Planning Organization (MPO) for Macon, to develop link-level mobile[1] source emissions inventories for the purpose of establishing a motor vehicle emissions budget (MVEB) for the 2009 attainment year for the Macon PM2.5 Attainment State Implementation Plan (SIP) revision, hereinafter called the Macon PM2.5 Attainment Plan. The 2009 emission factors used were based on the single-run, annual-average-conditions approach described in EPA's August 9, 2005, *Guidance for Creating Annual On-Road Mobile Source Emission Inventories for PM2.5 Nonattainment Areas for Use in SIPs and Conformity*.[2] Consistent with that guidance, once this budget is found adequate or approved by EPA, subsequent emissions analyses for transportation conformity will also use the single-run, annual-average-conditions approach used to establish the MVEB. These inventories reflect the most recent planning assumptions and emission factor model available, and the use of an updated travel demand model. The GDOT travel demand and emissions estimation modeling process was employed to estimate mobile source emission inventories to establish the MVEB for the Macon PM2.5 Attainment Plan in a manner consistent with federal regulations for performing regional emissions analyses used in transportation conformity determinations. The alignment of methodologies for MVEB and transportation conformity emissions analyses reduces the possibility of spurious differences between motor vehicle emission budgets and transportation conformity analyses that must conform to those budgets.

Effective April 5, 2005, the U.S. Environmental Protection Agency (EPA) designated Bibb County and part of Monroe County as nonattainment for the annual fine particulate (PM2.5) National Ambient Air Quality Standard. The PM2.5 standard is subject to Subpart 1 of the Clean Air Act., the more general nonattainment area planning and control requirements of the Act. The designation also defined the year 2010 as the deadline for the Macon area to attain the PM2.5 standard; thus requiring 2007 - 2009 air quality modeling to demonstrate attainment of the standard.

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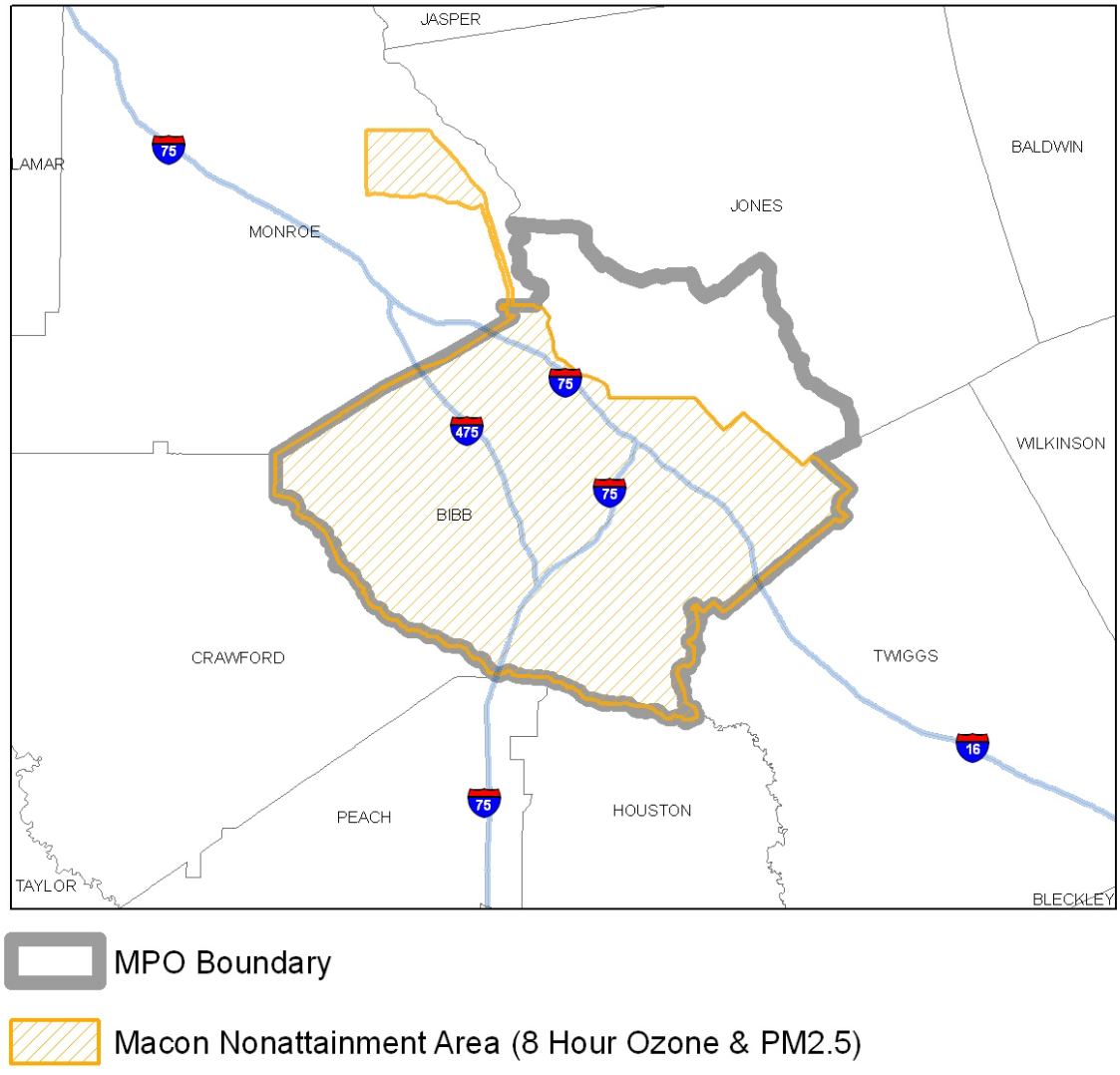
[1] The term "mobile" is used to describe emissions from on-road motor vehicles.

[2] http://epa.gov/otaq/stateresources/transconf/policy/420b05008.pdf

1.1 Planning Boundaries

As the MPO for the Macon urbanized area, MATS is responsible for the continuing, cooperative, and comprehensive metropolitan planning process required by Title 23 U.S.C. 134. Based on the 2000 Census, the Macon MPO boundary includes all of Bibb County plus a portion of Jones County. However, the Macon nonattainment boundary includes all of Bibb County, none of Jones County, and a very small segment of Monroe County. Figure 1.1-1 illustrates the two different boundaries.

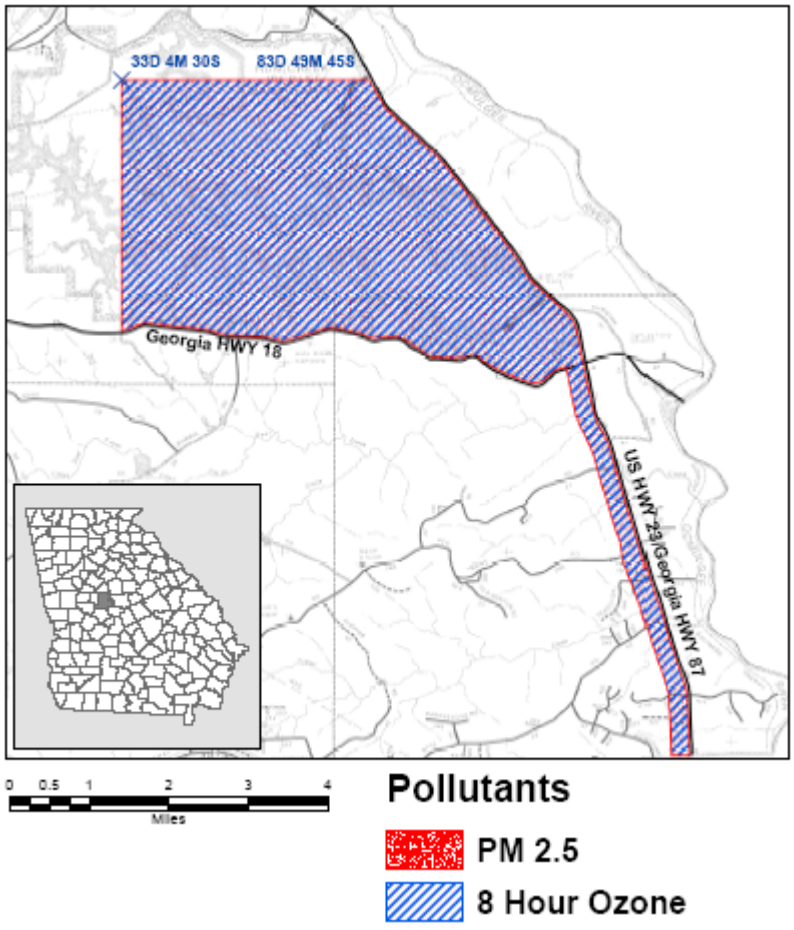
Figure 1.1-1
Macon MPO and Nonattainment Area



An enlargement of the small part of Monroe County designated as nonattainment is shown in Figure 1.1-2. The area encompasses approximately 13.5 square miles and per the 2000 Census contains 69 households and a population of 175. The official nonattainment area description, per the EPA Green Book,[3] is as follows:

> *From the point where Bibb and Monroe Counties meet at U.S. Hwy 23/Georgia Hwy 87 follow the Bibb/Monroe County line westward 150' from the U.S. Hwy 23/Georgia Hwy 87 centerline, proceed northward 150' west of and parallel to the U.S. Hwy 23/Georgia Hwy 87 centerline to 33 degrees, 04 minutes, 30 seconds; proceed westward to 83 degrees, 49 minutes, 45 seconds; proceed due south to 150' north of the Georgia Hwy 18 centerline, proceed eastward 150' north of and parallel to the Georgia Hwy 18 centerline to 1150' west of the U.S. Hwy 23/Georgia Hwy 87 centerline, proceed southward 1150' west of and parallel to the U.S. Hwy 23/Georgia Hwy 87 centerline to the Monroe/Bibb County line; then follow the Monroe/Bibb County line to 150' west of the U.S. Hwy 23/ Georgia Hwy 87 centerline.*

Figure 1.1-2
Detailed Map for Ozone & PM2.5 Nonattainment Area in Monroe County



Based on consultation between representatives from Monroe County and GDOT, it was determined that GDOT would also represent Monroe County on the interagency committee.

[3] www.epa.gov/oar/oaqps/greenbk/7160429.html

Monroe County signed a letter authorizing GDOT to represent their transportation interests throughout the conformity process under both ozone and PM2.5 standards. A copy of the signed letter is in Exhibit 1.

