2000 AUGUST EMISSIONS INVENTORY FOR FALL LINE AIR QUALITY STUDY (FAQS)

PREPARED FOR:

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ACRONYMS AND ABBREVIATIONS

AADT	average annual daily traffic
AAMA	American Automobile Manufacturer's Association
ARD	Acid Rain Division
ATV	all-terrain vehicle
BEIS	Biogenic Emissions Inventory System
CE	control efficiency
CNG	compressed natural gas
DARS	Data Attribute Rating System
DOE	Department of Energy
DOT	Department of Transportation
EIA	Energy Information Administration
EIIP	Emission Inventory Improvement Program
EPA	U.S. Environmental Protection Agency
EPD	Environmental Protection Division
FAA	Federal Aviation Administration
FAAED	FAA Aircraft Engine Emission Database
FCI	Fuel Consumption Index
FIPS	Federal Information Processing Standards
GTM	gross ton-miles
HC	hydrocarbon
HPMS	Highway Performance Monitoring System
I/M	inspection and maintenance
Lbs	pounds
LPG	liquefied petroleum gas
LTO	landing and takeoff
MC	medium cure
MS	medium set
NAA	nonattainment area
NAPIM	National Association of Printing Ink Manufacturers
NET	National Emission Trends
NEVES	Nonroad Engine and Vehicle Emission Study
NMTOC	nonmethane total organic compounds
OAQPS	Office of Air Quality Planning and Standards
QA	quality assurance
QC	quality control
EI	Emissions Inventory
psi	pounds per square inch
psia	pounds per square inch absolute
RC	rapid cure
RE	rule effectiveness
RP	rule penetration
RS	rapid set
RVP	Reid vapor pressure
SAF	seasonal adjustment factor
SC	slow cure
SCC	source classification code
SIC	standard industrial classification
SS	slow set
U.S.	United States
VMT	vehicle miles traveled per year

CHAPTER 1 EXECUTIVE SUMMARY AND EMISSIONS SUMMARY

1.1 INTRODUCTION

The State of Georgia Department of Natural Resources, Environmental Protection Division (EPD), is required under Section 182(a)(3)(A) of the Clean Air Act Amendments of 1990 to submit a complete inventory of ozone precursors for the year 2000. This report documents the development and presents results of the inventory developed to comply with this requirement, the 2000 August Emissions Inventory (EI) for 11 counties in three cities: Macon, Augusta, and Columbus . The EI is a comprehensive inventory of volatile organic compounds (VOC), oxides of nitrogen (NO_X), carbon monoxide (CO), sulfur dioxide (SO_2), ammonia (NH_3), and coarse particulate matter (PM_{10}) emissions for point sources, stationary area sources, highway mobile sources, non-road mobile sources, and biogenic sources.

This inventory was procured using the latest models and planning assumptions available. Models and planning assumptions have improved since constructing the 1990 Baseline Inventory. As a result, one can not make a direct comparison to the 1990 inventory, because the tools and assumptions used to create the two inventories are not comparable.

This chapter presents an overview of the methods taken in the development of the EI. Emission summaries and a discussion of the emission totals are also presented in this Chapter. The remainder of the report is organized as follows:

- Chapter 2 presents the detailed methods used to develop the point source portion of the EI;
- Chapter 3 presents the detailed methods used to develop the area source portion of the EI;
- Chapter 4 presents the detailed methods used to develop the nonroad mobile sources portion of the EI;
- Chapter 5 presents the detailed methods used to develop the highway mobile sources portion of the EI;
- Chapter 6 presents the quality assurance (QA) methods used to review the EI; and
- Appendices A through G present detailed emission summaries of the EI.

1.2 OVERVIEW OF EI DEVELOPMENT

The most current methods as outlined in EPA guidance documents were used to develop the emission estimates in the EI. These methods included those described in the Emission Inventory Improvement Program (EIIP) series of guidance documents. For point sources, a comprehensive list of facilities in 11 counties for three cities: Macon, Augusta, and Columbus was developed. All of the sources on the list received a survey developed for this project. Emission estimates were developed based on the information sources provided in the survey. For stationary area sources, EIIP and earlier EPA guidance documents were used to determine the most feasible emission estimation method for each category. Local activity data was used for all sources for which it

was available. For nonroad mobile sources, the most current engine population estimates and emission factors were used, including data from EPA's Nonroad model.
Local activity data was used for all sources for which it was available. For highway mobile sources activity, vehicle miles traveled (VMT) data supplied by the Georgia Department of Transportation (GDOT) was used. Emission factors were developed based on local data using EPA's MOBILE6 model.
For biogenic sources, the most current methods were utilized, including BEIS3 model with BELD3 plantation database.

