Mobile Source Emissions Modeling for Macon Nonattainment Area PM2.5 Maintenance Plan Motor Vehicle Emissions Budget

1.0 Overview

The Georgia Environmental Protection Division (EPD) worked with the Georgia Department of Transportation (GDOT) and the Macon-Bibb County Planning and Zoning Commission, the Metropolitan Planning Organization (MPO) for Macon, to develop mobile[1] source emissions inventories for the purpose of establishing motor vehicle emissions budgets (MVEB) for the 2023 maintenance year for the Macon PM2.5 Maintenance State Implementation Plan (SIP) revision, hereinafter called the Macon PM2.5 Maintenance Plan. The 2023 mobile emissions were developed consistent with 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 this guidance, once this budget is found adequate or approved by EPA, subsequent emissions analyses for transportation conformity will also use the same 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 Maintenance 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.

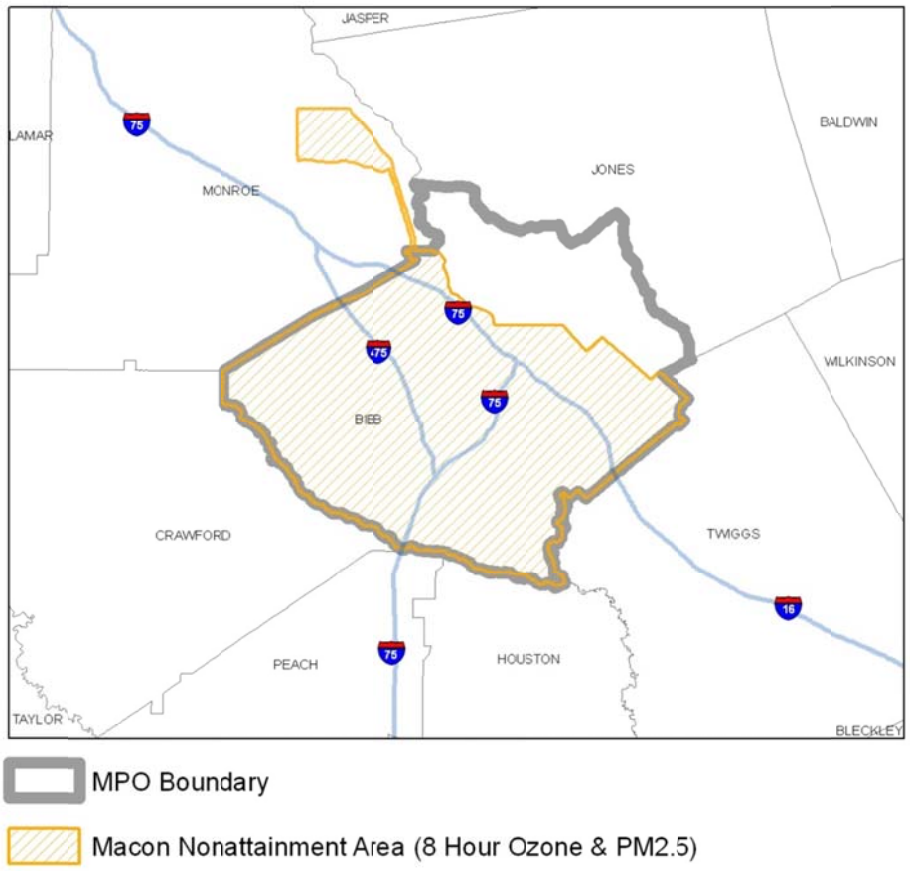
Effective April 5, 2005, the U.S. Environmental Protection Agency (EPA) designated Floyd County as nonattainment for the annual fine particulate (PM2.5) National Ambient Air Quality Standard. The PM2.5 standard is subject to Subpart 1 of the Clean Air Act, the more general nonattainment area planning 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. Based on quality-assured and certified monitoring data for the 2007–2009 monitoring period, EPA determined that the Macon Area attained the 1997 annual PM2.5 NAAQS by the applicable attainment date of April 5, 2010, on June 2, 2011.

[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, Macon Area Transportation Study (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.

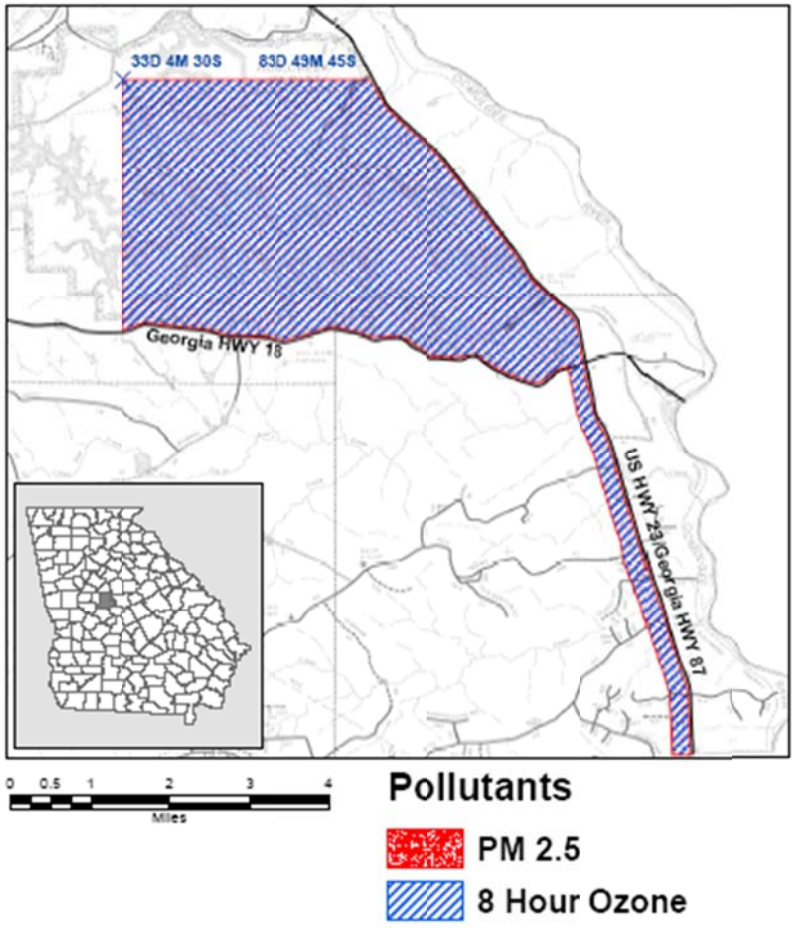
Figure 1.1-1
Macon MPO and Nonattainment Area



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 2010 Census contains a population of 98. The official nonattainment area description, per the EPA Green Book3, is as follows:

> *From the point where Bibb and Monroe Counties meet at US Hwy 23/GA Hwy 87, follow the Bibb/Monroe County line westward 150' from the US Hwy 23/GA Hwy 87 centerline, proceed northward150' west of and parallel to the US Hwy 23/ GA Hwy 87 centerline to 33° 4' 30"; proceed westward to 83° 49' 45"; proceed due south to 150' north of the GA Hwy 18 centerline, proceed eastward 150' north of and parallel to the GA Hwy 18 centerline to 1,150' west of the US Hwy 23/GA Hwy 87 centerline proceed southward 1,150' west of and parallel to the US Hwy 23/GA Hwy 87 centerline to the Monroe/Bibb County line; then follow the Monroe/Bibb County line to 150' west of the US Hwy23/GA Hwy 87 centerline.*

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



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

Based on consultation between representatives from Monroe County and GDOT, it was determined that GDOT would also represent Monroe County on the interagency committee. 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 September 15, 2011. The assumptions used to develop Macon's conforming Long Range Transportation Plan and Transportation Improvement Program were also used to develop the network and emissions for the Macon PM2.5 Maintenance Plan MVEB, which required emissions for the year 2023.

The MOVES 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.

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
2007 and 2023

	2007	2023
Total Population	168,747	174,291
Number of Households	67,805	70,196
Employment	107,423	123,249

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 are important 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.

Table 2.0-2
Macon Model Hourly Per Lane Capacity Matrix

	Area Type						
Facility Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Interstate	1900	1950	2000	2050	2100	2060	2020
Freeway	1600	1660	1730	1790	1850	1820	1780
Expressway	1300	1380	1450	1530	1600	1570	1540
Parkway	1170	1240	1310	1370	1440	1410	1380
Freeway to Freeway Ramp	1400	1530	1650	1780	1900	1860	1820
Freeway Entrance Ramp	900	1030	1150	1280	1400	1370	1340
Freeway Exit Ramp	800	810	810	820	820	810	790
Principal Arterial – Class I	1000	1030	1050	1080	1100	1080	1060
Principal Arterial – Class II	900	900	900	900	900	880	860
Minor Arterial – Class I	800	810	810	820	820	810	790
Minor Arterial – Class II	630	630	640	640	640	630	610

Facility Type	Area Type						
	1	2	3	4	5	6	7
One Way Arterial	760	760	770	770	770	760	740
Major Collector	520	530	540	550	560	550	540
Minor Collector	380	390	390	400	400	390	380
One Way Collector	460	470	470	480	480	470	460
Local Road	340	350	360	370	380	370	360
Centroid Connector	0	0	0	0	0	0	0

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 as a base in the Macon model since the travel dynamics for these urban areas are very similar. Through the process of model calibration and validation, the speeds were revised slightly for a couple of facilities to more accurately represent travel conditions in the Macon area. 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

Facility Type	Area Type						
	1	2	3	4	5	6	7
Interstate	55	60	60	60	60	70	70
Freeway	50	55	55	55	55	60	60
Expressway	50	50	50	50	55	55	55
Parkway	45	50	50	50	50	55	55
Freeway to Freeway Ramp	55	55	55	55	55	55	55
Freeway Entrance Ramp	45	50	50	50	50	55	55
Freeway Exit Ramp	22	23	30	31	34	40	48
Principal Arterial – Class I	22	28	33	34	37	47	52
Principal Arterial – Class II	23	26	31	32	35	45	49
Minor Arterial – Class I	22	23	30	31	34	40	47
Minor Arterial – Class II	21	22	27	30	32	38	45
One Way Arterial	23	26	30	32	35	42	48
Major Collector	17	18	21	27	29	34	42
Minor Collector	14	15	18	24	26	30	40
One Way Collector	17	18	21	27	29	34	42
Local Road	14	14	17	18	22	28	35
Centroid Connector	14	14	17	18	22	28	35

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 a closure criterion for determining whether there is "reasonable agreement" in travel times for trip distribution and trip assignment. Closure is obtained if the following criterion is met:

- Maximum link volume change =< 1,000

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 a 24-hour equilibrium assignment algorithm. The traffic assignment algorithm is iterative, running through successive applications until equilibrium occurs. Equilibrium occurs when no trip can be made by an alternate path without increasing the total travel time of all trips in the network. The equilibrium assignment is an iterative process that reflects travel demand assigned to minimum time paths as well as the effects of congestion. In each assignment iteration, traffic volumes are loaded onto network links and travel times are adjusted in response to the volume to capacity relationships. Final assigned volumes are derived by summing a percentage of the loadings from each iteration. The percentages reflect congested conditions that usually influence motorists' path selection for a portion of the day, not the entire day.

Georgia DOT requires multiple validation checks to each of the major steps in the travel demand modeling process. Output modeled volumes are validated against traffic counts at several levels – regional, corridors (screenlines) and link-by-link. Regional evaluations include VMT, Root Mean Squared Error and R-Squared calculations for volume-count matching. Corridor evaluations are primarily screenline comparisons. Nationally recognized maximum desirable deviation standards are applied to analyze model performance at the link level. These include FHWA's "*Calibration & Adjustment of System Planning Models*", 1990, and the NCHRP Report 365: "*Travel Estimation Techniques for Urban Planning*", 1998. The Macon model was also validated using 24-hour counts and modeled volumes. Documentation on the development of the Macon Model is in Appendix A.

2.1 Travel Demand Modeling Post-Processing Procedures

The Macon regional travel demand model produces daily estimates of travel and vehicle hours traveled (VHT) and a peak hour speed for each link in the highway network. The links from the daily highway assignment contain a variety of attributes such as the number of distance, lanes, speed, capacities and daily volumes. The daily VMT is determined by multiplying the daily volume by the distance for each link. In order to account for travel conditions throughout the day, VMT estimates, times and speeds by hour were produced. Other refinements to the network link data, discussed below, were performed to produce the files needed for MOVES. The procedures used in estimating 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.

HPMS Adjustment of VMT

In order to develop the information necessary to perform emissions modeling, post-processing of the output from the travel demand model was required. First, intra-zonal VMT is normally not reflected in the daily network assignment. A procedure was used that multiplied the number of intra-zonal vehicle trips from the vehicle trip table by the zone centroid distance to calculate the intra-zonal VMT. This VMT was then added to the network in a new link and summarized in the model VMT summaries.

Next, the daily VMT from the travel demand model was 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,[4] "[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."*

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 MOVES for each scenario year and annual average VMT.

HPMS adjustment factors were developed based on the average annual daily HPMS VMT for the model calibration year of 2006. The HPMS adjustment reconciles the travel demand model link-based VMT to the average annual daily travel conditions at the aggregate functional class level. The aggregate functional classification level was used since FHWA eliminated the urban/rural area type distinction from HPMS functional classifications beginning with the 2009 data, reported in 2010. (*Guidance for the Functional Classification of Highways (updated), Federal Highway Administration, October 14, 2008.)*

To determine the "2006 HPMS VMT" adjustment factors, the average annual daily Floyd County VMT for the year 2006 was summarized by the HPMS functional classifications from the Georgia Department of Transportation's Office of Transportation Data "445 Report." The

[4] *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.

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 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 that will be used in the HPMS VMT adjustment process. Table 2.1-1 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 2.1-1
Highway Mileage and Average Annual Daily VMT for Jones County

		Highway Mileage		Average Annual Weekday Adjusted VMT	
Functional Class Name	**Functional Class No.**	**Macon 2006 Model**	**GDOT HPMS**	**Whole County**	**Modeled Portion**
Rural Interstate	1	0.00	0.00	0	0
Rural Principal Arterial	2	2.22	2.39	14,644	13,603
Rural Minor Arterial	6	3.87	57.54	420,328	28,270
Rural Major Collector	7	35.10	68.06	132,779	68,477
Rural Minor Collector	8	20.60	46.32	85,156	37,872
Rural Local	9	77.10	328.39	113,495	26,647
Urbanized Interstate	11	0.00	0.00	0	0
Urban Freeway	12	0.00	0.00	0	0
Urbanized Principal Arterial	14	13.50	3.00	50,912	229,104
Urbanized Minor Arterial	16	4.40	2.56	11,343	19,496
Urbanized Collector	17	10.50	4.05	8,141	21,106
Urbanized Local	19	18.90	32.46	39,795	23,171
		186.19	544.77	876,593	467,745

Table 2.1-2 lists the daily VMT for the Macon MPO area from the travel demand model by county.