1.2 Emissions Analysis – Models and Assumptions

In accordance with Section 93.105(b) of the Transportation Conformity Rule and Sections 106(g) and 106(h) of Georgia's transportation conformity SIP, all of which require interagency consultation for SIP development, a detailed listing of the procedures and planning assumptions used for the regional emissions analysis supporting development of the MVEB was distributed to the interagency consultation committee for review on December 19, 2007.

The assumptions used to develop Macon's conforming Long Range Transportation Plan and Transportation Improvement Program were also used to develop the additional network and emissions for the Macon PM2.5 Attainment Plan, which required emissions for the year 2009.

The MOBILE6.2 input files reflect all federal and state motor vehicle emission control programs. In addition, the input files were customized to reflect the specific weather conditions and vehicle registration data for the Macon nonattainment area. MOBILE6.2 input files and emission factors for PM2.5 are shown in Exhibits 3 through 6.

2.0 Travel Demand Modeling Procedures

Georgia DOT is responsible for the development and application of the travel demand models for the urban areas outside of Atlanta. This section summarizes the Macon model's key travel demand modeling attributes, listed below, as they relate to the most important factors in estimating emissions.

1. Socio-economic data based on best available information
2. Consistency between transportation alternatives and land use scenarios
3. Modeled volumes validated against observed counts
4. Reasonable agreement between travel times used for trip-distribution and trip assignment
5. Reasonable sensitivity to time, cost and other factors affecting travel choices
6. Capacity-sensitive traffic assignment methodology

Model Attributes 1 & 2 (Socio-Economic Data)

The primary data inputs to travel demand models are socio-economic data, such as population and employment, and transportation networks. Modeling attributes one and two deal specifically with the socio-economic data inputs to the travel demand modeling process.

The first modeling attribute is that the socio-economic data be based on the best available information. In Georgia, each MPO has the responsibility of preparing socio-economic data. Georgia DOT reviews the socio-economic data for reasonableness and accuracy. The data development process and accuracy checks rely on the best available information, such as US

Census data, aerial photography, land use maps, knowledge of proposed new developments and site visits (local knowledge). Other reasonableness and logic checks are made for data at the traffic zone level, such as calculating statistics including population per household, population density and employment density. The MPOs and GDOT work cooperatively, using the best available data, to insure that the data inputs to travel demand models are accurate and reasonable.

The second modeling attribute is that socio-economic data reflect the transportation alternatives being considered. This relates to the fact that improved transportation accessibility can alter land use patterns. However, it is generally accepted that significant improvements in transportation accessibility are necessary to bring about relatively small changes in land use. Due to their complexity, land use models are generally utilized in only a few large metropolitan areas in the United States. Georgia's MPOs, with the exception of Atlanta, do not use land use models. Instead, usually a single forecast for future socio-economic data is made that takes into consideration planned major transportation improvements. Future forecasts are generally made by first developing regional control totals for expected growth. Allocation of expected growth is then done using known development patterns and proposals as the basis, taking into consideration planned infrastructure improvements (new highways, sewer extensions, etc.). If unanticipated major projects are evaluated during the plan update process, a revised forecast may be developed with guidance from the MPO's Technical Coordinating Committee. The population and employment forecasts for the MATS area are listed in Table 2.0-1.

Table 2.0-1
Population and Employment Forecasts for MATS Area
2002 and 2009

	2002	2009
Total Population	167,677	170,171
Number of Households	64,744	66,550
Employment	110,222	117,039

Model Attribute 3 (Model Validation)

The next attribute involves the validation of travel demand models against observed traffic counts. Model validation is the process of insuring travel models produce results that reasonably replicate observed travel patterns. Properly validated models not only replicate observed conditions, but they also use accurate inputs and apply reasonable calculations to do so.

Georgia DOT applied multiple validation checks to each of the major steps in the Macon travel demand modeling process. In addition to socio-economic data checks, both the inputs to and outputs from the models were checked for accuracy and reasonableness during each step of the process. These inputs and outputs include transportation network attributes, trip generation parameters and results, trip distribution parameters and average trip lengths by purpose, auto occupancy rates, and speed-volume relationships.

Highway Networks – Air Quality Attributes

Georgia DOT develops and maintains highway networks with MATS review and assistance. Highway network attributes are reviewed for accuracy using the state roadway characteristics database, aerial photography and site visits / local knowledge. Network link attributes include the HPMS functional classification, so that modeled and observed Vehicle Miles Traveled (VMT) can be compared by county. Networks also include GDOT traffic count station numbers, so counts for the base year model can be included in output networks for validation purposes.

Highway Networks - Speed

Since speeds can be highly important[4] for mobile emissions estimation, GDOT uses reasonable inputs and validates each of the factors that influence speed estimation; particularly the following:

- Roadway capacities
- Free-flow speeds
- Modeled volumes
- Speed-volume relationships

Link Capacities

Georgia DOT's link capacities were developed using the latest Highway Capacity Manual Software with typical parameters for various roadway classes and area types. The density of population and employment is used to classify the intensity of development patterns throughout the study area. The Macon model uses the following seven area types to classify land use.

- (1) - Central Business District (CBD) / High Density Urban
- (2) - Urban Commercial
- (3) - Urban Residential
- (4) - Suburban Commercial
- (5) - Suburban Residential
- (6) - Exurban
- (7) - Rural

Table 2.0-2 displays the hourly capacities per lane utilized in the Macon travel demand model.

[4] PM2.5 emission factors from MOBILE6 do not vary significantly by speed.

Table 2.0-2
Macon Model Hourly Per Lane Capacity Matrix

Per Lane Hourly Capacities by Facility Type (FT) and Area Type (AT)								
AT	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Facility Description**
FT								
1	1900	1950	2000	2050	2100	2060	2020	Interstate
2	1600	1660	1730	1790	1850	1820	1780	Freeway
3	1300	1380	1450	1530	1600	1570	1540	Expressway
4	1170	1240	1310	1370	1440	1410	1380	Parkway
6	1400	1530	1650	1780	1900	1860	1820	Freeway-to-Freeway Ramp
7	900	1030	1150	1280	1400	1370	1340	Entrance Ramp
8	800	810	810	820	820	810	790	Exit Ramp
11	1000	1030	1050	1080	1100	1080	1060	Principal Arterial - Class I
12	900	900	900	900	900	880	860	Principal Arterial - Class II
13	800	810	810	820	820	810	790	Minor Arterial - Class I
14	630	630	640	640	640	630	610	Minor Arterial - Class II
15	760	760	770	770	770	760	740	One-Way Arterial
21	520	530	540	550	560	550	540	Major Collector
22	380	390	390	400	400	390	380	Minor Collector
23	460	470	470	480	480	470	460	One-way Collector
30	340	350	360	370	380	370	360	Local Roads
32	0	0	0	0	0	0	0	Centroids

Free-flow Speeds

Assumed free-flow speeds are approximately 5 mph faster than typical speed limits for the various roadway classes and area types, taking into consideration control for delay (i.e., traffic signals) if applicable. Peak and off-peak free-flow speeds were evaluated using observed speeds obtained from a travel time study conducted in the Augusta area. An analysis of the Augusta data indicated that Augusta's characteristics and data results are appropriate for use in the Macon model since the travel dynamics for these urban areas are very similar. Table 2.0-3 displays the free-flow speeds utilized in the Macon travel demand model.

Table 2.0-3
Macon Model Free-flow Speed Matrix

Speeds by Facility Type (FT) and Area Type (AT)								
AT	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Facility Description**
FT								
1	55	60	60	60	60	70	70	Interstate
2	50	55	55	55	55	60	60	Freeway
3	50	50	50	50	55	55	55	Expressway
4	45	50	50	50	50	55	55	Parkway
6	55	55	55	55	55	55	55	Freeway-to-Freeway Ramp
7	45	50	50	50	50	55	55	Entrance Ramp
8	22	23	30	31	34	40	48	Exit Ramp
11	22	28	33	34	37	47	52	Principal Arterial - Class I
12	23	26	31	32	35	45	49	Principal Arterial - Class II
13	22	23	30	31	34	40	47	Minor Arterial - Class I
14	21	22	27	30	32	38	45	Minor Arterial - Class II
15	23	26	30	32	35	42	48	One-Way Arterial
21	17	18	21	27	29	34	42	Major Collector
22	14	15	18	24	26	30	40	Minor Collector
23	17	18	21	27	29	34	42	One-way Collector
30	14	14	17	18	22	28	35	Local Roads
32	14	14	17	18	22	28	35	Centroids

Modeled Volumes

Output modeled volumes are validated against traffic counts at several levels – regional, corridors and link-by-link. Regional evaluations include VMT, Root Mean Squared Error and R-Squared calculations. Corridor evaluations are primarily screenline and cutline comparisons. Nationally recognized maximum desirable deviation standards are applied to analyze model performance at the link level.

Base year external station volumes are based directly on observed traffic counts at each location. Future year external station volumes are estimated from historical trends in traffic counts at each location. Extrapolated future external station volumes are refined to insure use of reasonable annual compounded growth rates.

Speed-Volume Relationships

Georgia DOT uses speed-volume relationships that are different for various roadway types and area types. The speed-volume curves are calibrated to accurately reflect observed traffic volumes, while retaining sensible shapes to insure reasonable congested speeds. Peak-period speed data obtained from the GDOT travel time study was used as a reasonableness check in calibrating GDOT speed-volume curves.

Trip Generation

The GDOT trip generation process primarily uses parameters from the Augusta household survey, the Quick Response Freight Manual and US Census data. Minor adjustments are made to GDOT standard procedures to reflect unique characteristics in each area being modeled (e.g.,

port, military bases, etc.). Various validation checks are made to insure that trip generation results are reasonable. National data sources are used as reasonableness checks for trip generation results.

Trip Distribution
Trip distribution parameters are calibrated to produce reasonable average trip lengths. Expected average trip lengths are estimated from Census Journey-to-Work data and the population and geographic size of the modeled area. Travel times from trip assignment are used as input to trip distribution (i.e., feedback), which strengthens the validity of the modeled trip lengths.

Model Attribute 4 (Feedback of Travel Times)
The Macon model insures that there is reasonable agreement between travel times used for trip distribution and trip assignment by implementing a feedback loop. Within the feedback loop, all model steps from trip distribution to trip assignment are repeated until trip tables and link volumes change very little from one loop to the next. The Macon model includes closure criteria for determining whether there is "reasonable agreement" in travel times for trip distribution and trip assignment. Closure is obtained if both of the following criteria are met:

- Less than 5% of O-D[5] pair travel times change by more than 5% (weighted by the O-D pair trips)
- Less than 5% of links have volume changes of more than 5%

The Method of Successive Averages is used to insure that the model reaches stable conditions.