1.3 EMISSION TOTALS

Total anthropogenic emissions by pollutant are presented in Table 1.3-1. For this and all other tables listing total emissions by major source grouping, the emissions values include all emissions generated within the 11 county. Total anthropogenic emissions by pollutant for each county are presented in Table 1.3-2. Total emissions by pollutant and major source grouping are presented in Table 1.3-3. Total VOC emissions by County and major source category are presented in Table 1.3-4. Total NO_X emissions by County and major source category are presented in Table 1.3-5. Total CO emissions by County and major source category are presented in Table 1.3-6. Total NH_3 emissions by County and major source category are presented in Table 1.3-7. Total SO_2 emissions by County and major source category are presented in Table 1.3-8. Total PM_{10} emissions by County and major source category are presented in Table 1.3-9.

Table 1.3-1: 2000 Total Anthropogenic Emissions by Pollutant

Pollutant	Summer Day Emissions lbs/day
VOC	375,229
NO_X	335,166
CO	1,613,264
NH_3	105,270
SO_2	190,632
PM_{10}	359,793

Table 1.3-2: 2000 Total Anthropogenic Emissions by County and Pollutant

COUNTY NAME	VOC lbs/day	NO_X lbs/day	CO lbs/day	NH_3 lbs/day	SO_2 lbs/day	PM_{10} lbs/day
Bibb	92,313	75,593	360,944	4,563	71,943	83,437
Chattahoochee	3,452	3,061	11,860	370	180	3,922
Columbia	28,188	17,129	169,103	1,879	1,031	29,870
Harris	10,192	14,491	60,469	1,227	377	21,446
Houston	39,787	43,597	170,088	5,046	14,154	39,382
Jones	9,163	9,251	48,366	2,106	714	19,417
McDuffie	11,576	7,569	43,914	4,145	292	24,176
Muscogee	69,120	34,386	270,469	2,805	5,961	23,642
Peach	14,207	10,019	42,468	2,186	479	19,396
Richmond	92,227	112,666	410,881	80,030	94,704	73,844
Twiggs	5,003	7,403	24,704	912	799	21,261
TOTAL	375,229	335,166	1,613,264	105,270	190,632	359,793

Table 1.3-3: Total 2000 Anthropogenic Emissions by Pollutant and Major Source Grouping

Sector	VOC Emissions		NO_X Emissions		CO Emissions	
	tons/yr	lbs/day	tons/yr	lbs/day	tons/yr	lbs/day
Point	7,773	45,660	25,418	138,460	37,351	203,420
Area	-	173,160	-	14,900	-	139,720
On-Road Mobile	-	125,669	-	132,966	-	863,964
Nonroad Mobile	-	30,740	-	48,840	-	406,160
TOTAL	7,773	375,229	25,418	335,166	37,351	1,613,264

Table 1.3-3: Total 2000 Anthropogenic Emissions by Pollutant and Major Source Grouping Continued

Sector	NH_3 Emissions		SO_2 Emissions		PM_{10} Emissions	
	tons/yr	lbs/day	tons/yr	lbs/day	tons/yr	lbs/day
Point	13,146	72,020	29,580	178,000	18,132	96,800
Area	-	25,320	-	1,260	-	252,860
On-Road Mobile	-	7,490	-	7,352	-	6,693
Nonroad Mobile	-	440	-	4,020	-	3,440
TOTAL	13,146	105,270	29,580	190,632	18,132	359,793

Table 1.3-4: Total 2000 Anthropogenic VOC Emissions by County and Major Source Grouping

County Name	Point		Area		Mobile		Nonroad	
	tons/year	lbs/day	tons/year	lbs/day	tons/year	lbs/day	tons/year	lbs/day
Bibb	4,146	23,440	-	36,640	-	26,573	-	5,660
Chattahoochee	-	-	-	1,880	-	1,172	-	400
Columbia	54	260	-	11,320	-	10,988	-	5,620
Harris	184	880	-	3,040	-	4,852	-	1,420
Houston	377	2,040	-	17,900	-	15,167	-	4,680
Jones	3	-	-	4,560	-	4,263	-	340
McDuffie	318	1,700	-	4,680	-	4,456	-	740
Muscogee	148	3,200	-	36,540	-	22,720	-	6,660
Peach	155	1,080	-	7,160	-	5,167	-	800
Richmond	2,374	13,000	-	47,860	-	27,147	-	4,220
Twiggs	15	60	-	1,580	-	3,163	-	200
TOTAL	7,773	45,660	-	173,160	-	125,669	-	30,740