Table 2.1-2
Summary of 2006 Daily VMT for Macon MPO Area
(from the MATS travel demand model)

Functional Class Name	Functional Class No.	Bibb County	Jones County	Total
Interstates	1,11,12	2,314,061	0	2,314,061
Principal Arterials	2,14	840,422	140,967	981,389
Minor Arterials	6,16	1,258,455	30,931	1,289,386
Collectors	7,8,17	413,748	53,205	466,953
Local	9,19	691,847	98,336	790,183
Total		5,518,532	323,440	5,841,972

Table 2.1-3 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 years 2007 and 2023.

Table 2.1-3
HPMS VMT Average Annual Daily Adjustment Factors for Macon MPO Area

Functional Class Name	Functional Class No.	2006 HPMS VMT	2006 Model VMT	Adjustment Factor
Interstates	1,11,12	2,381,607	2,314,061	1.03
Principal Arterials	2,14	1,012,878	981,389	1.03
Minor Arterials	6,16	1,382,813	1,289,386	1.07
Collectors	7,8,17	565,481	466,953	1.21
Local	9,19	941,331	790,183	1.19
Total		6,284,109	5,841,972	1.08

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. The following equation was used to calculate the 2006 HPMS adjustment factors:

$$HPMS\ Adjustment\ Factor_i = (2006\ HPMS\ VMT_i / 2006\ Model\ VMT_i)$$

where $_i$=HPMS functional class)

The 2006 factors were applied to the VMT on each link in the highway network based on the aggregate functional classification for the year 2006. These factors were applied to the model application for 2007 and 2023. Table 2.1-4 lists the adjusted modeled VMT by year for Bibb County which was used in the emissions modeling procedures.

Table 2.1-4
Average Annual Daily Modeled VMT for Bibb County
(As adjusted per Table 2.1-1)

Year	VMT
2007	5,865,058
2023	7,244,222

VMT Estimation by Hour

Factors derived using the methodology described in the report *Speed and Delay Prediction Models for Planning Applications* were used to develop VMT estimates by hour from the daily estimates. The methodology is a simplified queuing-based model (QSIM) which incorporates several key features such as the use of temporal distribution as a basis for developing hourly traffic estimates and the estimation of "peak spreading" for both arterials and freeways. Because most analytical methods consider only the effects of peak hour congestion (such as V/C ratio), a new measurement of daily congestion was used: the Average Annual Daily Traffic-to-Capacity (AADT/C) ratio, where capacity is the two-way capacity. Hourly factors were developed based on the AADT/C ratio and are listed in Table 2.1-5. These factors were applied to the daily traffic assignment to develop hourly volumes and VMT by link. Conical volume-delay curves were then used to develop hourly times and speeds by link.

Roadtype Classification

The network link data was also classified by MOVES roadtype based on functional classification. The mapping of FHWA highway functional system classifications to the appropriate MOVES roadtypes used for this modeling is listed in Table 2.1-6. Interstate and freeway ramps are functionally classified as local facilities in Georgia. Since these facilities operate with restricted access, the facility type definition variable (a unique variable in the highway network that defines the highway facilities based on their operation) was used to classify ramps as either rural or urban restricted facilities. Off-network activity is calculated within the MOVES process based on the source type (vehicle) population and is not an input from the travel demand model data.

Table 2.1-6
Listing of FHWA Highway Functional Classifications
Mapped to MOVES Road Types

FHWA Highway Functional System	MOVES Road Type	MOVES Value
Rural interstate	Rural restricted access	2
Rural other principal arterial	Rural restricted access	2
Rural minor arterial	Rural unrestricted access	3

FHWA Highway Functional System	MOVES Road Type	MOVES Value
Rural major collector	Rural unrestricted access	3
Rural minor collector	Rural unrestricted access	3
Rural local	Rural unrestricted access	3
Urban interstate	Urban restricted access	4
Urban other freeways	Urban restricted access	4
Urban other principal arterial	Urban unrestricted access	5
Urban minor arterial	Urban unrestricted access	5
Urban collector	Urban unrestricted access	5
Urban local	Urban unrestricted access	5

Table 2.1-5
Hourly Distribution of Daily Vehicle Miles Travelled (VMT)

	Hour of Day																							
AADT/C Ratio	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
<= 7	1.00	0.60	0.48	0.45	0.67	1.85	5.01	7.73	6.13	4.82	4.79	5.12	5.36	5.47	6.05	7.27	8.28	8.27	5.89	4.18	3.32	3.03	2.44	1.77
8	1.01	0.61	0.48	0.43	0.64	1.82	5.04	7.67	6.42	4.97	4.82	5.19	5.41	5.53	6.07	7.14	7.97	7.90	5.87	4.21	3.33	3.10	2.53	1.84
9	1.01	0.61	0.48	0.42	0.63	1.81	5.06	7.64	6.56	5.05	4.84	5.22	5.43	5.56	6.08	7.08	7.81	7.71	5.86	4.22	3.33	3.13	2.58	1.88
10	1.01	0.60	0.47	0.40	0.61	1.80	5.05	7.49	6.61	5.19	4.95	5.29	5.46	5.60	6.09	6.99	7.58	7.50	5.92	4.31	3.38	3.18	2.63	1.91
11	1.01	0.60	0.45	0.38	0.58	1.79	5.05	7.33	6.65	5.33	5.06	5.35	5.50	5.64	6.11	6.90	7.34	7.28	5.98	4.39	3.43	3.23	2.68	1.93
12	1.01	0.59	0.44	0.36	0.56	1.78	5.04	7.17	6.70	5.47	5.17	5.42	5.53	5.68	6.12	6.81	7.10	7.06	6.04	4.48	3.48	3.28	2.73	1.96
13	1.27	0.89	0.75	0.68	0.86	1.98	4.97	6.92	6.49	5.36	5.09	5.32	5.42	5.55	5.96	6.59	6.86	6.82	5.88	4.45	3.54	3.35	2.85	2.14
14	1.54	1.19	1.06	0.99	1.16	2.18	4.90	6.67	6.28	5.25	5.00	5.21	5.30	5.43	5.80	6.37	6.61	6.58	5.73	4.43	3.60	3.43	2.97	2.33
15	1.80	1.48	1.37	1.31	1.46	2.38	4.82	6.42	6.07	5.14	4.92	5.11	5.19	5.30	5.63	6.15	6.37	6.34	5.57	4.40	3.65	3.50	3.09	2.51
16	2.06	1.78	1.68	1.63	1.76	2.58	4.75	6.17	5.86	5.04	4.84	5.00	5.08	5.18	5.47	5.93	6.12	6.10	5.42	4.38	3.71	3.58	3.21	2.70
17	2.33	2.08	1.99	1.95	2.06	2.77	4.68	5.92	5.65	4.93	4.75	4.90	4.96	5.05	5.31	5.71	5.88	5.86	5.26	4.35	3.77	3.65	3.33	2.88
18	2.59	2.38	2.30	2.26	2.36	2.97	4.60	5.67	5.43	4.82	4.67	4.79	4.85	4.92	5.14	5.49	5.63	5.61	5.10	4.32	3.82	3.72	3.45	3.06
19	2.85	2.68	2.61	2.58	2.66	3.17	4.53	5.42	5.22	4.71	4.59	4.69	4.74	4.80	4.98	5.27	5.39	5.37	4.95	4.30	3.88	3.80	3.57	3.25
20	3.11	2.97	2.92	2.90	2.96	3.37	4.46	5.17	5.01	4.60	4.50	4.58	4.62	4.67	4.82	5.05	5.14	5.13	4.79	4.27	3.94	3.87	3.69	3.43
21	3.38	3.27	3.24	3.22	3.27	3.57	4.39	4.92	4.80	4.49	4.42	4.48	4.51	4.55	4.66	4.83	4.90	4.89	4.64	4.25	4.00	3.95	3.81	3.62
22	3.64	3.57	3.55	3.53	3.57	3.77	4.31	4.67	4.59	4.38	4.33	4.38	4.39	4.42	4.49	4.61	4.66	4.65	4.48	4.22	4.05	4.02	3.93	3.80
23	3.90	3.87	3.86	3.85	3.87	3.97	4.24	4.42	4.38	4.28	4.25	4.27	4.28	4.29	4.33	4.39	4.41	4.41	4.32	4.19	4.11	4.09	4.05	3.98
24	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17

Source: Speed and Delay Prediction Models for Planning Applications

Speed Bin Classification

The network link hourly data was also stratified by speed bin. As previously mentioned, conical volume-delay curves were used to develop hourly times and speed by link. MOVES defines 16 "speed bins" which describe the average driving speed on a roadtype or highway network link. Table 2.1-7 lists the speed bins and ranges that were assigned to the network link data by hour.

Table 2.1-7
Listing of MOVES Speed Bins

Speed Bin	Lower Range	Upper Range
1	<=	2.4
2	2.5	7.4
3	7.5	12.4
4	12.5	17.4
5	17.5	22.4
6	22.5	27.4
7	27.5	32.4
8	32.5	37.4
9	37.5	42.4
10	42.5	47.4
11	47.5	52.4
12	52.5	57.4
13	57.5	62.4
14	62.5	67.4
15	67.5	72.4
16	=>	72.5

2.2 Development of MOVES Input Files

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

Interagency Consultation

To prevent transportation conformity problems, the emissions 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 MOVES input parameters for the Macon PM2.5 Maintenance Plan mobile source emissions modeling were established through interagency consultation and are listed below:

1) Emission Factor Model: MOVES2010a - Database: MOVES20100830

a. Emission Process - using MOVES in Inventory mode for a July day, which was annualized for 2007 and 2023 Maintenance Plan Inventories, and as the basis for 2023 motor vehicle emissions budgets

2) MOVES Inputs –
   a. Temperature and relative humidity
      i. 2007 data from National Mobile Inventory Model's (NMIM) default database (NCD20090531)
   b. Fuel
      i. Bibb County - MOVES defaults for July
      ii. Monroe County - MOVES defaults for July

   c. 2002 Regional Fleet Age Distribution
      i. Derived from R.L. Polk & Co. registration data for the five counties in the Macon metropolitan statistical area: Bibb, Crawford, Jones, Monroe, and Twiggs
      ii. Default for HDDV Class 8B

   d. Regional Vehicle Population
      i. Started with 2002 R.L. Polk & Co. registration data for for the five counties in the Macon MSA,, as well as the Georgia Dept. of Revenue's registration data for 2003 and 2007
      ii. Vehicles by type were grown from 2002 to 2007 using different growth factors by vehicle type based on either Census person population estimates or Georgia 2007 registration data. Methodology developed by EPD for inputs to the SMOKE-MOVES Integration Tool.
      iii. 2023 data grown from 2007 based on estimated MPO population growth
      iv. Vehicle population for MOVES source type 62 revised using MOVES default VMT/VPOP ratios and VMT for HPMS type 60 data

   e. MOVES Default VMT fractions by source type, adjusted using GDOT count data

MOVES

MOVES20100830 is the latest database version for EPA's motor vehicle emissions model. MOVES requires a variety of input files. The MOVES input data files associated with travel behavior have been developed using the Macon travel demand model data, Georgia vehicle classification counts, and MOVES national defaults. Other data sources were used to develop the source type population data, meteorology data, and fuel specifications. These data files were developed through Interagency Consultation.

MOVES Parameters

MOVES was run for 2007 and 2023 using the following parameters listed in Table 2.2-1. The RunSpecs are shown in Exhibit 2 and 3.

Table 2.2-1
MOVES Input Parameters

Parameters	**Input Values**		
Scale	Domain: County	Calculation Type: Inventory Mode	
Time Spans	Time Aggregation: Weekday – 24 hours	Month: July	Year: 2007 or 2023
Geographical Boundary	Bibb County		
Vehicles Equipment	Fuels: • Diesel Fuel • Gasoline	Source Use Types: • Combination Long-haul Truck • Combination Short-haul Truck • Intercity Bus • Light Commercial Truck • Motor Home • Motorcycle • Passenger Car • Passenger Truck • Refuse Truck • School Bus • Single Unit Long-haul Truck • Single Unit Short-haul Truck • Transit Bus	Selections: • Diesel Fuel - Combination Long-haul Truck • Diesel Fuel - Combination Short-haul Truck • Diesel Fuel - Intercity Bus • Diesel Fuel - Light Commercial Truck • Diesel Fuel - Motor Home • Diesel Fuel - Passenger Car • Diesel Fuel - Passenger Truck • Diesel Fuel - Refuse Truck • Diesel Fuel - School Bus • Diesel Fuel - Single Unit Long-haul Truck • Diesel Fuel - Single Unit Short-haul Truck • Diesel Fuel - Transit Bus • Gasoline - Combination Short-haul Truck • Gasoline - Light Commercial Truck • Gasoline - Motor Home • Gasoline - Motorcycle • Gasoline - Passenger Car • Gasoline - Passenger Truck • Gasoline - Refuse Truck • Gasoline - School Bus • Gasoline - Single Unit Long-haul Truck • Gasoline - Single Unit Short-haul Truck • Gasoline - Transit Bus

Parameters	**Input Values**		
RoadType	Types: 1-5	• Off-Network • Rural Restricted Access • Rural Unrestricted Access • Urban Restricted Access • Urban Unrestricted Access	
Pollutants and Processes	PM2.5	Primary Exhaust PM2.5 – Total	• Running Exhaust • Start Exhaust • Crankcase Running Exhaust • Crankcase Start Exhaust • Crankcase Extended Idle Exhaust • Extended Idle Exhaust
		Primary PM2.5 – Organic Carbon	• Running Exhaust • Start Exhaust • Crankcase Running Exhaust • Crankcase Start Exhaust • Crankcase Extended Idle Exhaust • Extended Idle Exhaust
		Primary PM2.5 – Elemental Carbon	• Running Exhaust • Start Exhaust • Crankcase Running Exhaust • Crankcase Start Exhaust • Crankcase Extended Idle Exhaust • Extended Idle Exhaust
		Primary PM 2.5 Sulfate Particulate	• Running Exhaust • Start Exhaust • Crankcase Running Exhaust • Crankcase Start Exhaust • Crankcase Extended Idle Exhaust • Extended Idle Exhaust
		Primary PM2.5 – Brakewear	• Breakwear

Parameters	**Input Values**		
		Particulate	
		Primary PM2.5 – Tirewear Particulate	• Tirewear
		Total Energy Consumption	• Running Exhaust • Start Exhaust
	NOx	Oxides of Nitrogen (NOx)	• Running Exhaust • Start Exhaust • Crankcase Running Exhaust • Crankcase Start Exhaust • Crankcase Extended Idle Exhaust • Extended Idle Exhaust
Output	General Output	Units: • Units: Grams • Energy Units: Joules • Distance Units: Miles	Activity: • Distance Traveled • Population

Methodology to Develop MOVES Input Data

The data files to run MOVES are entered via the County Data Importer. The methodologies to prepare the data files are described in Table 2.2-2 with their associated Excel Workbook and Worksheet names. The input data are shown in Exhibits 2-5 for the years 2007 and 2023.