Model Attribute 5 (Mode Choice)
The fifth modeling attribute calls for mode choice models to be reasonably sensitive to changes in travel times and costs. The Macon travel demand model utilizes a trip-end based procedure that determines transit-oriented person trips before the region's person trips are converted to vehicle trips. This trip-end model estimates transit patronage based on socio-economic characteristics such as income or auto-ownership, rather than transportation system characteristics.

Model Attribute 6 (Traffic Assignment)
The sixth modeling attribute calls for the use of capacity sensitive assignment procedures. The Macon model uses equilibrium assignment procedures. The assignment algorithm is a hybrid of a 24-hour assignment and time-of-day assignments. The Macon model was validated using 24-hour counts and modeled volumes.

2.1 Travel Demand Modeling Post-Processing Procedures

The Macon regional travel demand model produces daily estimates of VMT and vehicle hours traveled (VHT) and a peak hour speed for each link in the highway network. In order to account for travel conditions throughout the day, VMT estimates and speeds by the four time-of-day periods listed below were produced. This is to ensure that the procedures used in estimating

[5] (origin-destination)

emissions for the Macon model area are consistent with the procedures used for emissions modeling (including conformity analyses) in the other nonattainment areas in Georgia.

- AM Period – (6:00 am – 10:00 am) – 4 hours
- Midday Period – (10:00 am – 3:00 pm) – 5 hours
- PM Period – (3:00 pm – 7:00 pm) – 4 hours
- Night Period – (7:00 pm – 6:00 am) – 11 hours

The stratification of the VMT and speeds by time-of-day provides more detailed information to use in estimating emissions. The following sections describe the procedures used to produce VMT and speeds by the four time-of-day periods from the daily assignment for input to the emissions modeling.

VMT Estimation By Time-of-Day

In order to develop the information necessary to perform time-of-day emissions modeling, post-processing of the output from the travel demand model was required. Factors derived from the National Cooperative Highway Research Program (NCHRP) Report 187 – *Quick Response Urban Travel Estimation Techniques and Transferable Parameters – User's Guide* were used to develop VMT estimates by time of day from the daily estimates. The factors in Table 2.1-1 below, from NCHRP Report 187 Table 22 – Hourly Distribution on Internal Auto Driver Travel by Trip Purpose: Urbanized area Population, 100,000 – 250,000, were used.

Table 2.1-1
Hourly Distribution on Internal Auto Driver Travel

Hour #	Hour	All Trip Purposes
0	Midnight	0.80
1	1 AM	0.40
2	2 AM	0.20
3	3 AM	0.10
4	4 AM	0.40
5	5 AM	1.00
6	6 AM	4.30
7	7 AM	8.20
8	8 AM	4.60
9	9 AM	4.10
10	10 AM	4.70
11	11 AM	4.90
12	Noon	6.30
13	1 PM	5.40
14	2 PM	5.80
15	3 PM	7.20
16	4 PM	9.90
17	5 PM	9.50
18	6 PM	5.70
19	7 PM	5.40
20	8 PM	4.10
21	9 PM	3.00
22	10 PM	2.20
23	11 PM	1.80
		100.00

The percent of trips occurring in each time period was estimated from Table 2.1-1 by summing the appropriate hourly values. This results in the following factors:

- AM Period – 21.2%
- Midday Period – 27.1%
- PM Period – 32.3%
- Night Period – 19.4%

Time-of-day volumes were estimated by multiplying the daily volumes by these factors. VMT by time-of-day could then be derived from the time period volumes and link distances.

Speed By Time-of-Day

Since highway speeds vary over the course of a day (due to changes in traffic volume), it is necessary to estimate traffic peaking patterns before speeds by time-of-day can be estimated from a daily travel demand model. To represent peaking characteristics within each period either volumes or capacities must be adjusted. In this case, capacities were adjusted. Time period

capacity factors were derived using the factors in Table 2.1-1. Capacity factors for each period were estimated as:

*Peaking Factor = % Trips in Period / (Maximum Hourly % in Period * Hours in Period)*

A period Capacity Factor was then calculated as:
*Capacity Factor = Hours in Period * Peaking Factor*

A capacity for each period could then be calculated as:
*Period Capacity = Hourly Capacity * Capacity Factor*

Table 2.1-2 shows the capacity factors that were derived from the hourly factors in Table 2.1-1.

Table 2.1-2
Time of Day Capacity Factors

Period	Hours of Period	Max Percentage per Period	Peaking Factor	Capacity Factors	% of Capacity
AM	4	8.2	0.6463	2.6	18.8
MD	5	6.3	0.8603	4.3	31.3
PM	4	9.9	0.8157	3.3	23.7
NT	11	5.4	0.3266	3.6	26.1

Link volume-capacity ratios were calculated for each period using the estimated volumes by time period and the capacity by time period. Congested speeds by period were then estimated using the speed-delay curves from the Macon travel demand model.

The VMT from the travel demand model was then adjusted based on the VMT estimates that GDOT develops for the Highway Performance Monitoring System (HPMS). According to Section 3.4.2.4 of EPA's "Volume IV" guidance,[6] "[T]he detailed VMT estimates produced by the transportation planning process should be made consistent in the aggregate with HPMS." Consistent with this long-standing SIP guidance, Section 93.122(b)(3) of the Transportation Conformity Rule, Procedures for Determining Regional Transportation Related Emissions, says:

> *"Highway Performance Monitoring System (HPMS) estimates of vehicle miles traveled (VMT) shall be considered the primary measure of VMT within the portion of the nonattainment or maintenance area and for the functional classes of roadways included in HPMS.... For areas with network-based travel models, a factor (or factors) may be developed to reconcile and calibrate the network-based travel model estimates of VMT in the base year of its validation to the HPMS estimates for the same period. These factors may then be applied to model estimates of future VMT."*

[6] *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources*, EPA-420-R-92-009, US EPA, Office of Air and Radiation, Office of Mobile Sources, 1992, http://www.epa.gov/otaq/invntory/r92009.pdf.

There has been a history in Georgia of adjusting the VMT from the regional travel demand model with the HPMS VMT by functional classification rather than "in the aggregate." This procedure is used in the preparation of mobile source emissions for SIPs and conformity determinations in Georgia nonattainment areas.

The EPA guidance issued in August 2005, *Guidance for Creating Annual On-Road Mobile Source Emission Inventories for PM2.5 Nonattainment Areas for Use in SIPs and Conformity*, identified several approaches for preparing PM2.5 emissions. The guidance also specified that the interagency consultation process should be used to determine which approach is most appropriate for the area. The Macon interagency consultation group agreed to the *Single-Run Approach* recommended by EPD and GDOT for establishing the MVEB and performing subsequent conformity analyses. This methodology involves a single set of modeling runs, using MOBILE6.2 emission factors reflecting annual average inputs for each analysis year, and annual average VMT. HPMS adjustment factors were developed based on the average annual daily HPMS VMT for the year 2002 for the Macon travel demand model area. The year 2002 was used because this is the base year for the calibration and validation of the regional travel demand model. The HPMS adjustment reconciles the average annual daily travel conditions at the functional class level to the travel demand model link-based VMT. The following equation was used to calculate the HPMS adjustment factors:

$$HPMS\ Adjustment\ Factor_i = (2002\ HPMS\ VMT_i / 2002\ Model\ VMT_{i)}$$

where $_i$ *= HPMS functional class)*

To determine the "2002 HPMS VMT" adjustment factors, the average annual daily VMT for the year 2002 was summarized by the 12 HPMS functional classifications from the Georgia Department of Transportation's Office of Transportation Data "445 Report." The data was summarized for the Macon MPO area which consists of all of Bibb County and a portion of Jones County. The 445 Report summarizes the mileage and VMT by function classification by county. Since only a portion of Jones County was included in the Macon regional travel demand model, adjustments to the HPMS VMT summaries for Jones County had to be performed. The highway mileage for Jones County by functional classification was summarized for the area within the Macon model and compared to the county total summary. A factor was developed based on the percent of the highway mileage within the model compared to the total mileage for the county by functional classification. This factor was then applied to the average daily HPMS VMT by functional classification to determine the average annual daily VMT to be used in the HPMS VMT adjustment process. Table 2.1-3 lists the highway mileage and average annual daily VMT for the entire Jones County and for the portion of the county that is included in the regional travel demand model.

Table 2.1-3
Highway Mileage and Average Annual Daily VMT for Jones County

		Highway Mileage		Average Annual Daily VMT	
Functional Class Name	**Functional Class No.**	**Macon 2002 Model**	**GDOT HPMS**	**Whole County**	**Modeled Portion**
Rural Interstate	1	0.00	0.00	0	0
Rural Principal Arterial	2	2.22	2.39	19,295	18,015
Rural Minor Arterial	6	5.87	57.54	462,858	47,219
Rural Major Collector	7	17.55	68.06	116,019	29,917
Rural Minor Collector	8	7.11	46.32	77,330	11,870
Rural Local	9	37.34	328.39	120,493	13,701
Urbanized Interstate	11	0.00	0.00	0	0
Urban Freeway	12	0.00	0.00	0	0
Urbanized Principal Arterial	14	2.77	3.00	47,040	43,434
Urbanized Minor Arterial	16	2.19	2.56	13,057	11,170
Urbanized Collector	17	4.19	4.05	7,496	7,755
Urbanized Local	19	9.88	32.46	39,277	11,955
		89.12	544.77	902,965	195,035

Table 2.1-4 lists the daily HPMS VMT for the Macon MPO area from the travel demand model.

Table 2.1-4
Summary of 2002 Daily VMT for Macon MPO Area
(from the MATS travel demand model)

Functional Class Name	Functional Class No.	Bibb County	Jones County	Total
Rural Interstate	1	313,391	0	313,391
Rural Principal Arterial	2	15,619	18,015	33,634
Rural Minor Arterial	6	130,819	47,219	178,038
Rural Major Collector	7	129,243	29,917	159,160
Rural Minor Collector	8	14,521	11,870	26,391
Rural Local	9	81,778	13,701	95,479
Urbanized Interstate	11	1,694,897	0	1,694,897
Urban Freeway	12	0	0	0
Urbanized Principal Arterial	14	811,270	43,434	854,704
Urbanized Minor Arterial	16	1,136,102	11,170	1,147,272
Urbanized Collector	17	275,297	7,755	283,052
Urbanized Local	19	449,707	11,955	461,662
Grand Total		5,052,644	195,036	5,247,680

Table 2.1-5 lists the adjustment factors based on the comparison between the HPMS average annual daily VMT and the VMT from the regional travel demand model. These factors were applied to the VMT on each link in the highway network based on the functional classification for the year 2009.