Figure 1.3-1: VOC Emissions for 11 Counties

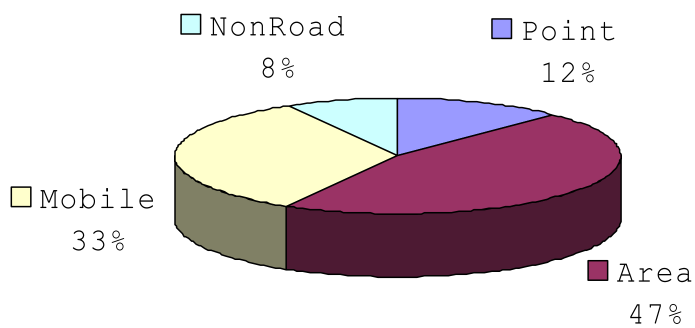


Table 1.3-5: Total 2000 Anthropogenic NO_X Emissions by County and Major Source Grouping

County Name	Point		Area		Mobile		Nonroad	
	tons/year	lbs/day	tons/year	lbs/day	tons/year	lbs/day	tons/year	lbs/day
Bibb	6,415	36,060	-	2,980	-	26,813	-	9,740
Chattahoochee	-	-	-	20	-	1,501	-	1,540
Columbia	3	-	-	900	-	11,749	-	4,480
Harris	1,394	5,920	-	660	-	6,631	-	1,280
Houston	3,512	19,240	-	780	-	16,057	-	7,520
Jones	239	1,300	-	900	-	4,711	-	2,340
McDuffie	-	-	-	460	-	6,009	-	1,100
Muscogee	131	680	-	3,580	-	21,326	-	8,800
Peach	-	-	-	440	-	7,559	-	2,020
Richmond	13,311	73,080	-	3,940	-	26,026	-	9,620
Twiggs	413	2,180	-	240	-	4,583	-	400
TOTAL	25,418	138,460	-	14,900	-	132,966	-	48,840

Figure 1.3-2: NO_X Emissions for 11 Counties

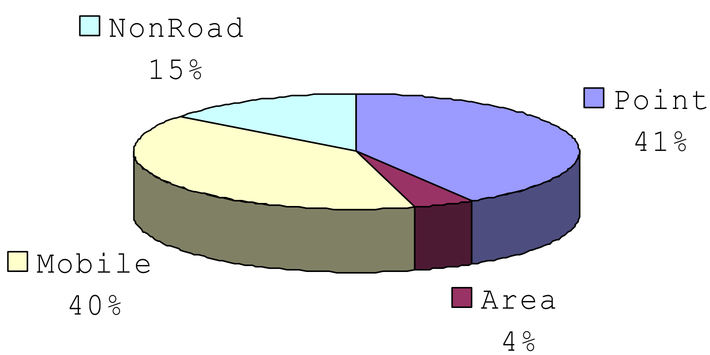


Table 1.3-6: Total 2000 Anthropogenic CO Emissions by County and Major Source Grouping

County Name	Point		Area		Mobile		Nonroad	
	tons/year	lbs/day	tons/year	lbs/day	tons/year	lbs/day	tons/year	lbs/day
Bibb	14,020	75,940	-	13,620	-	185,084	-	86,300
Chattahoochee	-	-	-	600	-	7,120	-	4,140
Columbia	6	40	-	22,280	-	75,763	-	71,020
Harris	490	2,420	-	11,880	-	30,309	-	15,860
Houston	282	1,460	-	14,260	-	105,748	-	48,620
Jones	127	680	-	15,980	-	27,686	-	4,020
McDuffie	67	400	-	7,820	-	27,734	-	7,960
Muscogee	122	620	-	14,520	-	161,749	-	93,580
Peach	-	-	-	3,320	-	31,808	-	7,340
Richmond	22,188	121,680	-	31,840	-	191,401	-	65,960
Twiggs	49	180	-	3,600	-	19,564	-	1,360
TOTAL	37,351	203,420	-	139,720	-	863,964	-	406,160