Table 2.2-2
Methodology to Prepare MOVES Input Data Files
For the County Data Importer for Bibb County

Input Data from Travel Demand Model

County Data Manager Inputs	Worksheet	Methodology
AverageSpeed Distribution	avgSpeedDistribution	The weekday link hourly vehicle hours travelled (VHT) is summarized by road type and speed bin. The MOVES defaults for the 13 source types by year are used to allocate to vehicle type. The fraction of time in each speed bin for each hour based on vehicle type, road type, and average speed is calculated where the fractions sum to one for each combination of vehicle type and road type by hour.
Ramp Fraction	RoadType	The weekday link VMT is summarized for interstate/freeway and ramp facilities by urban versus rural area type classifications. The percent of ramp VMT of the total interstate/freeway and ramp VMT is calculated by area type.
RoadTypeDistribution	roadTypeDistribution	The weekday link hourly VMT is summarized by roadtype. The MOVES defaults for the 13 source types by year are used to allocate to vehicle type. The fraction of VMT by road type and vehicle type is calculated where the fractions sum to one for each vehicle type.
Vehicle Type VMT	HPMSVtypeYear	The weekday VMT is summarized by MOVES roadtype and then weighted by the vehicle classification counts[5] for the Georgia area outside of the Atlanta 20 county area by the 6 HPMS vehicle types. The fractions for vehicle type 20 and 30 are then re-distributed based on the MOVES source vehicle defaults for the year. This is because the vehicle classification counts are collected using counters which count vehicles by the number of axles and as a result, the counts do not accurately reflect the difference between passenger cars and SUVs. The daily VMT is annualized using the EPA AADVMT Calculator Excel workbook.
	MonthVMTFraction	MOVES National Defaults
	DayVMTFraction	MOVES National Defaults

[5] (A summary of the vehicle classification counts and description of the methodology used is in Exhibit 5)

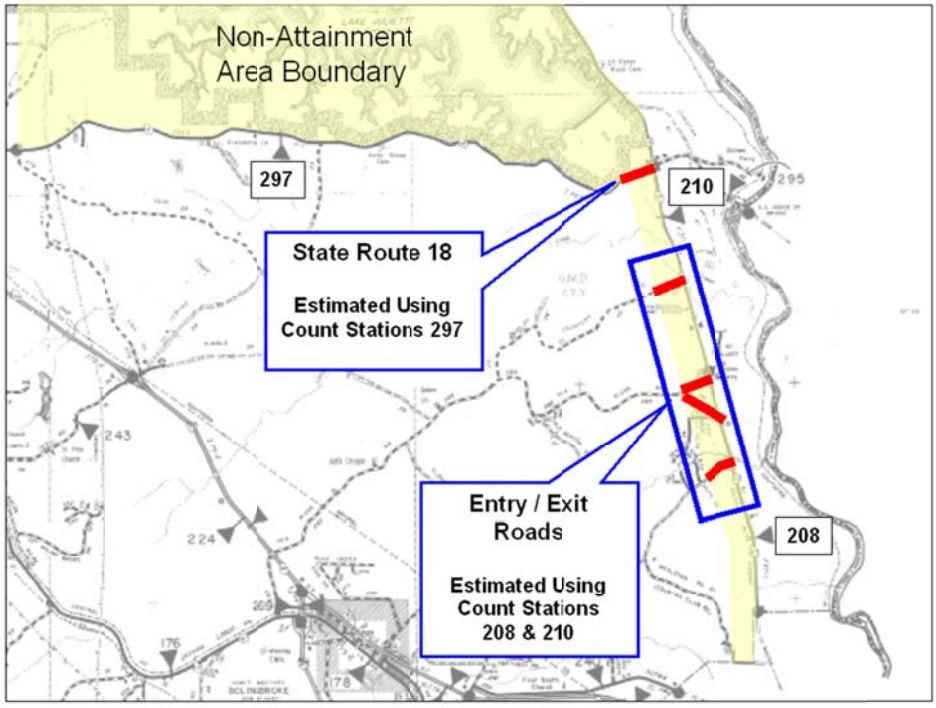
County Data Manager Inputs	Worksheet	Methodology
	HourVMTFraction	The weekday link hourly VMT is summarized by roadtype and hour. The MOVES defaults for the 13 source types by year are used to allocate to vehicle type. The fraction of VMT by road type and vehicle type is calculated where the fractions sum to one for each vehicle type by roadtype. The hourVMTFraction must sum to 1 for each source type-road type-type of day combination.
Input Data from Other Sources		
County Data Manager Inputs	**Worksheet**	**Methodology**
Source Type Population	sourceTypeYear	Vehicle population by source types was developed using 2002 R.L. Polk & Co. registration data. The 2002 data were grown to 2007 using either census person population estimates or Georgia annual vehicle registration data. Vehicle population for source type 62 (long-haul trucks) was recalculated using corresponding VMT for HPMS type 60 data from the HPMSVtypeYear worksheet and national default ratios of VMT and vehicle population in order to account for activity from trucks not registered but run locally. MPO population projection was used to calculate 2023 vehicle population.
I/M Programs	IMCoverage	No I/M Program
Fuel Supply	Fuel Supply	MOVES Defaults for Bibb County
	Fuel Formulation	MOVES Defaults for Bibb County
Meteorology Data	ZoneMonthHour	NCD20090531- 2007 data for Bibb County
Age Distribution	sourceTypeAgeDistribution	Age distributions in MOBILE6 format were derived from 2002 R.L. Polk & Co. registration data for all vehicle types, except for HDDV Class 8B where MOBILE6 defaults were used. They were converted into MOVES format using EPA converter.

2.3 Procedures for Producing 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 2010 Census contains a population of 98. Since the area is not modeled, emissions estimates were produced using off-model techniques. According to the Transportation Conformity Rule 93.122(a)(7), reasonable methods shall be used to estimate nonattainment or maintenance area VMT on off-network roadways within the urban transportation planning area, and on roadways outside the urban transportation planning area. The methodology to produce the mobile emissions for Monroe County, described in this section, uses reasonable methods.

A combination of techniques was used to produce the emissions for the nonattainment portion of Monroe County. Georgia DOT historical traffic counts were used as the basis to estimate running emissions while the percent of the population was used to estimate non-running emissions. Figure 2.3-1, displays the relevant traffic count stations and the applicable roadway segments that are included in the off-model estimation process.

Figure 2.3-1
Traffic Count Stations



As Figure 2.3-1 indicates, VMT forecasts for the segment of State Route 18 were produced using historical traffic counts for GDOT count station 297. Traffic volumes projections are displayed in Table 2.3-2, and were based on a linear extrapolation of the historical counts, which are also shown in Table 2.3-2. The 1997 count for station 297 was omitted because it appears to be an outlier. If the 1997 count were included, the linear extrapolation would be declining.

Table 2.3-2
Historical Traffic Counts

Macon, Georgia - Off Model
Emission Estimation
Monroe County
Portion for PM

Relevant GDOT
Count Stations

	AADT							Projected Traffic								
Station #	1997	1998	1999	2000	2001	2002	2003	2005	2006	2007	2008	2010	2015	2020	2023	2030
208	5128	5467	5836	6660	5701	6560	6930	5400	6150	5990	6310	7084	7697	8311	8679	9538
210	3800	3828	4086	4769	4325	5443	5300	5010	4870	5320	5300	6221	7135	8049	8597	9877
212	2893	3005	3208	3737	3325	4269	4080	4330	4200	4200	3890	4945	5692	6439	6887	7933
295	2021	1901	1942	1960	2103	2383	2410	2450	2510	2460	2340	2724	3039	3355	3544	3986
297	2503	1411	1373	1400	1500	1514	1470	1250	1400	1500	1400	1492	1530	1568	1591	1644
Average 208 + 210						6,002	6,115	5,205	5,510	5,655	5,805	6,653	7,416	8,180	8,638	9,708
Difference						1,117	1,630	390	1,280	670	1,010	863	562	262	82	-339
27% of volume						1,620	1,651	1,405	1,488	1,527	1,567	1,796	2,002	2,209	2,332	2,621

MOVES was run twice for Monroe County for each year. First MOVES was run in Emission Rate mode to produce emissions by roadtype and speed. The output from the Rate per Vehicle and Rate per Distance were used to estimate the running emissions. Then MOVES was run in Inventory mode. The percentage of the county population within the nonattainment area was applied to produce the non-running emissions. Table 2.3-3 lists the input files to the County Data Importer. The input data are shown in Exhibits 7-10 for the years 2007 and 2023.

Table 2.3-3
Methodology to Prepare MOVES Input Data Files
For the County Data Importer for Monroe County

Input Data from Travel Demand Model

County Data Manager Inputs	Worksheet	Methodology
AverageSpeed Distribution	avgSpeedDistribution	MOVES National Defaults
Ramp Fraction	RoadType	MOVES National Defaults
RoadTypeDistribution	roadTypeDistribution	MOVES National Defaults
Vehicle Type VMT	HPMSVtypeYear	GDOT 445 Report was used to determine annual average DVMT. MOVES National Default vehicle type fractions were used to allocate to vehicle type. The daily VMT was annualized using the EPA AADVMT Calculator Excel workbook. (Future year DVMT was grown using past VMT from 445 Reports)
	MonthVMTFraction	MOVES National Defaults
	DayVMTFraction	MOVES National Defaults
	HourVMTFraction	MOVES National Defaults

Input Data from Other Sources

County Data Manager Inputs	Worksheet	Methodology
Source Type Population	sourceTypeYear	Vehicle population by source types was developed using 2002 R.L. Polk & Co. registration data. The 2002 data were grown to 2007 using either census person population estimates or Georgia annual vehicle registration data. Census population projection was used to calculate 2023 vehicle population.
I/M Programs	IMCoverage	No I/M Program
Fuel Supply	Fuel Supply	MOVES Defaults for Monroe County

County Data Manager Inputs	Worksheet	Methodology
	Fuel Formulation	MOVES Defaults for Monroe County
Meteorology Data	ZoneMonthHour	NCD20090531- 2007 data for Monroe County
Age Distribution	sourceTypeAgeDistribution	Age distributions in MOBILE6 format were derived from 2002 R.L. Polk & Co. registration data for all vehicle types, except for HDDV Class 8B where MOBILE6 defaults were used. They were converted into MOVES format using EPA converter.

Tables 2.3-4 and 2.3-5 list the summary of the emission calculations for the nonattainment area of Monroe County for 2007 and 2023. The spreadsheets are available upon request.

Table 2.3-3
Emissions for Nonattainment portion of Monroe County for 2007

Running Emissions

Entry/Exit Roads											**PM2.5**		**NOx**	
Based on Stations 208 & 210														
Year		**HPMS Code**	**MOVES Road Type**	**Volume**	**Mileage**	**VMT**	**No Adj**	**Final VMT**	**Speed**	**MOVES Speed Bin**	**Running Emission Factor**	**Running Emissions (in grams)**	**Running Emission Factor**	**Running Emissions (in grams)**
2007		9	3	1,527	0.25	381.7	1.0000	381.7	10	3	10.3917	3,966.6607	175.8768	67,134.3903
SR 18 Facility														
Pro-rated to one station														
Year	**Station**	**HPMS Code**		**Volume**	**Mileage**	**VMT**	**No Adj**	**Final VMT**	**Speed**	**MOVES Speed Bin**	**Running Emission Factor**	**Running Emissions (in grams)**	**Running Emission Factor**	**Running Emissions (in grams)**
2007	297	7	3	1,500	0.25	375.0	1.0000	375.0	35	8	5.7922	2,172.0656	109.6572	41,121.4667
Total Running Emissions												6,138.7263		108,255.8569

Non-Running Emissions				**PM2.5**		**NOx**	
Year	**Total Vehicle Population**	**Partial County Factor***		**Total County Level Non-Running Emissions (in grams)****	**Non-Running Emissions pro-rated by partial county factor(in grams)**	**Total County Level Non-Running Emissions (in grams)****	**Non-Running Emissions pro-rated by partial county factor(in grams)**
2007	24,426	0.004		26,933.9456	107.7358	1,547,382.3222	6,189.5293

Total Daily Emissions in Grams		**PM2.5**		**NOx**	
Year			**Total Emissions (in grams)**		**Total Emissions (in grams)**
2007			6,246.4621		114,445.3862

TotalDaily Emissions in Tons		**PM2.5**		**NOx**	
Year			**Total Daily Emissions (in tons)**		**Total Daily Emissions (in tons)**
2007			0.0069		0.1262

Total Annual Emissions in Tons		**PM2.5**		**NOx**	
Year			**Total Daily Emissions (in tons)**		**Total Daily Emissions (in tons)**
2007			2.3549		43.1448

Note:

**Partial county factor is based on percent of the population within the non-attainment area - using 2010 Census*

Table 2.3-4
Emissions for Nonattainment portion of Monroe County for 2023

Running Emissions

Entry/Exit Roads

											PM2.5		NOx	
Based on Stations 208 & 210														
Year		HPMS Code	MOVES Road Type	Volume	Mileage	VMT	No Adj	Final VMT	Speed	MOVES Speed Bin	Running Emission Factor	Running Emissions (in grams)	Running Emission Factor	Running Emissions (in grams)
2023		9	3	2,332	0.25	583.1	1.0000	583.1	10	3	1.3428	782.9165	17.2226	10,041.8787