Table 2.1-5
HPMS VMT Average Annual Daily Adjustment Factors for Macon MPO Area

Functional Class Name	Functional Class No.	2002 HPMS VMT	2002 Model VMT	Adjustment Factor
Rural Interstate	1	300,515	313,391	0.96
Rural Principal Arterial	2	29,388	33,634	0.87
Rural Minor Arterial	6	172,736	178,038	0.97
Rural Major Collector	7	154,611	159,160	0.97
Rural Minor Collector	8	49,320	26,391	1.87
Rural Local	9	124,146	95,479	1.30
Urbanized Interstate	11	1,666,302	1,694,897	0.98
Urban Freeway	12	-	-	-
Urbanized Principal Arterial	14	843,711	854,704	0.99
Urbanized Minor Arterial	16	1,161,237	1,147,272	1.01
Urbanized Collector	17	266,565	283,052	0.94
Urbanized Local	19	728,590	461,662	1.58
Grand Total		5,497,121	5,247,680	1.05

The HPMS adjustment factors were developed for the entire Macon MPO which includes a portion of Jones County to reflect the travel activity for the entire area. However, because Jones County is not part of the nonattainment area, only the travel within Bibb County was used in the preparations of emissions for conformity determination. Table 2.1-6 shows the adjusted modeled VMT for Bibb County used in the emissions modeling procedures.

Table 2.1-6
Average Annual Daily Modeled VMT for Bibb County
(As adjusted per Table 2.1-5)

Year	VMT
2009	6,028,078

2.2 Development of Mobile Source Emission Factors

The mobile source emission factors used for the Macon emissions analysis reflect all federal and state mobile source control rules, including federal tailpipe standards and gasoline sulfur and volatility limits.

To prevent transportation conformity problems, the emission rates used in preparation of emission inventories for SIP MVEB development and transportation conformity analysis must be consistent. Interagency consultation helps to assure consistency between the two procedures. The MOBILE6 input parameters for the Macon PM2.5 Attainment Plan mobile source emissions modeling were established through interagency consultation and are listed below:

- Emission Factor Model: MOBILE6.2.03
- Single-Run Approach, per EPA's *Guidance for Creating Annual On-Road Mobile Source Emission Inventories for PM2.5 Nonattainment Areas for Use in SIPs and Conformity*, dated August 9, 2005
- MOBILE6 Inputs
  - Temperature and relative humidity
    - Annual averages of the hourly averages for each hour of each month for the years 2000-2002
  - Barometric pressure
    - Annual average of the daily average for each month for the years 2000-2002
  - Fuel RVP[7] and sulfur
    - Bibb County
      - Average of 2009 monthly values for Bibb County in the National Mobile Inventory Model (NMIM) default database
    - Monroe County
      - Average of 2009 monthly values for Monroe County in an NMIM database modified for EPD by Eastern Research Group, Inc., in May 2007 to reflect updated gasoline survey data
  - 2002 regional fleet age distribution[8]
    - Derived from R.L. Polk & Co. registration data for the five counties in the Macon metropolitan statistical area: Bibb, Crawford, Jones, Monroe, and Twiggs
    - Applied to 15 of the 16 MOBILE6.2.03 composite vehicle classifications - LDV, LDT1, LDT2, LDT3, LDT4, HDV2B, HDV3, HDV4, HDV5, HDV6, HDV7, HDV8A, HDBS, HDBT, MC
      - Default for HDV8B
  - Default VMT fractions

The regional fleet age distribution is documented in more detail in Exhibit 2. MOBILE6.2.03 is the latest version of EPA's motor vehicle emissions model. MOBILE6 produces emissions for four types of "driving cycles" – arterials/collectors, freeways/interstates, ramps, and local roads. It is assumed that all VMT by highway motor vehicles will occur in one of these four driving cycles. In MOBILE6, each driving cycle reflects different assumptions about vehicle activity and different emission estimates. The definitions of the different driving cycles from EPA's *Technical Guidance on the Use of MOBILE6.2 for Emission Inventory Preparation*[9] are provided

[7] Reid vapor pressure, a measure of gasoline volatility

[8] Registration data was from R. L. Polk & Co.'s National Vehicle Population Profile ® current as of October 2002 and from R.L. Polk & Co.'s TIPNet ® current as of March 2003. See Exhibit 2 for more details on this registration distribution by age.

[9] http://www.epa.gov/otaq/models/mobile6/420r04013.pdf

below.

Freeway Driving Cycle

In MOBILE6, "freeway" VMT refers to driving that occurs on roadways that do not have traffic signals, that usually have limited access (via converging ramps) and have free flow speeds greater than 50 miles per hour. These roadways are usually divided and have more than one lane in each direction. This definition does not include short sections (less than two miles) of a roadway between signals, but could include longer roadway segments that effectively act as freeways.

Arterials/Collector Driving Cycle

In MOBILE6, "arterial/collector" VMT refers to driving that occurs on roadways that have signalized traffic control. These roadways are not freeways, because they have traffic signals, but they may be divided, multiple-lane, one-way, and have high free-flow speeds. However, traffic will be stopped periodically by traffic signals and will be further affected by access to the roadway by driveways and un-signalized intersections. Even in free flow, the driving on arterial/collector roadways will be characterized by cruising periods interrupted by traffic signals.

Local Roadway Driving Cycle

In MOBILE6, "local roadway" VMT refers to driving on roadways that are not normally considered as part of the traffic network. These roadways rarely have traffic lights or more than one lane in each direction. They usually allow vehicle parking on the roadway surface and traffic control is handled via stop/yield signs. Speed limits are normally 30 miles per hour or less. The driving cycle used in MOBILE6 to model local roadways is fixed at an average speed of 12.9 miles per hour. Driving on local roadways is characterized by extremely low speeds and frequent stops at intersections.

Freeway Ramp

In MOBILE6, "freeway ramp" VMT refer to the access roadways for freeways. It includes both traffic movements entering and exiting the freeway. Driving on freeway ramps is characterized by rapid acceleration from stop or low speeds to freeway speeds and decelerations from freeway speeds to low speeds or stop. Freeway ramp activity is not included in the MOBILE6 freeway roadway definition. Therefore, all freeway activity must include a corresponding freeway ramp activity to account for acceleration and deceleration to and from freeway speeds.

Many areas do not explicitly account for freeway ramps as a separate roadway type so EPA developed a default fraction in MOBILE6 to account for this. This procedure does not need to be utilized for Macon's emission estimates because freeway ramps have been explicitly defined in the highway network. Freeway ramps have been defined as separate facilities stratified by the type of design and speed, high, medium, and low. High speed ramps are those that connect freeway to freeway travel, such as I-75 to I-16, while the lower speed ramps are for access to a freeway from an arterial or egress from a freeway to an arterial. The high speed ramps in the Macon network have significantly higher free-flow speeds than the lower speed ramps and are not characterized by rapid acceleration, or deceleration from freeway speeds to low speeds or stops. Based on guidance from EPA, emissions for high speed freeway ramps are estimated

using the freeway emission factors while emissions for lower speed freeway ramps are estimated using the freeway ramp emission factors.

In MOBILE6, only emissions for arterials/collectors and freeways/interstates are speed sensitive.[10] Emission factors are produced for 2.5 miles per hour and in one mile per hour increments between 3 and 65 for these two roadway types. The emission factors estimated for ramps are based on a default average speed of 34.6 mph, and for local roads on a default average speed of 12.9 mph.

The mapping of FHWA highway functional system classifications to the appropriate MOBILE6 driving cycle used for this modeling is listed in Table 2.2-1.

Table 2.2-1
Listing of FHWA Highway Functional Classifications
Mapped to MOBILE6 Driving Cycles

FHWA Highway Functional System	MOBILE6 Driving Cycle
Rural interstate	Freeway and freeway ramp
Rural other principal arterial	Freeway and freeway ramp
Rural minor arterial	Arterial/collector
Rural major collector	Arterial/collector
Rural minor collector	Arterial/collector
Rural local	Local
Urban interstate	Freeway and freeway ramp
Urban other freeways	Freeway and freeway ramp
Urban other principal arterial	Arterial/collector
Urban minor arterial	Arterial/collector
Urban collector	Arterial/collector
Urban local	Local

EPA believes that facilities with the HPMS classification of Rural Other Principal Arterial (HPMS code 2) should use a combination of the freeway and ramp emission factors. Per section 4.2.3 of *Technical Guidance on the Use of MOBILE6.2 for Emission Inventory Preparation*, "By default in MOBILE6.2, 8% of VMT in any freeway and freeway ramp category will be the freeway ramp VMT." The remaining 92% is freeway VMT. These default assumptions were used in calculating emissions for Rural Other Principal Arterials. This is the only case in the Macon emissions modeling where a combination of emission factors by type is used for the same functional classification.

Exhibit 3 contains abbreviated[11] MOBILE6 inputs for calculating the 2009 Bibb County emission factors at 2.5 mph. Exhibit 4 contains the MOBILE6 input used for the Monroe County emissions modeling. The emission factors by driving cycle and speed are listed in Exhibits 5 and 6.

[10] PM2.5 emission factors from MOBILE6 do not vary significantly by speed
[11] Complete MOBILE6.2 input, output, and supporting files are available on request.

2.3 Procedures for Estimating Bibb County Emissions Using the Travel Demand Model

Highway mobile emissions for the Bibb County portion of the Macon nonattainment area were developed using the MOBILE6.2 emission factors and the link-based emissions estimation procedure. Highway mobile activity and emissions were prepared for the year 2009.

Link-Based Emissions Estimation Procedure

The link-based estimation procedure uses the links from the daily highway assignment, which contain a variety of attributes such as the number of lanes, speed, capacities and daily volumes. The daily VMT is determined by multiplying the daily volume by the distance for each link. The next step in the emissions procedure is to determine the VMT and speed by time-of-day from the daily assignment by link as described in Section 2.1. The VMT by time-of-day is then adjusted by the VMT adjustment factor by HPMS functional classification to reconcile the model VMT to the average annual daily travel conditions.