Figure 1.3-3: CO Emissions for 11 Counties

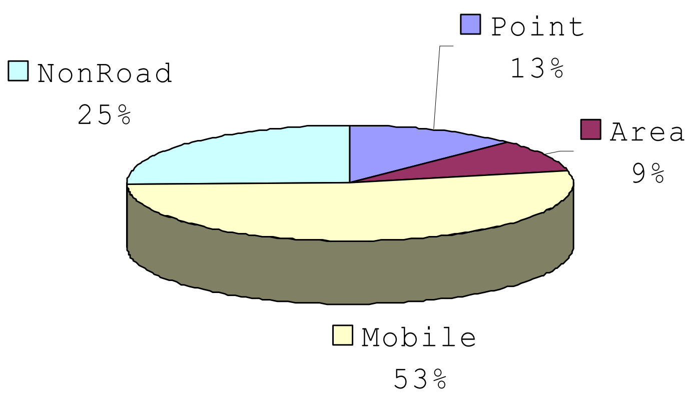


Table 1.3-7: Total 2000 Anthropogenic NH_3 Emissions by County and Major Source Grouping

County Name	Point		Area		Mobile		Nonroad	
	tons/year	lbs/day	tons/year	lbs/day	tons/year	lbs/day	tons/year	lbs/day
Bibb	174	880	-	2,220	-	1,343	-	120
Chattahoochee	-	-	-	240	-	130	-	-
Columbia	0	-	-	1,020	-	779	-	80
Harris	-	-	-	1,020	-	207	-	-
Houston	-	-	-	4,060	-	966	-	20
Jones	-	-	-	1,900	-	206	-	-
McDuffie	3	-	-	3,940	-	185	-	20
Muscogee	0	-	-	1,060	-	1,625	-	120
Peach	-	-	-	1,960	-	206	-	20
Richmond	12,967	71,140	-	7,080	-	1,750	-	60
Twiggs	1	-	-	820	-	92	-	-
TOTAL	13,146	72,020	-	25,320	-	7,490	-	440

Figure 1.3-4: NH_3 Emissions for 11 Counties

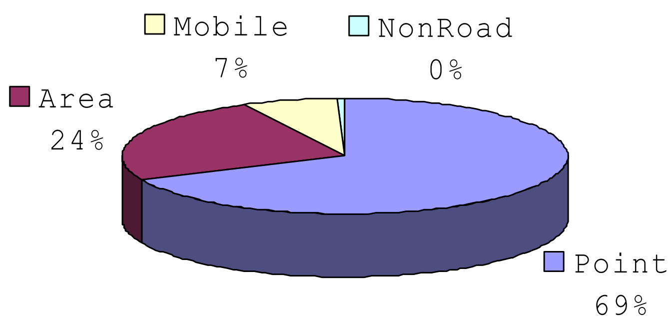


Table 1.3-8: Total 2000 Anthropogenic SO_2 Emissions by County and Major Source Grouping

County Name	Point		Area		Mobile		Nonroad	
	tons/year	lbs/day	tons/year	lbs/day	tons/year	lbs/day	tons/year	lbs/day
Bibb	10,750	69,340	-	240	-	1,603	-	760
Chattahoochee	-	-	-	-	-	20	-	160
Columbia	3	20	-	40	-	731	-	240
Harris	0	-	-	20	-	257	-	100
Houston	2,274	12,440	-	80	-	954	-	680
Jones	0	-	-	340	-	234	-	140
McDuffie	4	-	-	20	-	232	-	40
Muscogee	516	3,660	-	240	-	1,301	-	760
Peach	-	-	-	20	-	339	-	120
Richmond	15,919	91,980	-	260	-	1,484	-	980
Twiggs	114	560	-	-	-	199	-	40
TOTAL	29,580	178,000	-	1,260	-	7,352	-	4,020