SR 18 Facility

Pro-rated to one station														
Year	Station	HPMS Code		Volume	Mileage	VMT	No Adj	Final VMT	Speed	MOVES Speed Bin	Running Emission Factor	Running Emissions (in grams)	Running Emission Factor	Running Emissions (in grams)
2023	297	7	3	1,591	0.25	397.8	1.0000	397.8	35	8	0.5214	207.3872	10.5117	4,181.0321
Total Running Emissions												990.3037		14,222.9109

Non-Running Emissions

				PM2.5		NOx	
Year	Total Vehicle Population	Partial County Factor*		Total County Level Non-Running Emissions (in grams)	Non-Running Emissions pro-rated by partial county factor(in grams)	Total County Level Non-Running Emissions (in grams)	Non-Running Emissions pro-rated by partial county factor(in grams)
2023	34,441	0.004		3,054.5299	12.2181	368,397.9249	1,473.5917

Total Daily Emissions in Grams

		PM2.5	NOx
Year		Total Emissions (in grams)	Total Emissions (in grams)
2023		1,002.5219	15,696.5026

Total Daily Emissions in Tons

		PM2.5	NOx
Year		Total Daily Emissions (in tons)	Total Daily Emissions (in tons)
2023		0.0011	0.0173

Total Annual Emissions in Tons

		PM2.5	NOx
Year		Total Daily Emissions (in tons)	Total Daily Emissions (in tons)
2023		0.3779	5.9174

Note:

**Partial county factor is based on percent of the population within the non-attainment area - using 2010 Census*

2.4 Nonattainment Area Emissions Analysis Summary

A factor was developed to annualize the weekday emissions to include weekend activity. The factor was based on the MOVES defaults for DayVMTFractions which is being used as part of the MOVES inputs. The following formula was used:

Number of weekday equivalents in a year = 365*(5/7)+365*(2/7)*MOVES Urban Weekend Adjustment Factor(.7793) = 341.9809 (rounded to 342)

This is shown in cell D34 of tab "Import HPMS AADVMT and Factors" in the EPA AADVMTCalculator Excel workbook. The daily emissions are produced in grams and are converted to tons by dividing by 907,184.74. The daily emissions in tons are then multiplied by 342 to get annual emissions. Table 2.4-1 lists the results from the regional emissions analysis produced using the travel demand model in daily grams by county while Table 2.4-2 lists the emissions in annual tons.

Table 2.4-1
Summary of Mobile Source Emissions for Macon Nonattainment Area
(Daily Grams)

		PM2.5			Nox		
Year	County	Running	Non-running	Total	Running	Non-running	Total
2007	Bibb	661,868.7737	38,192.5713	700,061.3450	17,386,111.1673	2,498,616.5412	19,884,727.7085
	Monroe	6,138.7263	107.7358	6,246.4621	108,255.8569	6,189.5293	114,445.3862
	Total	668,007.5000	38,300.3071	706,307.8071	17,494,367.0242	2,504,806.0705	1,999,173.0947
		PM2.5			Nox		
Year	County	Running	Non-running	Total	Running	Non-running	Total
2023	Bibb	172,857.1837	12,328.0220	185,185.2057	3,743,833.9585	1,522,244.4094	1,534,572.4314
	Monroe	990.3037	12.2181	1,002.5218	14,222.9109	1,473.5917	15,696.5026
	Total	173,847.4874	12,340.2401	186,187.7275	3,758,056.8694	1,523,718.0011	1,550,268.9340

Table 2.4-2
Summary of Mobile Source Emissions for Macon Nonattainment Area
(Annual Tons)

		PM2.5			Nox		
Year	County	Running	Non-running	Total	Running	Non-running	Total
2007	Bibb	249.5183	14.3983	263.9166	6,554.3982	941.9546	7,496.3528

		PM2.5			Nox		
Year	**County**	**Running**	**Non-running**	**Total**	**Running**	**Non-running**	**Total**
	Monroe	2.3142	0.0406	2.3548	40.8114	2.3334	43.1448
	Total	251.8325	14.4389	266.2714	6,595.2096	944.2880	7,539.4976
		PM2.5			**Nox**		
Year	**County**	**Running**	**Non-running**	**Total**	**Running**	**Non-running**	**Total**
2023	Bibb	65.1655	4.6476	69.8131	1,411.3897	573.8717	1,985.2614
	Monroe	0.3733	0.0046	0.3779	5.3619	0.5555	5.9174
	Total	65.5388	4.6522	70.1910	1,416.7516	574.4272	1,991.1788

A series of sensitivity tests were performed for the future years 2023, 2035 and 2040. These tests assumed different growth scenarios in the nonattainment area and were used to develop safety margins. The last major Regional Transportation Plan was developed in 2009. The update of the Regional Transportation Plan for 2040 is underway and is due in 2013. Model runs were performed for 2040 with various growth assumptions. The estimated growth rate between 2023 and 2040 is less than 10%. An alternative scenario was tested where the growth increased by 30% for the years 2023 and 2040 to account for uncertainty in the future of growth projections and implementation of transportation improvements. The test for 2023 was to account for the potential impact the Transportation Investment Act may have on travel patterns and growth for 2023.

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
(404) 656-5277

State of Georgia
#2 Capitol Square, S.W.
Atlanta, Georgia 30334-1002

LARRY E. DENT
DEPUTY COMMISSIONER
(404) 656-5212

EARL L. MAHFUZ
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 ackrowledges 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: 2007 RunSpec for Bibb County

```
<runspec>
    <description><![CDATA[Bibb County 2007 PM2.5 maintenance plan Inventory
Readjust HPMS factors based 2006 model
Weight vmt by type by the model vmt by road type
071411 - Run #1
091211 - Run #5 -Used Cube roadtype dstrb]]></description>
    <modelscale value="Inv"/>
    <modeldomain value="SINGLE"/>
    <geographicselections>
        <geographicselection type="COUNTY" key="13021" description="GEORGIA - Bibb County"/>
    </geographicselections>
    <timespan>
        <year key="2007"/>
        <month id="7"/>
        <day id="5"/>
        <beginhour id="1"/>
        <endhour id="24"/>
        <aggregateBy key="Hour"/>
    </timespan>
    <onroadvehicleselections>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="62" sourcetypename="Combination Long-haul Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="61" sourcetypename="Combination Short-haul Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="41" sourcetypename="Intercity Bus"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="54" sourcetypename="Motor Home"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="21" sourcetypename="Passenger Car"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31" sourcetypename="Passenger Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="51" sourcetypename="Refuse Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="43" sourcetypename="School Bus"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="42" sourcetypename="Transit Bus"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="61" sourcetypename="Combination Short-haul Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="54" sourcetypename="Motor Home"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="11" sourcetypename="Motorcycle"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="21" sourcetypename="Passenger Car"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="31" sourcetypename="Passenger Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="51" sourcetypename="Refuse Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="43" sourcetypename="School Bus"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
```

<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="42" sourcetypename="Transit Bus"/>
</onroadvehicleselections>
<offroadvehicleselections>
</offroadvehicleselections>
<offroadvehiclesccs>
</offroadvehiclesccs>
<roadtypes>
<roadtype roadtypeid="1" roadtypename="Off-Network"/>
<roadtype roadtypeid="2" roadtypename="Rural Restricted Access"/>
<roadtype roadtypeid="3" roadtypename="Rural Unrestricted Access"/>
<roadtype roadtypeid="4" roadtypename="Urban Restricted Access"/>
<roadtype roadtypeid="5" roadtypename="Urban Unrestricted Access"/>
</roadtypes>
<pollutantprocessassociations>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="116" pollutantname="Primary PM2.5 - Brakewear Particulate" processkey="9" processname="Brakewear"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="2" processname="Start Exhaust"/>

<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="117" pollutantname="Primary PM2.5 - Tirewear Particulate" processkey="10" processname="Tirewear"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="90" processname="Extended Idle Exhaust"/>
</pollutantprocessassociations>
<databaseselections>
<databaseselection servername="" databasename="bibb_2007_pm_inventory_input5" description=""/>
</databaseselections>
<internalcontrolstrategies>
<internalcontrolstrategy classname="gov.epa.otaq.moves.master.implementation.ghg.internalcontrolstrategies.rateofprogress.RateOfProgressStrategy"><![CDATA[
useParameters No

]]></internalcontrolstrategy>
</internalcontrolstrategies>
<inputdatabase servername="" databasename="" description=""/>
<uncertaintyparameters uncertaintymodeenabled="false" numberofrunspersimulation="0" numberofsimulations="0"/>
<geographicoutputdetail description="COUNTY"/>
<outputemissionsbreakdownselection>
<modelyear selected="false"/>
<fueltype selected="false"/>

```
		<emissionprocess selected="true"/>
		<onroadoffroad selected="true"/>
		<roadtype selected="true"/>
		<sourceusetype selected="false"/>
		<movesvehicletype selected="false"/>
		<onroadscc selected="false"/>
		<offroadscc selected="false"/>
		<estimateuncertainty selected="false" numberOfIterations="2" keepSampledData="false" keepIterations="false"/>
		<sector selected="false"/>
		<engtechid selected="false"/>
		<hpclass selected="false"/>
	</outputemissionsbreakdownselection>
	<outputdatabase servername="" databasename="bibb_2007_pm_SO2_output5" description=""/>
	<outputtimestep value="Hour"/>
	<outputvmtdata value="true"/>
	<outputsho value="false"/>
	<outputsh value="false"/>
	<outputshp value="false"/>
	<outputshidling value="false"/>
	<outputstarts value="false"/>
	<outputpopulation value="true"/>
	<scaleinputdatabase servername="localhost" databasename="bibb_2007_pm_inventory_input5" description=""/>
	<pmsize value="0"/>
	<outputfactors>
		<timefactors selected="true" units="Hours"/>
		<distancefactors selected="true" units="Miles"/>
		<massfactors selected="true" units="Grams" energyunits="Joules"/>
	</outputfactors>
	<savedata>

	</savedata>

	<donotexecute>

	</donotexecute>

	<generatordatabase shouldsave="false" servername="" databasename="" description=""/>
		<donotperformfinalaggregation selected="false"/>
	<lookuptableflags scenarioid="bibb_2007" truncateoutput="false" truncateactivity="false"/>
</runspec>
```

Exhibit 2: MOVES Input Data for Bibb County Emissions for PM2.5 SIP Budget – 2007

Ramp Fraction

roadTypeID	RampFraction
2	0
4	0.0400

Sample Average Speed Distribution

sourceTypeid	roadTypeID	hourDayID	AvgSpeedBinID	AvgSpeedFraction
11	3	115	8	0.29629
21	3	115	8	0.29629
31	3	115	8	0.29629
32	3	115	8	0.29629
41	3	115	8	0.29629
42	3	115	8	0.29629
43	3	115	8	0.29629
51	3	115	8	0.29629
52	3	115	8	0.29629
53	3	115	8	0.29629
54	3	115	8	0.29629
61	3	115	8	0.29629
62	3	115	8	0.29629
11	3	115	9	0.20783
21	3	115	9	0.20783
31	3	115	9	0.20783
32	3	115	9	0.20783
41	3	115	9	0.20783
42	3	115	9	0.20783
43	3	115	9	0.20783
51	3	115	9	0.20783
52	3	115	9	0.20783
53	3	115	9	0.20783
54	3	115	9	0.20783
61	3	115	9	0.20783
62	3	115	9	0.20783
11	3	115	10	0.26139
21	3	115	10	0.26139
31	3	115	10	0.26139

sourceTypeid	roadTypeID	hourDayID	AvgSpeedBinID	AvgSpeedFraction
32	3	115	10	0.26139
41	3	115	10	0.26139
42	3	115	10	0.26139
43	3	115	10	0.26139
51	3	115	10	0.26139
52	3	115	10	0.26139
53	3	115	10	0.26139
54	3	115	10	0.26139
61	3	115	10	0.26139
62	3	115	10	0.26139

Note: File contains19,969 records and is available on request

Road Type Distribution

sourceTypeid	roadTypeID	RoadTypeVMTFraction
11	1	0.00000
11	2	0.00192
11	3	0.08081
11	4	0.42909
11	5	0.48818
21	1	0.00000
21	2	0.00192
21	3	0.08081
21	4	0.42909
21	5	0.48818
31	1	0.00000
31	2	0.00192
31	3	0.08081
31	4	0.42909
31	5	0.48818
32	1	0.00000
32	2	0.00192
32	3	0.08081
32	4	0.42909
32	5	0.48818
41	1	0.00000
41	2	0.00192
41	3	0.08081
41	4	0.42909
41	5	0.48818
42	1	0.00000

sourceTypeid	roadTypeID	RoadTypeVMTFraction
42	2	0.00192
42	3	0.08081
42	4	0.42909
42	5	0.48818
43	1	0.00000
43	2	0.00192
43	3	0.08081
43	4	0.42909
43	5	0.48818
51	1	0.00000
51	2	0.00192
51	3	0.08081
51	4	0.42909
51	5	0.48818
52	1	0.00000
52	2	0.00192
52	3	0.08081
52	4	0.42909
52	5	0.48818
53	1	0.00000
53	2	0.00192
53	3	0.08081
53	4	0.42909
53	5	0.48818
54	1	0.00000
54	2	0.00192
54	3	0.08081
54	4	0.42909

Source Type Population

yearID	sourceTypeID	sourceTypePopulation
2007	11	2256
2007	21	74020
2007	31	39305
2007	32	12921
2007	41	46
2007	42	28
2007	43	455
2007	51	65

yearID	sourceTypeID	sourceTypePopulation
2007	52	2434
2007	53	174
2007	54	269
2007	61	1031
2007	62	1142

Vehicle Type VMT – HPMSVtypeYear Worksheet

HPMSVtypeID	yearID	HPMSBaseYearVMT	baseYearOffNetVMT
10	2007	6089363.468	0
20	2007	1131933964	0
30	2007	671602403.6	0
40	2007	10356630.66	0
50	2007	62908806.1	0
60	2007	122846433.9	0