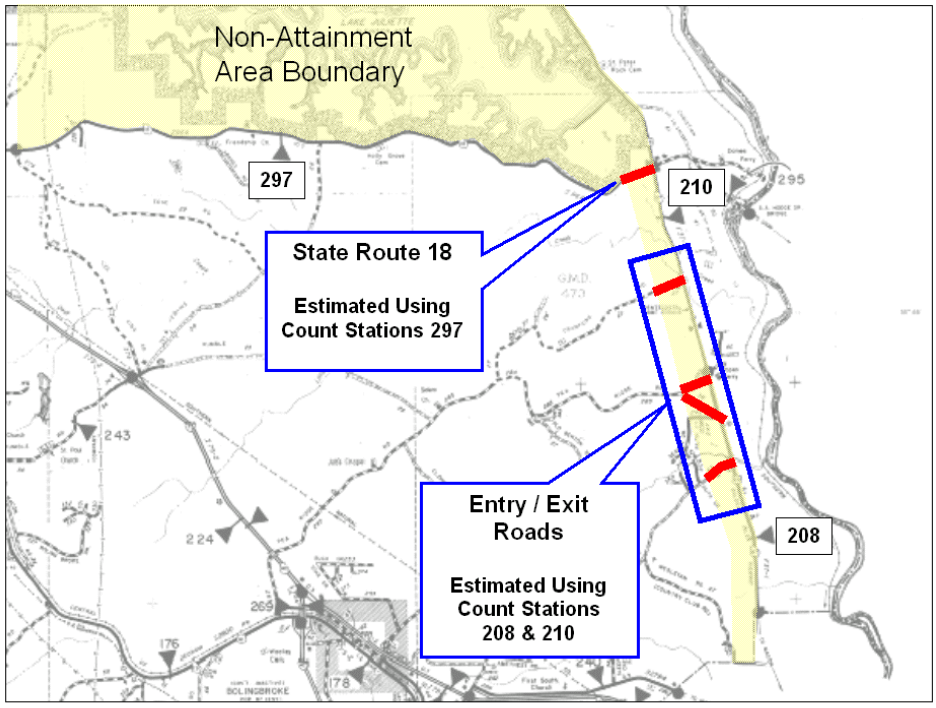
Once emission factors have been produced using the MOBILE6.2 model, the factors are then applied to the VMT estimates by time-of-day. Emission factors are applied at the link level, based on the driving cycle and the congested speed, only for the Bibb County portion of the Macon travel demand model. The emission factors for a particular driving cycle and speed are multiplied by the VMT for the link for each time-of-day period and summed for Bibb County to derive estimates of daily levels of emissions. The daily emissions are then multiplied by 365 to get annual emissions.

2.4 Procedures for Estimating Monroe County Emissions Using Off Model Techniques

The Monroe County portion of the Macon PM2.5 Nonattainment Area is not included in the Macon MPO's study area nor in the travel demand model. The area encompasses approximately 13.5 square miles and per the 2000 Census contains 69 households and a population of 175. Since the area is not modeled, emissions estimates were produced using off-model techniques, described in this section.

Georgia DOT historical traffic counts were used as the basis for the Monroe VMT estimates. VMT growth trends were estimated through linear regression using VMT estimates based on six consecutive years of traffic count data. For this analysis the six years of traffic count data were 1998-2003. Figure 2.4-1 displays the relevant traffic count stations and the applicable roadway segments that are included in the off-model estimation process.

Figure 2.4-1
Traffic Count Stations



As Figure 2.4-1 indicates, VMT forecasts for the segment of State Route 18 were produced using historical traffic counts for GDOT count station 297. Daily traffic volumes projections are displayed in Table 2.4-2, and were based on a linear extrapolation of the historical counts, which are shown in Table 2.4-1.

Table 2.4-1
Historical Traffic Counts

	Annual Average Daily Traffic (vehicles)					
Station #	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
208	5467	5836	6660	5701	6560	6930
210	3828	4086	4769	4325	5443	5300
297	1411	1373	1814	1921	1514	1470

Table 2.4-2
Projected Traffic

Station #	**208 & 210**	**297**
Yr 2009	2,100	1,784

VMT estimates for State Route 18 were calculated assuming a highway segment length of 0.25 miles. The average annual daily VMT projections were multiplied by 365 to produce annual VMT. Table 2.4-3 lists the annual average daily VMT by driving cycle for Monroe County.

Table 2.4-3
Projected Daily VMT for Facilities in Monroe County

VMT for SR-18			
Driving Cycle	Speed	Analysis Year	Projected VMT
Arterial	35	2009	446
VMT for Entry/Exits Between Stations 208 & 210			
Driving Cycle	Speed	Analysis Year	Projected VMT
Local	N/A	2009	525

With two exceptions, the Monroe county emission factors used are consistent with those used for the Macon travel demand model based emissions analysis. The exceptions are that, because Monroe County is covered by Georgia's gasoline marketing rule,[12] Georgia Gasoline's limits on (1) volatility and (2) sulfur were modeled when they differed from the federal limits.

Emission factors for arterials were applied to State Route 18 and factors applicable to local roads were applied to the entry/exit roads. Arterial emission factors are speed dependent; since the segment is close to an intersection, a moderate speed of 35 mph was assumed. Emission factors for local roads are not speed dependent. The applied emission factors are displayed in Table 2.4-4.

Table 2.4-4
Emission Factors (grams/mile) by Driving Cycle for PM 2.5 Emissions Inventory for Monroe County

For SR-18

Driving Cycle	Speed	Analysis Year	PM2.5 Emission Factor	NOx Emission Factor
Arterial	35	2009	0.0311	1.7190

For Entry/Exits between Stations 208 & 210

Driving Cycle	Speed	Analysis Year	PM2.5 Emission Factor	NOx Emission Factor
Local	N/A	2009	0.0312	1.8390

[12] See Rules for Air Quality Control, Chapter 391-3-1: Rule (bbb), Gasoline Marketing

Tons of emissions were estimated by multiplying the annual VMT by the emission factors, then applying the appropriate conversion factor (907,180 grams per ton). The total calculated annual emissions are displayed in Table 2.4-5.

Table 2.4-5
Total Estimated Off-Model Emissions for PM2.5
Partial Area of Monroe County
(in Annual Tons)

Year	PM2.5 Emissions	NOx Emissions
2009	0.0122	0.6969

2.5 Nonattainment Area Emissions Analysis Summary

The results from the regional emissions analysis produced using both travel demand model and off-model techniques are listed in Table 2.5-1.

Table 2.5-1
Summary of Mobile Source Emissions Macon Nonattainment Area
(in Annual Tons)

	Travel Model Emissions		Off-Model Emissions		Final Emissions	
Year	**PM2.5**	**NOx**	**PM2.5**	**NOx**	**PM2.5**	**NOx**
2009	75.5252	4,868.8732	0.0122	0.6969	75.5374	4,869.5702

Exhibit 1: Monroe County/GDOT Agreement

RECEIVED
OCT 0 1 2004
BY: Planning

RECEIVED
SEP 2 0 2004
MONROE COUNTY
COMMISSIONERS

Department of Transportation

HAROLD E. LINNENKOHL
COMMISSIONER
(404) 656-5206

PAUL V. MULLINS
CHIEF ENGINEER
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TREASURER
(404) 656-5224

September 13, 2004

Ben Spear, Jr., Chairman
Monroe County Board of Commissioners
P.O. Box 189
Forsyth, Georgia 31029-0189

Subject: Agreement for Georgia Department of Transportation to Represent the Interests of Monroe County for Transportation Conformity Purposes under Eight-Hour Ozone and PM2.5 Standards

Dear Chairman Spear:

On September 10, 2004, Ms. Cora Cook of the Office of Planning discussed with you transportation-related ramifications of EPA's designation of a part of Monroe County as nonattainment under the eight-hour ozone standard. EPA also recommends the same area of Monroe County be designated nonattainment under the PM2.5 standard. Although Monroe County's ozone designation and likely PM2.5 designation are due to emissions from a large stationary source, a process called "transportation conformity" will apply to that part of Monroe County designated as nonattainment.

This letter confirms your discussions with Ms. Cook that Monroe County requests the Department serve as its representative throughout the transportation conformity process for ozone and PM2.5 nonattainment. By my signature below, the Department acknowledges it will represent Monroe County and its transportation interests throughout the conformity process under both air quality standards. The Department will bring to the County Chairman's attention, issues of significance that could or would affect Monroe County's transportation interests. I have provided an area below for you to sign your concurrence with these arrangements. Please sign this letter, keep a copy for your records, and return the signed original to the attention of Ms. Cora Cook.

If you have any questions about air quality issues, Ms. Cora Cook will serve as your Department contact. You may reach her at (404) 657-6687. We look forward to representing the County throughout the transportation conformity process under both ozone and PM2.5 standards.

Sincerely,

Harold E. Linnenkohl
Commissioner

HEL:CJC

CONCURRENCE: _____
Ben Spear, Monroe County Commission Chairman

Exhibit 2: Vehicle Registration Data

Georgia's Revised MOBILE6 Registration Distribution by Age

Overview

R.L. Polk & Co. (Polk) maintains databases encompassing all registered vehicles in operation by state. Polk acquires the source registration data from the states and then processes and enhances the data. Key data elements Polk used for grouping vehicle registered in Georgia by their appropriate composite (i.e., gasoline and diesel) MOBILE6 vehicle types were: vehicle make, vehicle model, engine make, engine model, fuel type, cab type, bed length, wheel configuration, vehicle type, gross vehicle weight rating (GVWR)[i] class, model year, and registration geography (i.e., county).

Vehicle characteristic data elements used by Polk are derived from the unique 17 position vehicle identification number (VIN) assigned to every vehicle. Vehicle geography is assigned based on the registration address linked to each VIN.

In order to assign a MOBILE6 category to all registered vehicles, Polk constructed a master vehicle workfile using data from Polk's TIPNet and NVPP databases. This master vehicle workfile accounts for all registered vehicles, including: cars, vans, sport utility vehicles, trucks, buses, school buses, and motorcycles (GVWR classes 1-8 + motorcycle). The GVWR classes are:

Class 1	0 - 6,000 lbs.
Class 2	6,001 - 10,000 lbs.
Class 3	10,001 - 14,000 lbs.
Class 4	14,001 - 16,000 lbs.
Class 5	16,001 - 19,500 lbs.
Class 6	19,501 - 26,000 lbs.
Class 7	26,001 - 33,000 lbs.
Class 8	33,001 - 150,000 lbs.

The TIPNet database contains vehicles from full-size pickups/vans through class 8 (GVWR classes 1c-8), and is structured to serve the commercial vehicle market. The NVPP database contains vehicles GVWR classes 1-3 and is designed to serve the car, light truck/van, and motorcycle aftermarket.