Figure 1.3-5: SO_2 Emissions for 11 Counties

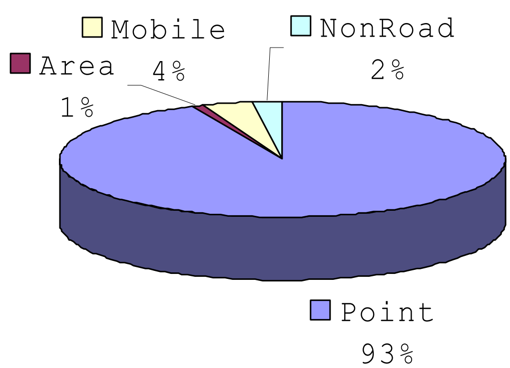
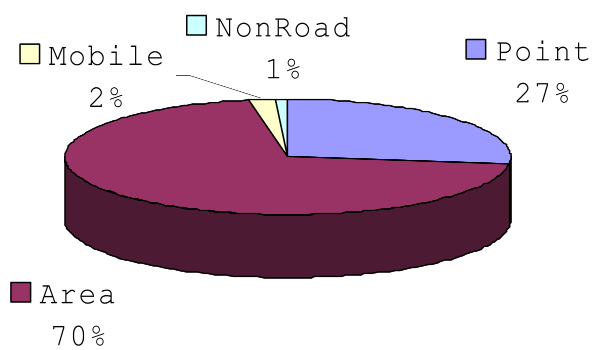


Table 1.3-9: Total 2000 Anthropogenic PM_{10} Emissions by County and Major Source Grouping

County Name	Point		Area		Mobile		Nonroad	
	tons/year	lbs/day	tons/year	lbs/day	tons/year	lbs/day	tons/year	lbs/day
Bibb	8,344	43,800	-	37,620	-	1,397	-	620
Chattahoochee	-	-	-	3,780	-	22	-	120
Columbia	108	480	-	28,420	-	670	-	300
Harris	18	140	-	20,920	-	286	-	100
Houston	810	4,540	-	33,340	-	882	-	620
Jones	5	-	-	19,080	-	257	-	80
McDuffie	1,059	5,800	-	18,080	-	256	-	40
Muscogee	514	2,520	-	19,400	-	1,082	-	640
Peach	-	-	-	18,940	-	376	-	80
Richmond	5,728	31,600	-	40,180	-	1,244	-	820
Twiggs	1,546	7,920	-	13,100	-	221	-	20
TOTAL	18,132	96,800	-	252,860	-	6,693	-	3,440

Figure 1.3-6: PM_{10} Emissions for 11 Counties



CHAPTER 2 POINT SOURCES

2.1 INTRODUCTION

The State of Georgia Department of Natural Resources (EPD) is required under Section 182(a)(3)(A) of the Clean Air Act Amendments of 1990 to submit a complete inventory of ozone precursors to demonstrate emission reductions necessary to comply with the ozone standard to the EPA. This includes point, stationary area, mobile and biogenic sources. This chapter explains the methods taken in the development of the point source component of the 2000 EI. The point source inventory encompasses 11 counties (in three cities: Augusta, Columbus, and Macon). The Georgia Tech developed an inventory of VOC, NO_X, CO, SO_2, NH_3, and PM_{10} from facilities with 2000 annual emissions equal to or greater than 25 tons per year. Below are tables listing the 11-county area. Also below is a map that identifies the inventoried counties.

Table 2.1-1: 11-County Area

Bibb	Chattahoochee	Columbia	Harris	Houston	Jones	McDuffie
Muscogee	Peach	Richmond	Twiggs			

Figure 2.1-1: Map of Inventory Area

2.2 DEVELOPMENT OF THE MAILING LIST

The first step in developing the point source inventory was to identify those plants located within the parameters set by EPA guidance and to create a mailing list of plants to receive the survey. Georgia Tech developed a list of unique facilities derived from Manufacturer's directory (EDI), Toxic Emission directory (from EPD), and EPA AIRs directory. Plant-level emission summaries were generated for each of the available data sets to determine which plants fell under the threshold requirements for completing the survey of 25 tons per year.

In some cases, the mailing address, contact name and/or plant location was outdated or no longer correct. Various methods were employed for locating these plants, including Internet searches for location of facility, contacting the headquarters of a facility to verify location and existence of a plant.

After all sources were compiled and verified, a mailing list was created that integrated all plants from each data set that were believed to exceed the survey threshold. The mailing list contained Federal Information Processing Standards (FIPS) State and county codes, plant ID code, plant location and full address, contact information, including address if different from plant location, contact phone number, extension, and fax number information.