Vehicle Type VMT – Sample HourVMTFraction

sourceTypeid	roadTypeID	dayID	hourID	HourVMTFraction
11	2	5	1	0.01000
11	2	5	2	0.00600
11	2	5	3	0.00480
11	2	5	4	0.00450
11	2	5	5	0.00670
11	2	5	6	0.01850
11	2	5	7	0.05011
11	2	5	8	0.07732
11	2	5	9	0.06131
11	2	5	10	0.04821
11	2	5	11	0.04791
11	2	5	12	0.05121
11	2	5	13	0.05361
11	2	5	14	0.05471
11	2	5	15	0.06051
11	2	5	16	0.07271
11	2	5	17	0.08282
11	2	5	18	0.08272
11	2	5	19	0.05891
11	2	5	20	0.04181
11	2	5	21	0.03321
11	2	5	22	0.03031
11	2	5	23	0.02440

sourceTypeid	roadTypeID	dayID	hourID	HourVMTFraction
11	2	5	24	0.01771
11	3	5	1	0.01000
11	3	5	2	0.00600
11	3	5	3	0.00480
11	3	5	4	0.00450
11	3	5	5	0.00670
11	3	5	6	0.01850
11	3	5	7	0.05011
11	3	5	8	0.07730
11	3	5	9	0.06136
11	3	5	10	0.04824
11	3	5	11	0.04791
11	3	5	12	0.05122
11	3	5	13	0.05362
11	3	5	14	0.05472
11	3	5	15	0.06052
11	3	5	16	0.07269
11	3	5	17	0.08276
11	3	5	18	0.08265
11	3	5	19	0.05891
11	3	5	20	0.04181
11	3	5	21	0.03321
11	3	5	22	0.03032
11	3	5	23	0.02442
11	3	5	24	0.01773
11	4	5	1	0.01009
11	4	5	2	0.00609
11	4	5	3	0.00487
11	4	5	4	0.00453
11	4	5	5	0.00671
11	4	5	6	0.01849
11	4	5	7	0.05014
11	4	5	8	0.07698
11	4	5	9	0.06182
11	4	5	10	0.04859
11	4	5	11	0.04805
11	4	5	12	0.05137
11	4	5	13	0.05370
11	4	5	14	0.05482
11	4	5	15	0.06052

sourceTypeid	roadTypeID	dayID	hourID	HourVMTFraction
11	4	5	16	0.07234
11	4	5	17	0.08196
11	4	5	18	0.08177
11	4	5	19	0.05889
11	4	5	20	0.04194
11	4	5	21	0.03329
11	4	5	22	0.03050
11	4	5	23	0.02465
11	4	5	24	0.01789

Note: File contains 1,561 records and is available on request

Meteorology Data

monthID	zoneID	HourID	temperature	relHumidity
7	130210	1	57.417	76.100
7	130210	2	56.317	78.308
7	130210	3	55.308	79.892
7	130210	4	54.308	81.383
7	130210	5	53.467	82.650
7	130210	6	52.692	83.733
7	130210	7	52.117	84.350
7	130210	8	52.833	83.592
7	130210	9	55.942	79.233
7	130210	10	60.933	70.883
7	130210	11	65.750	61.967
7	130210	12	69.800	54.733
7	130210	13	72.967	49.625
7	130210	14	75.108	46.183
7	130210	15	76.467	44.058
7	130210	16	77.117	42.958
7	130210	17	77.017	42.900
7	130210	18	75.733	44.617
7	130210	19	72.508	49.658
7	130210	20	68.200	57.167
7	130210	21	64.433	64.017
7	130210	22	61.942	68.467
7	130210	23	60.175	71.458
7	130210	24	58.633	74.117

Age Distribution - Sample

sourceTypeID	yearID	ageID	ageFraction
21	2007	0	0.01120
21	2007	1	0.04500
21	2007	2	0.04950
21	2007	3	0.06050
21	2007	4	0.05960
21	2007	5	0.05660
21	2007	6	0.06200
21	2007	7	0.06170
21	2007	8	0.07150
21	2007	9	0.06340
21	2007	10	0.05760
21	2007	11	0.05230
21	2007	12	0.04650
21	2007	13	0.04440
21	2007	14	0.04280
21	2007	15	0.03620
21	2007	16	0.03170
21	2007	17	0.02650
21	2007	18	0.02350
21	2007	19	0.01910
21	2007	20	0.01140
21	2007	21	0.00690
21	2007	22	0.00670
21	2007	23	0.00530
21	2007	24	0.00419
21	2007	25	0.00332
21	2007	26	0.00262
21	2007	27	0.00208
21	2007	28	0.00164
21	2007	29	0.00130
21	2007	30	0.03295
31	2007	0	0.01547
31	2007	1	0.03961
31	2007	2	0.04477
31	2007	3	0.04793
31	2007	4	0.04774
31	2007	5	0.05304
31	2007	6	0.06438
31	2007	7	0.02946
31	2007	8	0.03986
31	2007	9	0.04598
31	2007	10	0.04906

sourceTypeID	yearID	ageID	ageFraction
31	2007	11	0.04226
31	2007	12	0.03997
31	2007	13	0.05252
31	2007	14	0.05539
31	2007	15	0.05388
31	2007	16	0.04229
31	2007	17	0.05027
31	2007	18	0.04733
31	2007	19	0.04471
31	2007	20	0.03223
31	2007	21	0.02617
31	2007	22	0.02961
31	2007	23	0.00046
31	2007	24	0.00039
31	2007	25	0.00036
31	2007	26	0.00032
31	2007	27	0.00028
31	2007	28	0.00025
31	2007	29	0.00023
31	2007	30	0.00378

Note: File contains 373 records and is available on request

Exhibit 3: 2023 RunSpec

```
<runspec>
    <description><![CDATA[Bibb County 2023 PM2.5 maintenance plan Inventory
Readjust HPMS factors based 2006 model
Rerun using scripts similar to ARC's
Weight vmt by type by the model vmt by road type
Run#5 - Used Cube scripts - 091211
]]></description>
    <modelscale value="Inv"/>
    <modeldomain value="SINGLE"/>
    <geographicselections>
        <geographicselection type="COUNTY" key="13021" description="GEORGIA - Bibb County"/>
    </geographicselections>
    <timespan>
        <year key="2023"/>
        <month id="7"/>
        <day id="5"/>
        <beginhour id="1"/>
        <endhour id="24"/>
        <aggregateBy key="Hour"/>
    </timespan>
    <onroadvehicleselections>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="62" sourcetypename="Combination Long-haul Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="61" sourcetypename="Combination Short-haul Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="41" sourcetypename="Intercity Bus"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="54" sourcetypename="Motor Home"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="21" sourcetypename="Passenger Car"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31" sourcetypename="Passenger Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="51" sourcetypename="Refuse Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="43" sourcetypename="School Bus"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="42" sourcetypename="Transit Bus"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="61" sourcetypename="Combination Short-haul Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="54" sourcetypename="Motor Home"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="11" sourcetypename="Motorcycle"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="21" sourcetypename="Passenger Car"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="31" sourcetypename="Passenger Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="51" sourcetypename="Refuse Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="43" sourcetypename="School Bus"/>
```

<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="42" sourcetypename="Transit Bus"/>
</onroadvehicleselections>
<offroadvehicleselections>
</offroadvehicleselections>
<offroadvehiclesccs>
</offroadvehiclesccs>
<roadtypes>
<roadtype roadtypeid="1" roadtypename="Off-Network"/>
<roadtype roadtypeid="2" roadtypename="Rural Restricted Access"/>
<roadtype roadtypeid="3" roadtypename="Rural Unrestricted Access"/>
<roadtype roadtypeid="4" roadtypename="Urban Restricted Access"/>
<roadtype roadtypeid="5" roadtypename="Urban Unrestricted Access"/>
</roadtypes>
<pollutantprocessassociations>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="116" pollutantname="Primary PM2.5 - Brakewear Particulate" processkey="9" processname="Brakewear"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="1" processname="Running Exhaust"/>

<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="117" pollutantname="Primary PM2.5 - Tirewear Particulate" processkey="10" processname="Tirewear"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="90" processname="Extended Idle Exhaust"/>
</pollutantprocessassociations>
<databaseselections>
<databaseselection servername="" databasename="bibb_2023_pm_inventory_input5" description=""/>
</databaseselections>
<internalcontrolstrategies>
<internalcontrolstrategy classname="gov.epa.otaq.moves.master.implementation.ghg.internalcontrolstrategies.rateofprogress.RateOfProgressStrategy"><![CDATA[
useParameters	No

]]></internalcontrolstrategy>
</internalcontrolstrategies>
<inputdatabase servername="" databasename="" description=""/>
<uncertaintyparameters uncertaintymodeenabled="false" numberofrunspersimulation="0" numberofsimulations="0"/>
<geographicoutputdetail description="NATION"/>
<outputemissionsbreakdownselection>
<modelyear selected="false"/>

```
		<fueltype selected="false"/>
		<emissionprocess selected="true"/>
		<onroadoffroad selected="true"/>
		<roadtype selected="true"/>
		<sourceusetype selected="false"/>
		<movesvehicletype selected="false"/>
		<onroadscc selected="false"/>
		<offroadscc selected="false"/>
		<estimateuncertainty selected="false" numberOfIterations="2" keepSampledData="false" keepIterations="false"/>
		<sector selected="false"/>
		<engtechid selected="false"/>
		<hpclass selected="false"/>
	</outputemissionsbreakdownselection>
	<outputdatabase servername="" databasename="bibb_2023_pm_inventory_output5" description=""/>
	<outputtimestep value="Hour"/>
	<outputvmtdata value="true"/>
	<outputsho value="false"/>
	<outputsh value="false"/>
	<outputshp value="false"/>
	<outputshidling value="false"/>
	<outputstarts value="false"/>
	<outputpopulation value="true"/>
	<scaleinputdatabase servername="localhost" databasename="bibb_2023_pm_inventory_input5" description=""/>
	<pmsize value="0"/>
	<outputfactors>
		<timefactors selected="true" units="Hours"/>
		<distancefactors selected="true" units="Miles"/>
		<massfactors selected="true" units="Grams" energyunits="Joules"/>
	</outputfactors>
	<savedata>

	</savedata>

	<donotexecute>

	</donotexecute>

	<generatordatabase shouldsave="false" servername="" databasename="" description=""/>
		<donotperformfinalaggregation selected="false"/>
	<lookuptableflags scenarioid="bibb_2023" truncateoutput="false" truncateactivity="false"/>
</runspec>
```

Exhibit 4: MOVES Input Data for Bibb County Emissions for PM2.5 SIP Budget – 2023

Ramp Fraction

roadTypeID	RampFraction
2	0
4	0.0800

Sample Average Speed Distribution

sourceTypeid	roadTypeID	hourDayID	AvgSpeedBinID	AvgSpeedFraction
11	3	15	8	0.23614
21	3	15	8	0.23614
31	3	15	8	0.23614
32	3	15	8	0.23614
41	3	15	8	0.23614
42	3	15	8	0.23614
43	3	15	8	0.23614
51	3	15	8	0.23614
52	3	15	8	0.23614
53	3	15	8	0.23614
54	3	15	8	0.23614
61	3	15	8	0.23614
62	3	15	8	0.23614
11	3	15	9	0.30415
21	3	15	9	0.30415
31	3	15	9	0.30415
32	3	15	9	0.30415
41	3	15	9	0.30415
42	3	15	9	0.30415
43	3	15	9	0.30415
51	3	15	9	0.30415
52	3	15	9	0.30415
53	3	15	9	0.30415
54	3	15	9	0.30415
61	3	15	9	0.30415
62	3	15	9	0.30415
11	3	15	10	0.14167
21	3	15	10	0.14167
31	3	15	10	0.14167
32	3	15	10	0.14167
41	3	15	10	0.14167

sourceTypeid	roadTypeID	hourDayID	AvgSpeedBinID	AvgSpeedFraction
42	3	15	10	0.14167
43	3	15	10	0.14167
51	3	15	10	0.14167
52	3	15	10	0.14167
53	3	15	10	0.14167
54	3	15	10	0.14167
61	3	15	10	0.14167
62	3	15	10	0.14167

Note: File contains19,969 records and is available on request

Road Type Distribution

sourceTypeid	roadTypeID	RoadTypeVMTFraction
11	1	0.00000
11	2	0.00216
11	3	0.08445
11	4	0.47367
11	5	0.43971
21	1	0.00000
21	2	0.00216
21	3	0.08445
21	4	0.47367
21	5	0.43971
31	1	0.00000
31	2	0.00216
31	3	0.08445
31	4	0.47367
31	5	0.43971
32	1	0.00000
32	2	0.00216
32	3	0.08445
32	4	0.47367
32	5	0.43971
41	1	0.00000
41	2	0.00216
41	3	0.08445
41	4	0.47367
41	5	0.43971
42	1	0.00000
42	2	0.00216
42	3	0.08445
42	4	0.47367

sourceTypeid	roadTypeID	RoadTypeVMTFraction
42	5	0.43971
43	1	0.00000
43	2	0.00216
43	3	0.08445
43	4	0.47367
43	5	0.43971
51	1	0.00000
51	2	0.00216
51	3	0.08445
51	4	0.47367
51	5	0.43971
52	1	0.00000
52	2	0.00216
52	3	0.08445
52	4	0.47367
52	5	0.43971
53	1	0.00000
53	2	0.00216
53	3	0.08445
53	4	0.47367
53	5	0.43971
54	1	0.00000
54	2	0.00216
54	3	0.08445
54	4	0.47367
54	5	0.43971
61	1	0.00000
61	2	0.00216
61	3	0.08445
61	4	0.47367
61	5	0.43971
62	1	0.00000
62	2	0.00216
62	3	0.08445
62	4	0.47367
62	5	0.43971

Source Type Population

yearID	sourceTypeID	sourceTypePopulation
2023	11	2347
2023	21	76988
2023	31	40881
2023	32	13439
2023	41	48
2023	42	29
2023	43	474
2023	51	68
2023	52	2531
2023	53	181
2023	54	279
2023	61	1073
2023	62	1454

Vehicle Type VMT – HPMSVtypeYear Worksheet

HPMSVtypeID	yearID	HPMSBaseYearVMT	baseYearOffNetVMT
10	2023	7,569,538.22	0.00
20	2023	1,442,340,512.78	0.00
30	2023	774,433,109.86	0.00
40	2023	13,120,109.04	0.00
50	2023	78,086,337.55	0.00
60	2023	161,836,266.26	0.00