Using the data elements listed above, Polk assigned one of the 16 MOBILE6 categories to each of the vehicles in the workfile. Care was taken to assure that no makes and models are duplicated between the two databases. Note that the unit volume for same make/model vehicles can be divided among two or more MOBILE6 categories due to varying vehicle types and GVWR classes within a specific

make/model. TIPNet data supplies GVWR classes 1c-8 (full-size pickups/vans & heavier), while NVPP data provides passenger car, motorcycle, light truck, and light vans from GVWR class 1.

The 16 composite MOBILE6 vehicle types are listed and defined below, with examples of the types of vehicles they include.

Number **Abbreviation** **Description**

1 **LDV** **Light-Duty Vehicles (Passenger Cars)**
- Class 1 GVWR
- Include: Passenger Cars
- Fuel: All Types
- Source: R.L. Polk NVPP as of October 2002

2 **LDT1** **Light-Duty Trucks 1 (0-6,000 lbs. GVWR, 0-3,750 lbs. LVW[ii])**
- Class 1 GVWR
- Trucks, SUVs, & Vans
- Exclude Full-Size Pickups & Vans
- Fuel: All Types
- Source: R.L. Polk NVPP as of October 2002

3 **LDT2** **Light-Duty Trucks 2 (0-6,000 lbs. GVWR, 3,751-5,750 lbs. LVW)**
- Class 1 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Include all Full-Size Pickups & Vans (e.g. 150/1500 series vehicles: F150, C/K 1500, E150, Ram 1500 etc.)
- Include Vehicle Types: Incomplete Pickup + Cab Chassis
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003 & NVPP as of October 2002

4 **LDT3** **Light-Duty Trucks 3 (6,001-8,500 lbs. GVWR, 0-5,750 lbs. ALVW[iii])**
- Class 2 GVWR
- Trucks, SUVs, & Vans
- GVWR: 6,001-8,000 for Ford, Chevy, Dodge, plus all Toyota Tundra Models
- Fuel: All Types
- Exclude: Pickups with Long Bed or Vans with Extended Length (Except Tundra)
- Exclude Vehicle Types: Incomplete Pickup + Cab Chassis + Incomplete Vehicle + Straight Truck + School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003 & NVPP as of October 2002

Georgia's Revised MOBILE6 Registration Distribution by Age – continued

Number	Abbreviation	Description

5 LDT4 Light-Duty Trucks 4 (6,001-8,500 lbs. GVWR, >5,750 lbs. ALVW)

- Class 2 GVWR
- Trucks, SUVs, & Vans
- GVWR: 6,001-8,000 for Ford, Chevy, & Dodge
- Exclude: all Toyota Tundra Models
- Fuel: All Types
- Include: Pickups with Long Bed or Vans with Extended Length
- Include Vehicle Types: Incomplete Pickup + Cab Chassis + Incomplete Vehicle + Straight Truck
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

6 HDV2B Class 2b Heavy-Duty Vehicles (8,501-10,000 lbs. GVWR)

- Class 2 GVWR
- Trucks, SUVs, & Vans
- GVWR: 8,001-10,000 for Ford, Chevy, & Dodge
- Exclude: All Toyota Tundra Models
- Fuel: All Types
- Include: Pickups with Long Bed or Vans with Extended Length
- Include Vehicle Types: Incomplete Pickup + Cab Chassis + Incomplete Vehicle + Straight Truck
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

7 HDV3 Class 3 Heavy-Duty Vehicles (10,001-14,000 lbs. GVWR)

- Class 3 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

8 HDV4 Class 4 Heavy-Duty Vehicles (14,001-16,000 lbs. GVWR)

- Class 4 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

Georgia's Revised MOBILE6 Registration Distribution by Age – continued

Number	Abbreviation	Description

9 **HDV5** **Class 5 Heavy-Duty Gasoline Vehicles (16,001-19,500 lbs GVWR)**

- Class 5 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

10 **HDV6** **Class 6 Heavy-Duty Vehicles (19,501-26,000 lbs. GVWR)**

- Class 6 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

11 **HDV7** **Class 7 Heavy-Duty Vehicles (26,001-33,000 lbs. GVWR)**

- Class 7 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

12 **HDV8A** **Class 8a Heavy-Duty Vehicles (33,001-60,000 lbs. GVWR)**

- Class 8 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Include Vehicle Types: 4x2 Non-Tractor Vehicles + All Tractors + Motor Home Chassis
- Source: R.L. Polk TIPNet as of March 2003

13 **HDV8B** **Class 8b Heavy-Duty Vehicles (>60,000 lbs. GVWR)**

- Class 8 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: All Tractors + School Bus + Bus Non-School (Coach)
- Exclude Wheels: 4x2
- Source: R.L. Polk TIPNet as of March 2003

14 **HDBS** **School Buses**

- Include Vehicle Type: School Bus
- Fuel: All Types
- Source: R.L. Polk TIPNet as of March 2003

Georgia's Revised MOBILE6 Registration Distribution by Age – continued

Number	Abbreviation	Description

15 **HDBT** **Transit & Urban Buses**

- Include Vehicle Type: Bus Non-School (Coach)
- Fuel: All Types
- Source: R.L. Polk TIPNet as of March 2003

16 **MC** **Motorcycles (All)**

- Fuel: All Types
- Source: R.L. Polk NVPP as of October 2002

The data acquired from Polk was queried to determine the number of vehicles registered in the 5-county Macon metropolitan statistical area by age and MOBILE6 vehicle type. Results of this query were used to develop MOBILE6 registration distribution by age inputs. For each of the 16 composite MOBILE6 vehicle types, the fraction of all vehicles of that type which are zero-to-one model year old, two model years old, three model years old, etc., up to the oldest category, 25-model-years-and-older, was determined. The resulting MOBILE6 input data is shown on the following two pages. Note that the Polk-derived distribution for Class 8b vehicles (MOBILE6 vehicle type 13) is commented out; in accordance with EPA guidance, MOBILE6 defaults were used for this vehicle type.