2.3 DEVELOPMENT OF THE SURVEY

Every effort was made to develop a survey that minimized the reporting burden while ensuring complete and accurate data submittals. The survey included a separate form each for 1) general plant information, 2) stacks, 3) control devices, 4) process information forms: fuel burning, evaporative emissions, and miscellaneous, and 5) emission estimation. The fuel and miscellaneous process pages were organized according to an emission factor equation, while the evaporative loss page was tailored for material balance calculations. Emission factor selection was required by the source. For processes where emissions were not reported, it was decided that Georgia Tech staff would perform the emissions calculations. The stack and control pages require linkage to the process they exhaust or control in order to properly represent the emission conditions of the plant. Each page of the survey included field-specific instructions and suggested sample data. Additionally, the survey packet included a 2-page quick reference to alert sources familiar with the inventory process to the requirements and parameters of this inventory. A complete copy of the survey is presented in Appendix H.

All plants received in the mail a paper copy of the survey, complete with instructions on how to complete each page of the survey prior to the workshop. The instructions offered sources an opportunity to request the survey be e-mailed to them. Many sources requested such electronic copies. The Georgia Tech interacted with plants to further assist facilities in completing the survey within the time limit allotted.

In order to accurately track each facility's progress in completing the survey, a tracking data base was created that contains all current contact and address information for plants included in the Emissions Inventory. If a facility sent an official letter stating that they were below the threshold requirement, the tracking database kept a record of this information. This served as the master list of facilities that Georgia Tech sent the survey to and as a basis for the point source emission database. A separate database was created to house the emissions inventory.

2.4 DEVELOPMENT OF THE INVENTORY

All information received from facilities was reviewed for completeness. Obvious errors or omissions resulted in follow-up calls to the facility for clarification. Data were accepted via hard copy mailed or faxed. After a submittal was deemed complete, a received date was entered into the tracking database.

The process rates, emission factors, SCCs and emissions data were entered into a spreadsheet, which would become part of the EI database. This spreadsheet was created to calculate annual and ozone season daily emissions based upon SCC codes selected for each process. Emission factors were taken directly from the latest publicly available record of AP-42. For all processes, throughput and capacity data could be transferred directly into the spreadsheet. Fuel and miscellaneous processes require selection of the emission factors in the absence of source test or monitoring data. For evaporative emissions, which looked only at VOC emissions, a material balance was performed to derive the proper annual and ozone season daily emissions. Seasonal throughput data supplied by the facility were used to determine ozone daily emissions. Control efficiencies were applied to determine emissions both with and without rule effectiveness. Any emission factors and calculations that a facility supplied were used in lieu of AP-42 factors. All calculations entered into the spreadsheet were reviewed independently and quality assured using the procedures in the QA chapter of this document. The final spreadsheet was converted into a Microsoft Access database. Summaries of the data for 11 counties are provided in Appendices A-G.

CHAPTER 3 AREA SOURCES

3.1 INTRODUCTION

Emissions for area sources, except for fire emissions (i.e., agricultural, wildfires, and prescribed fires) and ammonia emissions, are obtained from EPA's NET99. More information on the methods utilized by EPA developing NET99 can be found at ftp://ftp.epa.gov/EmisInventory/finalnei99ver2/criteria/documentation/area/ArDoc99v2_Oct02.pdf

Ammonia emissions are estimated by Dr. Carlos Cordelino of Department of Earth and Atmospheric Sciences at Georgia Institute of Technology. More information on the methods used for ammonia emissions can be obtained from Dr Cordelino, carlos.cordelino@eas.gatech.edu.

3.2 FOREST WILDFIRES

3.2.1 Description

Forest wildfires are considered a combustion source of emissions and can emit large amounts of VOC, NO_X, CO, PM and SO_2 over a short time. The amount of emissions varies not only with the number of acres burned, but also with the tons of growth per acre (fuel loading) and the type of fuel burned.

3.2.2 Methodology

VOC, NO_X, CO, and PM emissions from wildfires were calculated for each county in the FAQS area by applying an emission factor and the estimated fuel consumption to the number of acres burned in the county. The emission factors and fuel consumptions were selected based upon NFDRS fuel type. Each fuel type has detailed fuel composition information. For our application fuel type D was used for coastal GA, fuel type E was used for northern GA (i.e., mountainous regions), and fuel type C was used for the rest of GA (Chan, 2001).

Table 3.1-1 NFDRS Fuel Model Descriptions

Fuel Model	Description
C	Open pine stands with perennial grasses and forbs
D	Palmetto-gallberry under story pine over story
E	Northern mountain area; Hardwood areas after the canopies leaf out

SO_2 emissions were obtained from EPA NEI1999 final v2.0 (EPA, 2003).