Vehicle Type VMT – Sample HourVMTFraction

sourceTypeid	roadTypeID	dayID	hourID	HourVMTFraction
11	2	5	1	0.01004
11	2	5	2	0.00603
11	2	5	3	0.00479
11	2	5	4	0.00437
11	2	5	5	0.00653
11	2	5	6	0.01834
11	2	5	7	0.05030
11	2	5	8	0.07686
11	2	5	9	0.06306
11	2	5	10	0.04921
11	2	5	11	0.04817
11	2	5	12	0.05165
11	2	5	13	0.05390

sourceTypeid	roadTypeID	dayID	hourID	HourVMTFraction
11	2	5	14	0.05509
11	2	5	15	0.06063
11	2	5	16	0.07190
11	2	5	17	0.08080
11	2	5	18	0.08035
11	2	5	19	0.05882
11	2	5	20	0.04202
11	2	5	21	0.03327
11	2	5	22	0.03073
11	2	5	23	0.02499
11	2	5	24	0.01815
11	3	5	1	0.01002
11	3	5	2	0.00601
11	3	5	3	0.00481
11	3	5	4	0.00449
11	3	5	5	0.00668
11	3	5	6	0.01848
11	3	5	7	0.05013
11	3	5	8	0.07720
11	3	5	9	0.06154
11	3	5	10	0.04837
11	3	5	11	0.04797
11	3	5	12	0.05128
11	3	5	13	0.05365
11	3	5	14	0.05477
11	3	5	15	0.06053
11	3	5	16	0.07258
11	3	5	17	0.08249
11	3	5	18	0.08235
11	3	5	19	0.05891
11	3	5	20	0.04186
11	3	5	21	0.03323
11	3	5	22	0.03038
11	3	5	23	0.02450
11	3	5	24	0.01777
11	4	5	1	0.01005
11	4	5	2	0.00604
11	4	5	3	0.00482
11	4	5	4	0.00447
11	4	5	5	0.00665

sourceTypeid	roadTypeID	dayID	hourID	HourVMTFraction
11	4	5	6	0.01845
11	4	5	7	0.05016
11	4	5	8	0.07702
11	4	5	9	0.06196
11	4	5	10	0.04865
11	4	5	11	0.04806
11	4	5	12	0.05141
11	4	5	13	0.05373
11	4	5	14	0.05486
11	4	5	15	0.06055
11	4	5	16	0.07233
11	4	5	17	0.08190
11	4	5	18	0.08169
11	4	5	19	0.05890
11	4	5	20	0.04194
11	4	5	21	0.03327
11	4	5	22	0.03050
11	4	5	23	0.02466
11	4	5	24	0.01793

Note: File contains 1,561 records and is available on request

Meteorology Data

monthID	zoneID	HourID	temperature	relHumidity
7	130210	1	57.417	76.100
7	130210	2	56.317	78.308
7	130210	3	55.308	79.892
7	130210	4	54.308	81.383
7	130210	5	53.467	82.650
7	130210	6	52.692	83.733
7	130210	7	52.117	84.350
7	130210	8	52.833	83.592
7	130210	9	55.942	79.233
7	130210	10	60.933	70.883
7	130210	11	65.750	61.967
7	130210	12	69.800	54.733
7	130210	13	72.967	49.625
7	130210	14	75.108	46.183
7	130210	15	76.467	44.058
7	130210	16	77.117	42.958
7	130210	17	77.017	42.900
7	130210	18	75.733	44.617
7	130210	19	72.508	49.658

monthID	zoneID	HourID	temperature	relHumidity
7	130210	20	68.200	57.167
7	130210	21	64.433	64.017
7	130210	22	61.942	68.467
7	130210	23	60.175	71.458
7	130210	24	58.633	74.117

Age Distribution - Sample

sourceTypeID	yearID	ageID	ageFraction
21	2023	0	0.01120
21	2023	1	0.04500
21	2023	2	0.04950
21	2023	3	0.06050
21	2023	4	0.05960
21	2023	5	0.05660
21	2023	6	0.06200
21	2023	7	0.06170
21	2023	8	0.07150
21	2023	9	0.06340
21	2023	10	0.05760
21	2023	11	0.05230
21	2023	12	0.04650
21	2023	13	0.04440
21	2023	14	0.04280
21	2023	15	0.03620
21	2023	16	0.03170
21	2023	17	0.02650
21	2023	18	0.02350
21	2023	19	0.01910
21	2023	20	0.01140
21	2023	21	0.00690
21	2023	22	0.00670
21	2023	23	0.00530
21	2023	24	0.00419
21	2023	25	0.00332
21	2023	26	0.00262
21	2023	27	0.00208
21	2023	28	0.00164
21	2023	29	0.00130
21	2023	30	0.03295
31	2023	0	0.01547
31	2023	1	0.03961
31	2023	2	0.04477
31	2023	3	0.04793

sourceTypeID	yearID	ageID	ageFraction
31	2023	4	0.04774
31	2023	5	0.05304
31	2023	6	0.06438
31	2023	7	0.02946
31	2023	8	0.03986
31	2023	9	0.04598
31	2023	10	0.04906
31	2023	11	0.04226
31	2023	12	0.03997
31	2023	13	0.05252
31	2023	14	0.05539
31	2023	15	0.05388
31	2023	16	0.04229
31	2023	17	0.05027
31	2023	18	0.04733
31	2023	19	0.04471
31	2023	20	0.03223
31	2023	21	0.02617
31	2023	22	0.02961
31	2023	23	0.00046
31	2023	24	0.00039
31	2023	25	0.00036
31	2023	26	0.00032
31	2023	27	0.00028
31	2023	28	0.00025
31	2023	29	0.00023
31	2023	30	0.00378

Note: File contains 373 records and is available on request

Exhibit 5: Vehicle Classification Counts

Weekday vehicle classification counts from GDOT were obtained for the years 2008 through 2010 for the entire state of Georgia. The counts for the 13 county nonattainment Atlanta MPO area were eliminated from the calculations. The vehicle classification counts collected were stratified based on the FHWA vehicle classifications. The counts were then summarized into the 6 HPMS vehicle type categories based the FHWA vehicle classifications. The percent by vehicle type by road type based on functional classification was calculated by year and then averaged for the three years. Table1 list the counts by year. Table 2 lists the final factors for VMT by vehicle type by road type based on the counts. These values were used to weight the VMT from the travel demand model by road type by vehicle type for input into AADVMT worksheet..

Table 1
GDOT Vehicle Classification Counts

2008 Statewide minus ARC 13 County MPO Area

			Weekday Counts				Percent by Road Type			
Code	HPMS Vehicle Type	FHWA Veh Class	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)
10	Motorcycles	Class 1	415,477	276,557	703,762	273,810	0.3%	0.4%	0.3%	0.3%
20	Passenger Cars	Class 2	78,146,859	45,813,738	134,370,835	70,721,022	55.0%	64.5%	65.4%	74.5%
30	Other 2 axle-4 tire vehicles	Class 3	23,048,320	16,181,222	37,536,241	19,040,830	16.2%	22.8%	18.3%	20.1%
40	Buses	Class 4	1,348,962	412,115	1,464,298	372,563	0.9%	0.6%	0.7%	0.4%
50	Single Unit Trucks	Class 5-7	5,177,758	3,054,596	6,643,091	2,735,728	3.6%	4.3%	3.2%	2.9%
60	Combination Trucks	Class 8-13	33,983,937	5,320,479	24,746,197	1,724,995	23.9%	7.5%	12.0%	1.8%
			142,121,313	71,058,707	205,464,424	94,868,948	100%	100%	100%	100%

2009 Statewide minus ARC 13 County MPO Area

			Weekday Counts				Percent by Road Type			
Code	HPMS Vehicle Type	FHWA Veh Class	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)
10	Motorcycles	Class 1	543,569	380,461	552,296	334,712	0.3%	0.3%	0.3%	0.3%
20	Passenger Cars	Class 2	99,860,922	74,033,369	123,617,071	92,974,090	57.6%	65.0%	66.5%	73.4%
30	Other 2 axle-4 tire vehicles	Class 3	29,013,174	25,257,242	35,153,989	26,580,997	16.7%	22.2%	18.9%	21.0%
40	Buses	Class 4	1,445,231	636,498	1,260,763	480,718	0.8%	0.6%	0.7%	0.4%
50	Single Unit Trucks	Class 5-7	5,931,816	4,577,695	5,977,298	3,774,967	3.4%	4.0%	3.2%	3.0%
60	Combination Trucks	Class 8-13	36,572,792	9,058,107	19,363,526	2,566,080	21.1%	7.9%	10.4%	2.0%
			173,367,504	113,943,372	185,924,943	126,711,564	100%	100%	100%	100%

Table 1
GDOT Vehicle Classification Counts (continued)

2010 Statewide minus ARC 13 County MPO Area

			Weekday Counts				Percent by Road Type			
Code	HPMS Vehicle Type	FHWA Veh Class	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)
10	Motorcycles	Class 1	531,781	465,637	767,240	413,477	0.3%	0.3%	0.3%	0.3%
20	Passenger Cars	Class 2	115,785,383	90,783,273	163,511,794	103,655,999	58.1%	64.4%	68.1%	73.3%
30	Other 2 axle-4 tire vehicles	Class 3	33,029,619	31,077,060	45,607,435	29,985,205	16.6%	22.1%	19.0%	21.2%
40	Buses	Class 4	1,648,242	837,435	1,403,597	520,635	0.8%	0.6%	0.6%	0.4%
50	Single Unit Trucks	Class 5-7	6,527,272	5,527,587	7,477,099	4,162,187	3.3%	3.9%	3.1%	2.9%
60	Combination Trucks	Class 8-13	41,728,831	12,222,357	21,492,738	2,746,397	20.9%	8.7%	8.9%	1.9%
	Total		199,251,128	140,913,349	240,259,903	141,483,900	100%	100%	100%	100%

2008-2010 Statewide minus ARC 13 County MPO Area Summary

			Weekday Counts				Percent by Road Type			
Code	HPMS Vehicle Type	FHWA Veh Class	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)
10	Motorcycles	Class 1	1,490,827	1,122,655	2,023,298	1,021,999	0.3%	0.3%	0.2%	0.2%
20	Passenger Cars	Class 2	293,793,164	210,630,380	421,499,700	267,351,111	57.7%	67.7%	73.5%	76.6%
30	Other 2 axle-4 tire vehicles	Class 3	85,091,113	72,515,524	118,297,665	75,607,032	16.7%	20.7%	16.5%	18.6%
40	Buses	Class 4	4,442,435	1,886,048	4,128,658	1,373,916	0.9%	0.6%	0.7%	0.5%
50	Single Unit Trucks	Class 5-7	17,636,846	13,159,878	20,097,488	10,672,882	3.4%	3.8%	3.0%	2.7%
60	Combination Trucks	Class 8-13	112,285,560	26,600,943	65,602,461	7,037,472	21.0%	6.9%	6.2%	1.4%
	Total		514,739,945	325,915,428	631,649,270	363,064,412	100%	100%	100%	100%

Table 2
Final Factors for VMT by Vehicle Type by Road Type

Code	HPMS Vehicle Type	FHWA Veh Class	Rural Restricted Access Factor	Rural Unrestricted Access Factor	Urban Restricted Access Factor	Urban Unrestricted Access Factor
10	Motorcycles	Class 1	0.002909	0.003512	0.003196	0.002817
20	Passenger Cars	Class 2	0.568990	0.646239	0.666475	0.737280
30	Other 2 axle-4 tire vehicles	Class 3	0.165098	0.223307	0.187197	0.207472
40	Buses	Class 4	0.008700	0.005776	0.006583	0.003800
50	Single Unit Trucks	Class 5-7	0.034469	0.040796	0.031867	0.029349
60	Combination Trucks	Class 8-13	0.219834	0.080369	0.104681	0.019282
	Total		1.000000	1.000000	1.000000	1.000000

Since the vehicle classification counts are collected using counters that do not adequately distinguish between passenger cars and SUVs, the MOVES defaults for vehicle types 20 and 30 by road type were used to redistribute the VMT. The MOVES Defaults are listed in Table 3.

Table 3
MOVES Defaults
Percent VMT by Vehicle Type

	Vehicle Type					
Year	**10**	**20**	**30**	**40**	**50**	**60**
1999	0.00390	0.58310	0.33480	0.00280	0.02610	0.04920
2000	0.00380	0.58250	0.33600	0.00280	0.02570	0.04920
2001	0.00340	0.58240	0.33740	0.00250	0.02590	0.04850
2002	0.00330	0.58110	0.33850	0.00240	0.02660	0.04820
2003	0.00330	0.57880	0.34060	0.00230	0.02690	0.04810
2004	0.00340	0.57260	0.34600	0.00220	0.02730	0.04850
2005	0.00360	0.57060	0.34770	0.00220	0.02710	0.04870
2006	0.00400	0.55990	0.35850	0.00220	0.02750	0.04780
2007	0.00450	0.55070	0.36630	0.00220	0.02790	0.04840
2008	0.00510	0.54610	0.36980	0.00230	0.02870	0.04800
2009	0.00530	0.54760	0.37480	0.00210	0.02660	0.04370
2010	0.00530	0.54360	0.37770	0.00220	0.02770	0.04350
2011	0.00530	0.53940	0.37830	0.00240	0.02970	0.04500
2012	0.00530	0.53700	0.37740	0.00250	0.03140	0.04640

	Vehicle Type					
Year	**10**	**20**	**30**	**40**	**50**	**60**
2013	0.00520	0.53640	0.37610	0.00260	0.03240	0.04730
2014	0.00520	0.53780	0.37370	0.00260	0.03310	0.04760
2015	0.00511	0.54185	0.36926	0.00266	0.03358	0.04754
2016	0.00505	0.54655	0.36414	0.00270	0.03413	0.04743
2017	0.00500	0.55148	0.35868	0.00274	0.03465	0.04744
2018	0.00495	0.55719	0.35240	0.00278	0.03509	0.04759
2019	0.00490	0.56346	0.34559	0.00281	0.03548	0.04777
2020	0.00484	0.57033	0.33840	0.00283	0.03581	0.04779
2021	0.00479	0.57743	0.33138	0.00285	0.03599	0.04755
2022	0.00475	0.58459	0.32444	0.00286	0.03613	0.04723
2023	0.00471	0.59142	0.31755	0.00288	0.03639	0.04705
2024	0.00466	0.59782	0.31089	0.00291	0.03674	0.04698
2025	0.00462	0.60374	0.30470	0.00294	0.03709	0.04692
2026	0.00458	0.60921	0.29896	0.00296	0.03745	0.04684
2027	0.00455	0.61410	0.29377	0.00300	0.03784	0.04674
2028	0.00452	0.61852	0.28903	0.00303	0.03828	0.04662
2029	0.00450	0.62265	0.28449	0.00307	0.03876	0.04652
2030	0.00448	0.62625	0.28038	0.00311	0.03930	0.04648
2031	0.00444	0.62984	0.27688	0.00313	0.03959	0.04611
2032	0.00440	0.63303	0.27380	0.00316	0.03987	0.04574
2033	0.00436	0.63573	0.27104	0.00319	0.04023	0.04545
2034	0.00432	0.63812	0.26857	0.00321	0.04058	0.04519
2035	0.00429	0.64015	0.26636	0.00324	0.04096	0.04501
2036	0.00425	0.64184	0.26447	0.00327	0.04134	0.04483
2037	0.00421	0.64323	0.26287	0.00330	0.04173	0.04465
2038	0.00418	0.64417	0.26173	0.00333	0.04211	0.04447
2039	0.00414	0.64476	0.26096	0.00336	0.04249	0.04428
2040	0.00411	0.64532	0.26017	0.00340	0.04289	0.04411
2041	0.00407	0.64586	0.25937	0.00343	0.04331	0.04396
2042	0.00404	0.64630	0.25864	0.00346	0.04374	0.04381
2043	0.00401	0.64666	0.25799	0.00350	0.04418	0.04366
2044	0.00398	0.64693	0.25741	0.00353	0.04462	0.04352
2045	0.00395	0.64711	0.25692	0.00357	0.04507	0.04338
2046	0.00392	0.64719	0.25653	0.00360	0.04552	0.04324
2047	0.00389	0.64720	0.25620	0.00364	0.04598	0.04310
2048	0.00386	0.64715	0.25593	0.00368	0.04643	0.04295
2049	0.00383	0.64704	0.25572	0.00371	0.04690	0.04281
2050	0.00380	0.64689	0.25554	0.00375	0.04736	0.04266

Exhibit 5: Vehicle Registration Data

Georgia's Revised 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) 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)[6] 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.