---

[i] The GVWR is the maximum weight of the vehicle when it is fully loaded, as specified by the manufacturer.
[ii] Loaded vehicle weight, the weight of vehicle sitting empty (curb weight) plus 300 pounds.
[iii] Adjusted loaded vehicle weight, average of the gross vehicle weight and the curb weight.

```
REG DIST
*
* The file REGDATA.D contains the default MOBILE6 values for the distribution of
* vehicles by age for July of any calendar year.  There are sixteeen (16)
* sets of values representing 16 combined gasoline/diesel vehicle class
* distributions.  These distributions are split for gasoline and diesel
* using the separate input (or default) values for diesel sales fractions.
* Each distribution contains 25 values which represent the fraction of
* all vehicles in that class (gasoline and diesel) of that age in July.
* The first number is for age 1 (calendar year minus model year plus one)
* and the last number is for age 25.  The last age includes all vehicles
* of age 25 or older.  The first number in each distribution is an integer
* which indicates which of the 16 vehicle classes are represented by the
* distribution.  The sixteen vehicle classes are:
*
*  1  LDV    Light-Duty Vehicles (Passenger Cars)
*  2  LDT1   Light-Duty Trucks 1 (0-6,000 lbs. GVWR, 0-3750 lbs. LVW)
*  3  LDT2   Light Duty Trucks 2 (0-6,001 lbs. GVWR, 3751-5750 lbs. LVW)
*  4  LDT3   Light Duty Trucks 3 (6,001-8500 lbs. GVWR, 0-3750 lbs. LVW)
*  5  LDT4   Light Duty Trucks 4 (6,001-8500 lbs. GVWR, 3751-5750 lbs. LVW)
*  6  HDV2B  Class 2b Heavy Duty Vehicles (8501-10,000 lbs. GVWR)
*  7  HDV3   Class 3 Heavy Duty Vehicles (10,001-14,000 lbs. GVWR)
*  8  HDV4   Class 4 Heavy Duty Vehicles (14,001-16,000 lbs. GVWR)
*  9  HDV5   Class 5 Heavy Duty Vehicles (16,001-19,500 lbs. GVWR)
* 10  HDV6   Class 6 Heavy Duty Vehicles (19,501-26,000 lbs. GVWR)
* 11  HDV7   Class 7 Heavy Duty Vehicles (26,001-33,000 lbs. GVWR)
* 12  HDV8A  Class 8a Heavy Duty Vehicles (33,001-60,000 lbs. GVWR)
* 13  HDV8B  Class 8b Heavy Duty Vehicles (>60,000 lbs. GVWR)
* 14  HDBS   School Busses
* 15  HDBT   Transit and Urban Busses
* 16  MC     Motorcycles (All)
*
* The 25 age values are arranged in two rows of 10 values followed by a row
* with the last 5 values.  Comments (such as this one) are indicated by
* an asterisk in the first column. Empty rows are ignored.  Values are
* read "free format," meaning any number may appear in any row with as
* many characters as needed (including a decimal) as long as 25 values
* follow the initial integer value separated by a space.
*
* If all 16 vehicle classes do not need to be altered from the default
* values, then only the vehicle classes that need to be changed need to
* be included in this file.  The order in which the vehicle classes are
* read does not matter, however each vehicle class set must contain 25
* values and be in the proper age order.
* ------------------------------------------------------------------------
*
* This file specifies the local registration distribution by age
* (MOBILE6 defaults for heavy-heavy-duties) for the five counties in the
* Macon metropolitan statistical area:
*
* Bibb, Crawford, Jones, Monroe, and Twiggs.
*
* Sources of registration data:  R. L. Polk & Co.'s National Vehicle
* Population Profile (R) as of October 2002 and R. L. Polk & Co.'s
* TIPNet (R) as of March 2003.
*
* LDV
1  0.0112  0.0450  0.0495  0.0605  0.0596  0.0566  0.0620  0.0617  0.0715  0.0634
   0.0576  0.0523  0.0465  0.0444  0.0428  0.0362  0.0317  0.0265  0.0235  0.0191
   0.0114  0.0069  0.0067  0.0053  0.0481

* LDT1
2  0.0218  0.0901  0.0860  0.0933  0.0761  0.0746  0.0658  0.0623  0.0585  0.0564
```

```
   0.0480  0.0354  0.0349  0.0239  0.0292  0.0264  0.0232  0.0202  0.0140  0.0108
   0.0065  0.0040  0.0029  0.0026  0.0333

* LDT2
3  0.0007  0.0030  0.0144  0.0168  0.0174  0.0476  0.0628  0.0002  0.0137  0.0341
   0.0533  0.0499  0.0498  0.0735  0.0745  0.0753  0.0587  0.0718  0.0692  0.0678
   0.0519  0.0431  0.0506  0.0000  0.0000

* LDT3
4  0.0412  0.0996  0.0960  0.0882  0.0987  0.0604  0.0724  0.0689  0.0721  0.0608
   0.0342  0.0257  0.0156  0.0185  0.0196  0.0169  0.0188  0.0235  0.0241  0.0173
   0.0119  0.0080  0.0074  0.0000  0.0002

* LDT4
5  0.0316  0.0350  0.0380  0.0525  0.0518  0.0456  0.0493  0.0532  0.0895  0.0764
   0.0609  0.0513  0.0466  0.0633  0.0641  0.0493  0.0296  0.0288  0.0232  0.0298
   0.0148  0.0096  0.0059  0.0000  0.0000

* HDV2B
6  0.0348  0.0629  0.0631  0.0773  0.0843  0.0320  0.0683  0.0588  0.0657  0.0425
   0.0397  0.0273  0.0263  0.0232  0.0428  0.0451  0.0304  0.0425  0.0428  0.0335
   0.0211  0.0170  0.0160  0.0005  0.0021

* HDV3
7  0.0264  0.0708  0.0895  0.0977  0.1181  0.0302  0.0527  0.0340  0.0461  0.0489
   0.0412  0.0291  0.0132  0.0324  0.0351  0.0362  0.0313  0.0483  0.0258  0.0242
   0.0115  0.0110  0.0038  0.0038  0.0384

* HDV4
8  0.0153  0.0366  0.0543  0.0803  0.0874  0.0366  0.0649  0.0519  0.0673  0.0496
   0.0531  0.0401  0.0366  0.0366  0.0579  0.0661  0.0319  0.0165  0.0213  0.0283
   0.0153  0.0130  0.0059  0.0000  0.0331

* HDV5
9  0.0116  0.0417  0.0625  0.0509  0.0718  0.0301  0.0880  0.0625  0.0440  0.0208
   0.0255  0.0463  0.0093  0.0069  0.0069  0.0139  0.0046  0.0185  0.0139  0.0185
   0.0162  0.0093  0.0162  0.0000  0.3102

* HDV6
10 0.0091  0.0196  0.0309  0.0603  0.0708  0.0400  0.0238  0.0231  0.0372  0.0288
   0.0196  0.0217  0.0224  0.0133  0.0154  0.0330  0.0365  0.0295  0.0295  0.0224
   0.0175  0.0133  0.0112  0.0042  0.3668

* HDV7
11 0.0118  0.0217  0.0355  0.0631  0.0502  0.0315  0.0325  0.0325  0.0562  0.0286
   0.0335  0.0305  0.0365  0.0552  0.0365  0.0571  0.0690  0.0463  0.0512  0.0325
   0.0256  0.0315  0.0207  0.0453  0.0650

* HDV8A
12 0.0190  0.0086  0.0455  0.0516  0.0436  0.0479  0.0516  0.0694  0.0903  0.0792
   0.0805  0.0461  0.0387  0.0461  0.0498  0.0344  0.0461  0.0283  0.0283  0.0283
   0.0123  0.0068  0.0092  0.0061  0.0326

* HDV8B
*13 0.0139  0.0197  0.0557  0.0452  0.0719  0.0406  0.0557  0.0418  0.0719  0.0487
*   0.0557  0.0302  0.0244  0.0371  0.0383  0.0696  0.0371  0.0267  0.0418  0.0244
*   0.0081  0.0070  0.0139  0.0162  0.1044

* HDBS
14 0.0226  0.0661  0.0871  0.0661  0.0403  0.0452  0.0548  0.0613  0.0919  0.0113
   0.0371  0.0532  0.1290  0.0371  0.0323  0.0484  0.0097  0.0194  0.0113  0.0129
   0.0177  0.0081  0.0065  0.0048  0.0258
```

```
* HDBT
15 0.0000  0.0449  0.0000  0.0787  0.1236  0.0112  0.0337  0.0674  0.0225  0.0000
   0.0674  0.0562  0.0225  0.0674  0.0787  0.0449  0.0225  0.0112  0.0674  0.0337
   0.0225  0.0562  0.0674  0.0000  0.0000

* MC
16 0.0005  0.0992  0.1223  0.0907  0.0818  0.0514  0.0500  0.0514  0.0422  0.0381
   0.0321  0.3403  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
   0.0000  0.0000  0.0000  0.0000  0.0000
```

Exhibit 3: Abbreviated MOBILE6 Input Files for Bibb County Emissions for PM2.5 SIP Budget

Year 2009 Arterials/Collectors, Ramps and Local Roads

```
*
* 7-1-09, Macon arterials/collectors, '02 Macon MSA reg. dist. (default for Class 8b),
default VMT mix (09aPMmac.in)
*
MOBILE6 INPUT FILE :

POLLUTANTS         : NOx
PARTICULATES       :

RUN DATA

* next lines show average annual hourly temp. for Macon, 2000-2002
HOURLY TEMPERATURES: 55  58  62  65  68  71  72  74  74  74  73  71
                     67  64  62  61  60  59  58  57  56  55  55  55

* see "macon_average_annual_sulfur_and_rvp_w_ERG_NMIM_updates.xls" for information on
average annual RVP
FUEL RVP           : 9.8

REG DIST           : 02macmsa.d
*_____________________________________________________________________________
*
SCENARIO REC       : arterial, Macon, 2009, 2.5 mph
> 7-1-09, '02 Macon MSA reg. dist. (default for Class 8b), default VMT mix
(09aPMmac.in)
CALENDAR YEAR      : 2009
EVALUATION MONTH   : 7
* next lines show average annual hourly rel. humidity for Macon, 2000-2002
RELATIVE HUMIDITY  : 89  85  77  68  61  56  53  51  50  50  52  57
                     64  72  76  80  82  84  85  86  88  89  90  90
* next line shows average annual daily barometric pressure for Macon, 2000-2002
BAROMETRIC PRES    : 29.70
PARTICLE SIZE      : 2.5
PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
DIESEL SULFUR      : 43.00
AVERAGE SPEED      : 2.5 Arterial 0.0 100.0 0.0 0.0
*_____________________________________________________________________________
*
[other scenarios not shown]

END OF RUN
```

Year 2009 Freeways

```
*
* 7-1-09, Macon freeways, '02 Macon MSA reg. dist. (default for Class 8b), default VMT
mix (09fPMmac.in)
*
```

```
MOBILE6 INPUT FILE :

POLLUTANTS         : NOx
PARTICULATES       :

RUN DATA

* next lines show average annual hourly temp. for Macon, 2000-2002
HOURLY TEMPERATURES: 55  58  62  65  68  71  72  74  74  74  73  71
                     67  64  62  61  60  59  58  57  56  55  55  55

* see "macon_average_annual_sulfur_and_rvp_w_ERG_NMIM_updates.xls" for information on
average annual RVP
FUEL RVP           : 9.8

REG DIST           : 02macmsa.d
*_____________________________________________________________________________
*
SCENARIO REC       : freeway, Macon, 2009, 2.5 mph
> 7-1-09, '02 Macon MSA reg. dist. (default for Class 8b), default VMT mix
(09fPMmac.in)
CALENDAR YEAR      : 2009
EVALUATION MONTH   : 7
* next lines show average annual hourly rel. humidity for Macon, 2000-2002
RELATIVE HUMIDITY  : 89  85  77  68  61  56  53  51  50  50  52  57
                     64  72  76  80  82  84  85  86  88  89  90  90
* next line shows average annual daily barometric pressure for Macon, 2000-2002
BAROMETRIC PRES    : 29.70
PARTICLE SIZE      : 2.5
PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
DIESEL SULFUR      : 43.00
AVERAGE SPEED      : 2.5 Non-Ramp 100.0 0.0 0.0 0.0
*_____________________________________________________________________________
*
[other scenarios not shown]

END OF RUN
```

Exhibit 4: MOBILE6 Input File for Monroe County Emissions for PM2.5 SIP Budget

```
*
* 7-1-09, Macon arterials/collectors, '02 Macon MSA reg. dist. (default for Class 8b),
default VMT mix (09mon-pm.in)
*
MOBILE6 INPUT FILE :

POLLUTANTS         : NOx
PARTICULATES       :

RUN DATA

* next lines show average annual hourly temp. for Macon, 2000-2002
HOURLY TEMPERATURES: 55  58  62  65  68  71  72  74  74  74  73  71
                     67  64  62  61  60  59  58  57  56  55  55  55

* see "macon_average_annual_sulfur_and_rvp_w_ERG_NMIM_updates.xls" for
* information on average annual RVP and sulfur
FUEL RVP           : 9.3

FUEL PROGRAM       : 4
   263.9  263.9  263.9  138.2   30.0   30.0   30.0   30.0
    30.0   30.0   30.0   30.0   30.0   30.0   30.0   30.0
  1000.0 1000.0 1000.0 1000.0  150.0  150.0   87.0   87.0
    80.0   80.0   80.0   80.0   80.0   80.0   80.0   80.0

* In 1999 there were 25 counties with Phase 1 Georgia gasoline.  These counties
included
* the 13-county Atlanta ozone 7-county Atlanta area: Cherokee (13057), Clayton (13063),
* Cobb (13067), Coweta (13077), DeKalb (13089), Douglas (13097), Fayette (13113),
* Forsyth (13117), Fulton (13121), Gwinnett (13135), Henry (13151), Paulding (13223),
* and Rockdale (13247);
*
* ...plus 12 attainment area counties:  Barrow (13013), Bartow (13015),
* Butts (13035), Carroll (13045), Dawson (13085), Hall (13139), Haralson (13143),
* Jackson (13157), Newton (13217), Pickens (13227), Spalding (13255), and
* Walton (13297).
*
* In 2003 there will be 20 additional attainment area counties with fuel controls
* (Phase 2):  Banks (13011), Chattooga (13055), Clarke (13059), Floyd (13115),
* Gordon (13129), Heard (13149), Jasper (13159), Jones (13169), Lamar (13171),
* Lumpkin (13187), Madison (13195), Meriwether (13199), Monroe (13207), Morgan (13211),
* Oconee (13219), Pike (13231), Polk (13233), Putnam (13237), Troup (13285), and
* Upson (13293);
*
* ...for a total of 45 counties with 7.0 psi RVP/low sulfur Georgia gasoline.
*
* Georgia gasoline, Phase 1
* 150 ppm average sulfur June 1 through September 15, 352 average rest
* of year until, effectively, June 1, 2003.
*
```

```
* Georgia gasoline, Phase 2
* a.  90 ppm average sulfur, 200 ppm per-gallon cap, effective 6-1-03.
*
* b.  30 ppm average sulfur, year round effective 1-1-04; 150 ppm per-gallon cap.
*
* c.  Seasonal 80 ppm per-gallon cap effective 6-1-04 for the period June 1 through
*     September 15.

REG DIST           : 02macmsa.d
*-------------------------------------------------------------------------------
*
SCENARIO REC       : arterial, Macon, 2009, 35 mph
> 7-1-09, '02 Macon MSA reg. dist. (default for Class 8b), default VMT mix (09mon-
pm.in)
CALENDAR YEAR      : 2009
EVALUATION MONTH   : 7
* next lines show average annual hourly rel. humidity for Macon, 2000-2002
RELATIVE HUMIDITY  : 89  85  77  68  61  56  53  51  50  50  52  57
                     64  72  76  80  82  84  85  86  88  89  90  90
* next line shows average annual daily barometric pressure for Macon, 2000-2002
BAROMETRIC PRES    : 29.70
PARTICLE SIZE      : 2.5
PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
DIESEL SULFUR      : 43.00
AVERAGE SPEED      : 35 Arterial 0.0 100.0 0.0 0.0
*-------------------------------------------------------------------------------
*
SCENARIO REC       : local, Macon, 2009, no speed input
> 7-1-09, '02 Macon MSA reg. dist. (default for Class 8b), default VMT mix (09mon-
pm.in)
CALENDAR YEAR      : 2009
EVALUATION MONTH   : 7
RELATIVE HUMIDITY  : 89  85  77  68  61  56  53  51  50  50  52  57
                     64  72  76  80  82  84  85  86  88  89  90  90
BAROMETRIC PRES    : 29.70
PARTICLE SIZE      : 2.5
PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
DIESEL SULFUR      : 43.00
* Note that 12.9 is the default MOBILE6 average speed for local streets.
AVERAGE SPEED      : 12.9 local

END OF RUN
```