3.2.3 Sources of Data

The number of state and private acres burned in 2000 August was obtained from the Georgia Forestry Commission (GA Forest Commission, 2001). The number of Federal acres burned in Georgia was obtained from National Interagency Fire Center (NIFC), National Large Incident Year To Date Report 2000 (Smith, 2001). Emission factors and fuel consumption for each fuel composition by each NFDRS fuel model were obtained from USDA Forest Service. Emission rates are presented in Table 3.1-2.

Table 3.1-2 Emission rates for Forest Wildfires by NFDRS Fuel Model

	Fuel loading (tons/acre)	Emission Rate (lbs/acre)				
NFDRS Fuel model		CO	NO_X	PM_{10}	$PM_{2.5}$	VOC
C	14.8	556	38	86	73	40
D	15.5	823	57	107	91	48
E	8.8	689	48	80	67	35

3.2.4 Emission Factors and Sample Calculation

Number of acres burned, Columbia County, 2000 August: 1.2 acres
NFDRS Fuel model: C
Forest wildfire VOC emission rate: 40 lbs/acre wood burned

$$1.2 AcresForestBurned \times \frac{40 LbsVOC}{AcreWoodBurned} \times \frac{1 Ton}{2{,}000 Lbs} \div 31 = 0.000775 TonsVOC / day$$

3.2.5 Additional Comments

Emissions from forest wildfires are assumed to be uniform throughout 2000 August and to occur 7 days per week.

3.3 SLASH BURNING AND PRESCRIBED BURNING

3.3.1 Description

Slash burning and prescribed burning are considered combustion sources of VOC, NO_X, CO, and PM emissions. Waste from logging operations is often burned under controlled conditions to reduce the potential fire hazard in forests and to remove brush that can serve as a host for destructive insects. Prescribed burning is used as a forest management practice to establish favorable seedbeds, remove competing underbrush, accelerate nutrient cycling, control tree pests, and contribute other ecological benefits. Prescribed burning can exhibit both seasonal and diurnal variations. Determining when to burn a stand of trees involves selection of the year to burn, selection of the proper state in the growing cycle (which means the proper season of the year), and selection of the times when favorable weather and fuel moisture conditions prevail.

3.3.2 Methodology

Emissions from slash and prescribed burning were calculated for each county in the FAQS area 2000 August by using the same method as wildfire emissions estimate. Since these fires happened under control, the fuel consumption are assumed to be less than the fuel consumption for the wildfire. EPA AP-42 fuel loading for prescribed burn and wildfire were used for normalization (EPA).

3.3.3 Sources of Data

The number of acres burned in 2000 August was obtained from the Georgia Forestry Commission (GA Forest Commission, 2001) which included total areas for slash burning and prescribed burn by each county in 2000 August. There was no prescribed burn on the Federal land during this period. EPA AP-42 fuel loading for prescribed burn and wildfire was obtained from http://www.epa.gov/ttn/chief/ap42/index.html. In FAQS area, the wildfire fuel loading is 7.1 tons/acre, and the prescribed burn fuel loading is 9 tons/acre.

$$Fuelloading\_Rx = Fuelloading\_WF \times \frac{Fuelloading\_Rx\_EPA}{Fuelloading\_WF\_EPA}$$

$$EmissionRate\_Rx = EmissionRate\_WF \times \frac{Fuelloading\_Rx\_EPA}{Fuelloading\_WF\_EPA}$$

Emission rates are presented in Table 3.2-1.

Table 3.3-1 Emission rates for Forest Wildfires by NFDRS Fuel Model

	Fuel loading (tons/acre)	Emission Rate (lbs/acre)				
NFDRS Fuel model		CO	NO_X	PM_{10}	$PM_{2.5}$	VOC
C	11.7	438	30	67	57	32
D	12.2	649	45	84	72	38
E	6.9	544	38	63	53	27

3.3.4 Emission Factors and Sample Calculation

Acres burned, Columbia County, 2000 August: 85 acres
NFDRS Fuel model: C
VOC emission rate, prescribed burning: 32 lbs VOC/acre wood burned

$$83.8 AcresBurnedForPrescribedFire \times \frac{32 lbsVOC}{AcreBurned} \times \frac{1 Ton}{2,000 Lbs} \div 31 days = 0.0427 Tons/day$$

3.3.5 Additional Comments

Emissions from slash and prescribed burning are assumed to be uniform throughout 2000 August and to occur 7 days per week. Slash burning and prescribed burning were calculated together.