[6] The GVWR is the maximum weight of the vehicle when it is fully loaded, as specified by the manufacturer.

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 (LD) Vehicles (Passenger Cars)**

- Class 1 GVWR
- Include: Passenger Cars
- Fuel: All Types
- Source: R.L. Polk NVPP as of October 2002

2 **LDT1** **LD Trucks 1 (0-6,000 lbs. GVWR, 0-3,750 lbs. LVW[7])**

- 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** **LD 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** **LD Trucks 3 (6,001-8,500 lbs. GVWR, 0-5,750 lbs. ALVW[8])**

- Class 2 GVWR
- Trucks, SUVs, & Vans
- GVWR: 6,001-8,000 for Ford, Chevy, Dodge, plus all Toyota Tundra Models

[7] Loaded vehicle weight, the weight of vehicle sitting empty (curb weight) plus 300 pounds.
[8] Adjusted loaded vehicle weight, average of the gross vehicle weight and the curb weight.

Number	Abbreviation	Description

- 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

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

Number	Abbreviation	Description

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

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

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 Macon-Floyd metropolitan statistical area by age and vehicle type. Results of this query were used to develop Registration distribution by age inputs. For each of the 16 composite 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 input data is shown on the following two pages. Note that the Polk-derived distribution for Class 8b vehicles (vehicle type 13) is commented out; in accordance with EPA guidance, defaults were used for this vehicle type.

Exhibit 6: Source Type Population Input Data Preparation

1) Date sources

2002-2003 Polk's data: Registration data from R. L. Polk & Co.'s National Vehicle Population Profile ® (current as of October 2002) and R. L. Polk & Co.'s TIPNet ® (current as of March 2003) are used. This database includes number of vehicles by age and 16 vehicle types in each Georgia county, and has been used to develop age distribution.

Georgia registration data (2003 and 2007): These registration data were obtained from www.georgiastats.uga.edu. This database includes number of vehicles by passenger vehicles, trucks, trailers, motorcycles, buses and others in each county as explained on the Georgia Department of Revenue website (http://motor.etax.dor.ga.gov/stats/renewalsstats.aspx). Passenger Vehicles include Ambulances, Convertibles, Coupes, Hearses, Jeeps, Limousines, Mixers, Motor Homes, Multi-Purpose Vehicles, Roadsters, Station Wagons, Touring Cars, Vans, 2 Doors, 3 Doors, and 4 Doors. Trucks include Truck Tractors, Trucks, and Wreckers.

2) Methodology

The Polk's data were summarized by 16 vehicles types in each county and then grown to 2007 using different growth factors by vehicle types (Table 1). The number of HDBS, HDBT and MC in Polk's data is comparable to Georgia registration data (Table 2 and Table 3). Therefore, the numbers of HDBS and HDBT were grown to 2007 by multiplying ratios of the number of buses in Georgia motor vehicle registration data in 2007 and 2003. The number of MC was grown to 2007 by multiplying ratios of the number of motor cycles in Georgia motor vehicle registration data in 2007 and 2003. The number of the rest of vehicle types was grown to 2007 by multiplying ratios of human population in 2007 and 2002. The Georgia motor vehicle registration data were not used for these vehicle types due to the difficulty to match the vehicle type used in Georgia motor vehicle registration data to the 16 vehicle types as used in the Polk's data. Since the ratios of 2007 and 2003 passenger cars and trucks in motor vehicle registration data are comparable to the ratios of population data (Table 4), population data were used as the growth indicator.

Table 1. List of different growth factors used by vehicle types

Vehicle types	Growth factor
HDBS	Georgia registration data (2003 and 2007), Buses
HDBT	Georgia registration data (2003 and 2007), Buses
HDV2B	Population 2002 and 2007
HDV3	Population 2002 and 2007
HDV4	Population 2002 and 2007
HDV5	Population 2002 and 2007
HDV6	Population 2002 and 2007
HDV7	Population 2002 and 2007
HDV8A	Population 2002 and 2007
HDV8B	Population 2002 and 2007
LDT1	Population 2002 and 2007
LDT2	Population 2002 and 2007
LDT3	Population 2002 and 2007
LDT4	Population 2002 and 2007
LDV	Population 2002 and 2007

MC	Georgia registration data (2003 and 2007), Motor cycles

Table 2. Summary of 2002-2003 Polk's data by 16 mobile vehicle types in four Georgia regions

Vehicle types	ATL13	ATL7	GAGAS	GAOTHER	Total
HDBS	7,854	1,333	2,032	8,221	19,440
HDBT	1,362	102	139	540	2,143
HDV2B	56,809	11,761	15,405	49,039	133,014
HDV3	27,628	5,996	7,822	23,797	65,243
HDV4	13,623	2,262	2,850	10,351	29,086
HDV5	6,005	1,162	1,550	5,577	14,294
HDV6	19,294	4,088	5,932	21,688	51,002
HDV7	16,380	2,528	3,838	15,309	38,055
HDV8A	37,555	4,307	6,619	31,883	80,364
HDV8B	14,449	2,201	3,061	10,926	30,637
LDT1	722,044	131,873	181,393	607,189	1,642,499
LDT2	95,101	28,933	37,692	156,187	317,913
LDT3	302,139	62,530	75,409	284,851	724,929
LDT4	43,616	8,019	9,721	39,432	100,788
LDV	1,723,769	255,647	346,907	1,383,696	3,710,019
MC	50,081	10,657	13,767	41,123	115,628

Table 3. Summary of 2003 Georgia registration data by 4 mobile vehicle types

Vehicle types	ATL13	ATL7	GAGAS	GAOTHER	Total
Buses	10,676	1,559	2,434	9,797	21,237
Trucks	558,496	168,930	237,022	823,867	1,788,315
Passenger Cars	2,259,027	339,456	449,177	1,744,474	4,792,134
Motorcycles	46,836	10,203	13,124	38,561	108,724

Table 4. Comparison between different growth factors

				Ratios	
	2002	**2003**	**2007**	**2007/2002**	**2007/2003**
Motor vehicle registration					
Passenger Car		4,792,134	5,330,256		1.112
Trucks		1,788,315	1,952,470		1.092
Motor Cycle		108,724	174,617		1.606
Bus		21,237	35,124		1.654
Population in Georgia, U.S. Census					
Population	8,585,535	8,735,259	9,533,761	1.110	1.091
Total Average Annual Daily VMT in Georgia, Georgia DOT 445 report, miles					
VMT	292,562,380	296,810,994	305,327,543	1.044	1.029
MOVES national SALESGROWTH factor defaults					
Motorcycle				1.383	1.311
Passenger Car				0.940	1.001
Passenger Truck				0.972	0.948
Light Commercial Truck				0.972	0.948
Intercity Bus				1.353	1.268
Transit Bus				1.353	1.268
School Bus				1.353	1.268
Refuse Truck				1.353	1.268
Single Unit Short-haul Truck				1.353	1.268
Single Unit Long-haul Truck				1.353	1.268
Motor Home				1.353	1.268
Combination Short-haul Truck				1.464	1.405
Combination Long-haul Truck				1.464	1.405

The projected 2007 vehicle population by 16 vehicle types in each county were then converted to 32 vehicles types, which were matched with 28 vehicle types and 12 vehicle types (corresponding to 12 SCC codes) as shown in the EPA MOVES converter tool. The EPA MOVES converter tool was also used to convert vehicle population in MOVES format by each of the four reference counties. These populations are the sum of populations of all counties sharing the same reference counties.

Exhibit 7: 2007 RunSpec for Monroe County

```
<runspec>
    <description><![CDATA[Monroe County 2007 PM2.5 maintenance plan lookups
Using HPMS vmt factored by road type
Defaults for average speed distribution and vmt by hour
Run #3 - Use 2007 yearly average meterology data - 090911
Run#4 - Revised vmtby type using HPMS data in spreadsheet - 090911- Lookups
Run for SO2 in inventory mode]]></description>
    <modelscale value="Inv"/>
    <modeldomain value="SINGLE"/>
    <geographicselections>
        <geographicselection type="COUNTY" key="13207" description="GEORGIA - Monroe County"/>
    </geographicselections>
    <timespan>
        <year key="2007"/>
        <month id="7"/>
        <day id="5"/>
        <beginhour id="1"/>
        <endhour id="24"/>
        <aggregateBy key="Hour"/>
    </timespan>
    <onroadvehicleselections>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="62" sourcetypename="Combination Long-haul Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="61" sourcetypename="Combination Short-haul Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="41" sourcetypename="Intercity Bus"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="54" sourcetypename="Motor Home"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="21" sourcetypename="Passenger Car"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31" sourcetypename="Passenger Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="51" sourcetypename="Refuse Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="43" sourcetypename="School Bus"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="42" sourcetypename="Transit Bus"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="61" sourcetypename="Combination Short-haul Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="54" sourcetypename="Motor Home"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="11" sourcetypename="Motorcycle"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="21" sourcetypename="Passenger Car"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="31" sourcetypename="Passenger Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="51" sourcetypename="Refuse Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="43" sourcetypename="School Bus"/>
```

```
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="42" sourcetypename="Transit Bus"/>
	</onroadvehicleselections>
	<offroadvehicleselections>
	</offroadvehicleselections>
	<offroadvehiclesccs>
	</offroadvehiclesccs>
	<roadtypes>
		<roadtype roadtypeid="1" roadtypename="Off-Network"/>
		<roadtype roadtypeid="2" roadtypename="Rural Restricted Access"/>
		<roadtype roadtypeid="3" roadtypename="Rural Unrestricted Access"/>
		<roadtype roadtypeid="4" roadtypename="Urban Restricted Access"/>
		<roadtype roadtypeid="5" roadtypename="Urban Unrestricted Access"/>
	</roadtypes>
	<pollutantprocessassociations>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="1" processname="Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="2" processname="Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="15" processname="Crankcase Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="16" processname="Crankcase Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="17" processname="Crankcase Extended Idle
Exhaust"/>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="90" processname="Extended Idle Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="1" processname="Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="2" processname="Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="15" processname="Crankcase Running
Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="16" processname="Crankcase Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="17" processname="Crankcase Extended Idle
Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="90" processname="Extended Idle Exhaust"/>
		<pollutantprocessassociation pollutantkey="116" pollutantname="Primary PM2.5 - Brakewear Particulate" processkey="9" processname="Brakewear"/>
		<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="1" processname="Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="2" processname="Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="15" processname="Crankcase Running
Exhaust"/>
		<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="16" processname="Crankcase Start
Exhaust"/>
		<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="17" processname="Crankcase Extended Idle
Exhaust"/>
		<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="90" processname="Extended Idle
Exhaust"/>
		<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="1" processname="Running Exhaust"/>
```

<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="117" pollutantname="Primary PM2.5 - Tirewear Particulate" processkey="10" processname="Tirewear"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="90" processname="Extended Idle Exhaust"/>
</pollutantprocessassociations>
<databaseselections>
<databaseselection servername="" databasename="monroe_2007_pm25_lookups_input1" description=""/>
</databaseselections>
<internalcontrolstrategies>
<internalcontrolstrategy classname="gov.epa.otaq.moves.master.implementation.ghg.internalcontrolstrategies.rateofprogress.RateOfProgressStrategy"><![CDATA[
useParameters	No

]]></internalcontrolstrategy>
</internalcontrolstrategies>
<inputdatabase servername="" databasename="" description=""/>
<uncertaintyparameters uncertaintymodeenabled="false" numberofrunspersimulation="0" numberofsimulations="0"/>
<geographicoutputdetail description="NATION"/>
<outputemissionsbreakdownselection>
<modelyear selected="false"/>

```
		<fueltype selected="false"/>
		<emissionprocess selected="true"/>
		<onroadoffroad selected="true"/>
		<roadtype selected="true"/>
		<sourceusetype selected="true"/>
		<movesvehicletype selected="false"/>
		<onroadscc selected="false"/>
		<offroadscc selected="false"/>
		<estimateuncertainty selected="false" numberOfIterations="2" keepSampledData="false" keepIterations="false"/>
		<sector selected="false"/>
		<engtechid selected="false"/>
		<hpclass selected="false"/>
	</outputemissionsbreakdownselection>
	<outputdatabase servername="" databasename="monroe_2007_pm25_SO2_output4" description=""/>
	<outputtimestep value="Hour"/>
	<outputvmtdata value="true"/>
	<outputsho value="false"/>
	<outputsh value="false"/>
	<outputshp value="false"/>
	<outputshidling value="false"/>
	<outputstarts value="false"/>
	<outputpopulation value="true"/>
	<scaleinputdatabase servername="localhost" databasename="monroe_2007_pm25_lookups_input1" description=""/>
	<pmsize value="0"/>
	<outputfactors>
		<timefactors selected="true" units="Hours"/>
		<distancefactors selected="true" units="Miles"/>
		<massfactors selected="true" units="Grams" energyunits="Joules"/>
	</outputfactors>
	<savedata>

	</savedata>

	<donotexecute>

	</donotexecute>

	<generatordatabase shouldsave="false" servername="" databasename="" description=""/>
		<donotperformfinalaggregation selected="false"/>
	<lookuptableflags scenarioid="Monroe_2007" truncateoutput="false" truncateactivity="false"/>
</runspec>
```