Exhibit 5: MOBILE6 Composite Emission Factors (gm/mi) for 2009 for Bibb County by Speed and Driving Cycle

	Arterial (All Veh)		Freeway (All Veh)		Local (All Veh)		Ramp (All Veh)	
Speed	PM2.5	NOx	PM2.5	NOx	PM2.5	NOx	PM2.5	NOx
2.5	0.0312	3.127	0.0312	3.213	0.0312	1.846	0.0311	1.855
3.0	0.0312	3.013	0.0312	3.099	0.0312	1.846	0.0311	1.855
4.0	0.0312	2.871	0.0312	2.956	0.0312	1.846	0.0311	1.855
5.0	0.0312	2.785	0.0312	2.871	0.0312	1.846	0.0311	1.855
6.0	0.0312	2.637	0.0312	2.669	0.0312	1.846	0.0311	1.855
7.0	0.0312	2.531	0.0312	2.525	0.0312	1.846	0.0311	1.855
8.0	0.0312	2.451	0.0312	2.417	0.0312	1.846	0.0311	1.855
9.0	0.0312	2.389	0.0312	2.333	0.0312	1.846	0.0311	1.855
10.0	0.0312	2.340	0.0312	2.266	0.0312	1.846	0.0311	1.855
11.0	0.0312	2.262	0.0312	2.178	0.0312	1.846	0.0311	1.855
12.0	0.0312	2.197	0.0312	2.104	0.0312	1.846	0.0311	1.855
13.0	0.0312	2.143	0.0312	2.042	0.0312	1.846	0.0311	1.855
14.0	0.0312	2.096	0.0312	1.989	0.0312	1.846	0.0311	1.855
15.0	0.0312	2.055	0.0312	1.943	0.0312	1.846	0.0311	1.855
16.0	0.0312	2.015	0.0312	1.926	0.0312	1.846	0.0311	1.855
17.0	0.0312	1.979	0.0312	1.911	0.0312	1.846	0.0311	1.855
18.0	0.0312	1.948	0.0312	1.897	0.0312	1.846	0.0311	1.855
19.0	0.0312	1.919	0.0312	1.885	0.0312	1.846	0.0311	1.855
20.0	0.0312	1.894	0.0312	1.874	0.0312	1.846	0.0311	1.855
21.0	0.0312	1.871	0.0312	1.864	0.0312	1.846	0.0311	1.855
22.0	0.0312	1.849	0.0312	1.855	0.0312	1.846	0.0311	1.855
23.0	0.0312	1.830	0.0312	1.847	0.0312	1.846	0.0311	1.855
24.0	0.0312	1.812	0.0312	1.839	0.0312	1.846	0.0311	1.855
25.0	0.0312	1.796	0.0312	1.832	0.0312	1.846	0.0311	1.855
26.0	0.0312	1.783	0.0312	1.828	0.0312	1.846	0.0311	1.855
27.0	0.0312	1.771	0.0312	1.824	0.0312	1.846	0.0311	1.855
28.0	0.0312	1.760	0.0312	1.820	0.0312	1.846	0.0311	1.855
29.0	0.0312	1.750	0.0312	1.816	0.0312	1.846	0.0311	1.855
30.0	0.0312	1.740	0.0312	1.813	0.0312	1.846	0.0311	1.855
31.0	0.0312	1.737	0.0312	1.812	0.0312	1.846	0.0311	1.855
32.0	0.0312	1.734	0.0312	1.812	0.0312	1.846	0.0311	1.855
33.0	0.0311	1.731	0.0311	1.812	0.0312	1.846	0.0311	1.855
34.0	0.0311	1.728	0.0311	1.811	0.0312	1.846	0.0311	1.855
35.0	0.0311	1.726	0.0311	1.811	0.0312	1.846	0.0311	1.855
36.0	0.0311	1.732	0.0311	1.818	0.0312	1.846	0.0311	1.855
37.0	0.0311	1.739	0.0311	1.824	0.0312	1.846	0.0311	1.855
38.0	0.0311	1.745	0.0311	1.830	0.0312	1.846	0.0311	1.855
39.0	0.0311	1.750	0.0311	1.836	0.0312	1.846	0.0311	1.855
40.0	0.0311	1.756	0.0311	1.841	0.0312	1.846	0.0311	1.855

	Arterial (All Veh)		Freeway (All Veh)		Local (All Veh)		Ramp (All Veh)	
Speed	PM2.5	NOx	PM2.5	NOx	PM2.5	NOx	PM2.5	NOx
41.0	0.0311	1.768	0.0311	1.854	0.0312	1.846	0.0311	1.855
42.0	0.0311	1.780	0.0311	1.866	0.0312	1.846	0.0311	1.855
43.0	0.0311	1.792	0.0311	1.877	0.0312	1.846	0.0311	1.855
44.0	0.0311	1.803	0.0311	1.888	0.0312	1.846	0.0311	1.855
45.0	0.0311	1.813	0.0311	1.898	0.0312	1.846	0.0311	1.855
46.0	0.0311	1.832	0.0311	1.917	0.0312	1.846	0.0311	1.855
47.0	0.0311	1.849	0.0311	1.935	0.0312	1.846	0.0311	1.855
48.0	0.0311	1.866	0.0311	1.952	0.0312	1.846	0.0311	1.855
49.0	0.0311	1.883	0.0311	1.968	0.0312	1.846	0.0311	1.855
50.0	0.0311	1.898	0.0311	1.984	0.0312	1.846	0.0311	1.855
51.0	0.0311	1.925	0.0311	2.010	0.0312	1.846	0.0311	1.855
52.0	0.0311	1.950	0.0311	2.035	0.0312	1.846	0.0311	1.855
53.0	0.0311	1.974	0.0311	2.060	0.0312	1.846	0.0311	1.855
54.0	0.0311	1.998	0.0311	2.083	0.0312	1.846	0.0311	1.855
55.0	0.0311	2.021	0.0311	2.106	0.0312	1.846	0.0311	1.855
56.0	0.0311	2.057	0.0311	2.143	0.0312	1.846	0.0311	1.855
57.0	0.0311	2.093	0.0311	2.178	0.0312	1.846	0.0311	1.855
58.0	0.0311	2.127	0.0311	2.212	0.0312	1.846	0.0311	1.855
59.0	0.0311	2.160	0.0311	2.245	0.0312	1.846	0.0311	1.855
60.0	0.0311	2.192	0.0311	2.277	0.0312	1.846	0.0311	1.855
61.0	0.0311	2.243	0.0311	2.328	0.0312	1.846	0.0311	1.855
62.0	0.0311	2.293	0.0311	2.378	0.0312	1.846	0.0311	1.855
63.0	0.0311	2.341	0.0311	2.426	0.0312	1.846	0.0311	1.855
64.0	0.0311	2.387	0.0311	2.473	0.0312	1.846	0.0311	1.855
65.0	0.0311	2.432	0.0311	2.518	0.0312	1.846	0.0311	1.855
66.0	0.0301	2.406	0.0301	2.481	0.0302	1.843	0.0301	1.883
67.0	0.0301	2.406	0.0301	2.481	0.0302	1.843	0.0301	1.883
68.0	0.0301	2.406	0.0301	2.481	0.0302	1.843	0.0301	1.883
69.0	0.0301	2.406	0.0301	2.481	0.0302	1.843	0.0301	1.883
70.0	0.0301	2.406	0.0301	2.481	0.0302	1.843	0.0301	1.883
71.0	0.0301	2.406	0.0301	2.481	0.0302	1.843	0.0301	1.883
72.0	0.0301	2.406	0.0301	2.481	0.0302	1.843	0.0301	1.883
73.0	0.0301	2.406	0.0301	2.481	0.0302	1.843	0.0301	1.883
74.0	0.0301	2.406	0.0301	2.481	0.0302	1.843	0.0301	1.883
75.0	0.0301	2.406	0.0301	2.481	0.0302	1.843	0.0301	1.883

Exhibit 6: MOBILE6 Composite Emission Factors (gm/mi) for Monroe County by Speed and Driving Cycle

Arterial

Driving Cycle	Speed	Analysis Year	PM2.5 Emission Factor	NOx Emission Factor
Arterial	35	2009	0.0311	1.7190

Local Road

Driving Cycle	Speed	Analysis Year	PM2.5 Emission Factor	NOx Emission Factor
Local	N/A	2009	0.0312	1.8390