Exhibit 8: MOVES Input Data for Monroe County Emissions for PM2.5 SIP Budget – 2007

Source Type Population

yearID	sourceTypeID	sourceTypePopulation
2007	11	700
2007	21	12384
2007	31	7717
2007	32	2494
2007	41	0
2007	42	0
2007	43	78
2007	51	11
2007	52	345
2007	53	24
2007	54	35
2007	61	172
2007	62	466

Vehicle Type VMT – HPMSVtypeYear Worksheet

HPMSVtypeID	yearID	HPMSBaseYearVMT	baseYearOffNetVMT
10	2007	2,783,976.15	0.00
20	2007	433,560,565.63	0.00
30	2007	265,025,409.86	0.00
40	2007	7,214,859.49	0.00
50	2007	32,794,066.07	0.00
60	2007	166,893,725.63	0.00

Meteorology Data

monthID	zoneID	HourID	temperature	relHumidity
7	132070	1	56.458	75.367

monthID	zoneID	HourID	temperature	relHumidity
7	132070	2	55.400	77.358
7	132070	3	54.325	79.117
7	132070	4	53.358	80.600
7	132070	5	52.542	81.750
7	132070	6	51.775	82.850
7	132070	7	51.267	83.342
7	132070	8	51.958	82.633
7	132070	9	55.083	78.308
7	132070	10	59.967	70.342
7	132070	11	64.742	61.875
7	132070	12	68.775	54.933
7	132070	13	71.908	49.917
7	132070	14	74.092	46.550
7	132070	15	75.533	44.317
7	132070	16	76.242	43.175
7	132070	17	76.033	43.242
7	132070	18	74.758	44.800
7	132070	19	71.625	49.558
7	132070	20	67.333	56.758
7	132070	21	63.600	63.300
7	132070	22	61.025	67.758
7	132070	23	59.250	70.717
7	132070	24	57.742	73.283

Age Distribution - Sample

sourceTypeID	yearID	ageID	ageFraction
21	2007	0	0.01120
21	2007	1	0.04500
21	2007	2	0.04950
21	2007	3	0.06050
21	2007	4	0.05960
21	2007	5	0.05660

sourceTypeID	yearID	ageID	ageFraction
21	2007	6	0.06200
21	2007	7	0.06170
21	2007	8	0.07150
21	2007	9	0.06340
21	2007	10	0.05760
21	2007	11	0.05230
21	2007	12	0.04650
21	2007	13	0.04440
21	2007	14	0.04280
21	2007	15	0.03620
21	2007	16	0.03170
21	2007	17	0.02650
21	2007	18	0.02350
21	2007	19	0.01910
21	2007	20	0.01140
21	2007	21	0.00690
21	2007	22	0.00670
21	2007	23	0.00530
21	2007	24	0.00419
21	2007	25	0.00332
21	2007	26	0.00262
21	2007	27	0.00208
21	2007	28	0.00164
21	2007	29	0.00130
21	2007	30	0.03295
31	2007	0	0.01547
31	2007	1	0.03961
31	2007	2	0.04477
31	2007	3	0.04793
31	2007	4	0.04774
31	2007	5	0.05304
31	2007	6	0.06438
31	2007	7	0.02946

sourceTypeID	yearID	ageID	ageFraction
31	2007	8	0.03986
31	2007	9	0.04598
31	2007	10	0.04906
31	2007	11	0.04226
31	2007	12	0.03997
31	2007	13	0.05252
31	2007	14	0.05539
31	2007	15	0.05388
31	2007	16	0.04229
31	2007	17	0.05027
31	2007	18	0.04733
31	2007	19	0.04471
31	2007	20	0.03223
31	2007	21	0.02617
31	2007	22	0.02961
31	2007	23	0.00046
31	2007	24	0.00039
31	2007	25	0.00036
31	2007	26	0.00032
31	2007	27	0.00028
31	2007	28	0.00025
31	2007	29	0.00023
31	2007	30	0.00378

Note: File contains 373 records and is available on request

Exhibit 9: 2023 RunSpec for Monroe County

```
<runspec>
	<description><![CDATA[Monroe County - PM2.5 Lookup for Maintenance SIP -  -
Run #4 - Re run with new weather - 091211 - plus re-run with MOVESdefault files and revised source population]]></description>
	<modelscale value="Rates"/>
	<modeldomain value="SINGLE"/>
	<geographicselections>
		<geographicselection type="COUNTY" key="13207" description="GEORGIA - Monroe County"/>
	</geographicselections>
	<timespan>
		<year key="2023"/>
		<month id="7"/>
		<day id="5"/>
		<beginhour id="1"/>
		<endhour id="24"/>
		<aggregateBy key="Hour"/>
	</timespan>
	<onroadvehicleselections>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="62" sourcetypename="Combination Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="61" sourcetypename="Combination Short-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="41" sourcetypename="Intercity Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="54" sourcetypename="Motor Home"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="21" sourcetypename="Passenger Car"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31" sourcetypename="Passenger Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="51" sourcetypename="Refuse Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="43" sourcetypename="School Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="42" sourcetypename="Transit Bus"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="61" sourcetypename="Combination Short-haul Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="54" sourcetypename="Motor Home"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="11" sourcetypename="Motorcycle"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="21" sourcetypename="Passenger Car"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="31" sourcetypename="Passenger Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="51" sourcetypename="Refuse Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="43" sourcetypename="School Bus"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="42" sourcetypename="Transit Bus"/>
	</onroadvehicleselections>
```

```
	<offroadvehicleselections>
	</offroadvehicleselections>
	<offroadvehiclesccs>
	</offroadvehiclesccs>
	<roadtypes>
		<roadtype roadtypeid="1" roadtypename="Off-Network"/>
		<roadtype roadtypeid="2" roadtypename="Rural Restricted Access"/>
		<roadtype roadtypeid="3" roadtypename="Rural Unrestricted Access"/>
		<roadtype roadtypeid="4" roadtypename="Urban Restricted Access"/>
		<roadtype roadtypeid="5" roadtypename="Urban Unrestricted Access"/>
	</roadtypes>
	<pollutantprocessassociations>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="1" processname="Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="2" processname="Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="15" processname="Crankcase Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="16" processname="Crankcase Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="17" processname="Crankcase Extended Idle
Exhaust"/>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="90" processname="Extended Idle Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="1" processname="Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="2" processname="Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="15" processname="Crankcase Running
Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="16" processname="Crankcase Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="17" processname="Crankcase Extended Idle
Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="90" processname="Extended Idle Exhaust"/>
		<pollutantprocessassociation pollutantkey="116" pollutantname="Primary PM2.5 - Brakewear Particulate" processkey="9" processname="Brakewear"/>
		<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="1" processname="Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="2" processname="Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="15" processname="Crankcase Running
Exhaust"/>
		<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="16" processname="Crankcase Start
Exhaust"/>
		<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="17" processname="Crankcase Extended Idle
Exhaust"/>
		<pollutantprocessassociation pollutantkey="112" pollutantname="Primary PM2.5 - Elemental Carbon" processkey="90" processname="Extended Idle
Exhaust"/>
		<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="1" processname="Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="2" processname="Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="15" processname="Crankcase Running
Exhaust"/>
```

<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Primary PM2.5 - Organic Carbon" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Primary PM2.5 - Sulfate Particulate" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="117" pollutantname="Primary PM2.5 - Tirewear Particulate" processkey="10" processname="Tirewear"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="90" processname="Extended Idle Exhaust"/>
</pollutantprocessassociations>
<databaseselections>
<databaseselection servername="" databasename="monroe_2023_pm_input4" description=""/>
</databaseselections>
<internalcontrolstrategies>
<internalcontrolstrategy classname="gov.epa.otaq.moves.master.implementation.ghg.internalcontrolstrategies.rateofprogress.RateOfProgressStrategy"><![CDATA[
useParameters	No

]]></internalcontrolstrategy>
</internalcontrolstrategies>
<inputdatabase servername="" databasename="" description=""/>
<uncertaintyparameters uncertaintymodeenabled="false" numberofrunspersimulation="0" numberofsimulations="0"/>
<geographicoutputdetail description="LINK"/>
<outputemissionsbreakdownselection>
<modelyear selected="false"/>
<fueltype selected="false"/>
<emissionprocess selected="true"/>
<onroadoffroad selected="true"/>
<roadtype selected="true"/>
<sourceusetype selected="true"/>
<movesvehicletype selected="false"/>
<onroadscc selected="false"/>
<offroadscc selected="false"/>
<estimateuncertainty selected="false" numberOfIterations="2" keepSampledData="false" keepIterations="false"/>

```
		<sector selected="false"/>
		<engtechid selected="false"/>
		<hpclass selected="false"/>
	</outputemissionsbreakdownselection>
	<outputdatabase servername="" databasename="monroe_2023_pm25_lookups_output4" description=""/>
	<outputtimestep value="Hour"/>
	<outputvmtdata value="true"/>
	<outputsho value="false"/>
	<outputsh value="false"/>
	<outputshp value="false"/>
	<outputshidling value="false"/>
	<outputstarts value="false"/>
	<outputpopulation value="true"/>
	<scaleinputdatabase servername="localhost" databasename="Monroe_2023_pm_input4" description=""/>
	<pmsize value="0"/>
	<outputfactors>
		<timefactors selected="true" units="Hours"/>
		<distancefactors selected="true" units="Miles"/>
		<massfactors selected="true" units="Grams" energyunits="Joules"/>
	</outputfactors>
	<savedata>

	</savedata>

	<donotexecute>

	</donotexecute>

	<generatordatabase shouldsave="false" servername="" databasename="" description=""/>
		<donotperformfinalaggregation selected="false"/>
	<lookuptableflags scenarioid="monroe_2023_1" truncateoutput="false" truncateactivity="false"/>
</runspec>
```

Exhibit 10: MOVES Input Data for Monroe County Emissions for PM2.5 SIP Budget – 2023

Source Type Population

yearID	sourceTypeID	sourceTypePopulation
2023	11	987
2023	21	17461
2023	31	10881
2023	32	3516
2023	41	0
2023	42	0
2023	43	111
2023	51	15
2023	52	486
2023	53	34
2023	54	50
2023	61	243
2023	62	657

Vehicle Type VMT – HPMSVtypeYear Worksheet

HPMSVtypeID	yearID	HPMSBaseYearVMT	baseYearOffNetVMT
10	2023	3,273,420.87	0.00
20	2023	411,263,213.35	0.00
30	2023	220,821,301.48	0.00
40	2023	2,003,423.42	0.00
50	2023	25,306,731.87	0.00
60	2023	32,714,715.77	0.00

Meteorology Data

monthID	zoneID	HourID	temperature	relHumidity
7	132070	1	56.458	75.367
7	132070	2	55.400	77.358
7	132070	3	54.325	79.117
7	132070	4	53.358	80.600
7	132070	5	52.542	81.750
7	132070	6	51.775	82.850
7	132070	7	51.267	83.342
7	132070	8	51.958	82.633
7	132070	9	55.083	78.308
7	132070	10	59.967	70.342
7	132070	11	64.742	61.875

monthID	zoneID	HourID	temperature	relHumidity
7	132070	12	68.775	54.933
7	132070	13	71.908	49.917
7	132070	14	74.092	46.550
7	132070	15	75.533	44.317
7	132070	16	76.242	43.175
7	132070	17	76.033	43.242
7	132070	18	74.758	44.800
7	132070	19	71.625	49.558
7	132070	20	67.333	56.758
7	132070	21	63.600	63.300
7	132070	22	61.025	67.758
7	132070	23	59.250	70.717
7	132070	24	57.742	73.283

Age Distribution - Sample

sourceTypeID	yearID	ageID	ageFraction
21	2023	0	0.01120
21	2023	1	0.04500
21	2023	2	0.04950
21	2023	3	0.06050
21	2023	4	0.05960
21	2023	5	0.05660
21	2023	6	0.06200
21	2023	7	0.06170
21	2023	8	0.07150
21	2023	9	0.06340
21	2023	10	0.05760
21	2023	11	0.05230
21	2023	12	0.04650
21	2023	13	0.04440
21	2023	14	0.04280
21	2023	15	0.03620
21	2023	16	0.03170
21	2023	17	0.02650
21	2023	18	0.02350
21	2023	19	0.01910
21	2023	20	0.01140
21	2023	21	0.00690
21	2023	22	0.00670
21	2023	23	0.00530
21	2023	24	0.00419
21	2023	25	0.00332

sourceTypeID	yearID	ageID	ageFraction
21	2023	26	0.00262
21	2023	27	0.00208
21	2023	28	0.00164
21	2023	29	0.00130
21	2023	30	0.03295
31	2023	0	0.01547
31	2023	1	0.03961
31	2023	2	0.04477
31	2023	3	0.04793
31	2023	4	0.04774
31	2023	5	0.05304
31	2023	6	0.06438
31	2023	7	0.02946
31	2023	8	0.03986
31	2023	9	0.04598
31	2023	10	0.04906
31	2023	11	0.04226
31	2023	12	0.03997
31	2023	13	0.05252
31	2023	14	0.05539
31	2023	15	0.05388
31	2023	16	0.04229
31	2023	17	0.05027
31	2023	18	0.04733
31	2023	19	0.04471
31	2023	20	0.03223
31	2023	21	0.02617
31	2023	22	0.02961
31	2023	23	0.00046
31	2023	24	0.00039
31	2023	25	0.00036
31	2023	26	0.00032
31	2023	27	0.00028
31	2023	28	0.00025
31	2023	29	0.00023
31	2023	30	0.00378

Note: File contains 373 records and is available on request