3.4 AGRICULTURAL BURNING

3.4.1 Description

Agricultural burning is considered a combustion source of VOC, NO_X, and CO emissions. This category covers agricultural burning practices used to clean and prepare land for planting and includes operations such as stubble burning, burning of agricultural crop residues, and burning of standing yield crops as part of harvesting.

3.4.2 Methodology

Emissions from agricultural fires were calculated for FAQS area in 2000 August by applying an appropriate emission factor and fuel loading factor to the number of fires per county. The emission factor and fuel loading for different crop was used to generate a composite emission rate based on the crop harvest area in each county. Wheat and corn were assumed as the most popular crops burned in August.

3.4.3 Sources of Data

Acreage burned for each county was obtained from the Georgia Forestry Commission (GA Forest Commission, 2001). The fuel loading factor and emission factor were obtained from Jenkins (Jenkins, 1996). The harvest area data were obtained from United States Department of Agriculture, National Agricultural Statistics Service (USDA, 2001).

3.4.4 Additional Comments

Emissions from agricultural burning are assumed to be uniform throughout the year and to occur 7 days per week.

CHAPTER 4 NONROAD MOBILE SOURCES

4.1 INTRODUCTION

This section presents emission estimates for the FAQS area for non-road mobile source categories: agricultural equipment, construction and mining equipment, industrial equipment, lawn and garden equipment, airport ground support equipment, commercial equipment, logging equipment, recreational equipment, pleasure craft, railroad equipment and aircraft, railroad locomotives. EPA Nonroad Model (EPA,2000) can be used to calculate emissions from all categories, except aircraft and railroad locomotives.

Among all categories, Nonroad model category and railroad locomotives emissions for FAQS area in 2000 August was estimated on the basis of EPA NEI1999 final v2.0 (EPA, 2003). It was projected to 2000 August using different projection method. The projection methods used for Nonroad model category and railroad locomotives were explained respectively in the following sections. Aircraft emissions for FAQS area in 2000 August were estimated directly, instead of projection of NEI1999 data.

4.2 NONROAD MODEL CATEGORY

4.2.1 Description

Nonroad Model (EPA, 2000) can calculate VOC, CO, NO_X, PM_{10}, $PM_{2.5}$ and SO_2 emissions from agricultural equipment, construction and mining equipment, industrial equipment, lawn and garden equipment, airport ground support equipment, commercial equipment, logging equipment, recreational equipment, pleasure craft, and railroad equipment.

Agricultural equipment can be separated into two major categories: agricultural tractors, which account for the majority of activity; and other agricultural equipment, which includes combines, balers, and general utility engines for irrigation and miscellaneous purposes. Most agricultural equipment uses gasoline and diesel fuel, with a small population using compressed natural gas (CNG), and LPG as fuel.

Construction and mining equipment includes bulldozers, tractors, loaders, scrapers, cranes, and motor graders. Gasoline, diesel, CNG, and LPG fuels are used by construction equipment.

Industrial equipment includes forklifts; mobile refrigeration units; auxiliary engines for hydraulic pump service on garbage trucks and other large vehicles; generator and pump service for utilities; and logging, mining, quarrying, oil field operations and portable well drilling equipment. Gasoline, diesel, CNG, and LPG fuels are used by industrial equipment.

Lawn and garden equipment includes lawnmowers, lawn and garden tractors, tillers, edgers, and leaf blowers. Gasoline and diesel fuel are used by lawn and garden equipment.

Airport ground support equipment is considered a Nonroad mobile source of VOC, NO_X, and CO emissions. Equipment in this category includes terminal tractors and airport ground support equipment. Gasoline, diesel, CNG, and LPG fuels are used by airport ground support equipment.

Commercial equipment includes generator sets, air compressors, pumps, pressure washers and welders. Gasoline, diesel, CNG, and LPG fuels are used by commercial equipment.

Recreational equipment includes both recreational vehicles and watercraft. Recreational vehicles include all-terrain vehicles (ATVs), minibikes, Nonroad motorcycles, golf carts, snowmobiles, and specialty vehicles/carts. Golf carts powered by electricity are not included in the NEVES population estimates. All other equipment, except for specialty vehicles/carts, is powered solely by gasoline. Specialty vehicles/carts include snow grooming equipment, ice maintenance equipment, go-carts, industrial ATVs, personnel carriers, and other equipment. Some vehicles used for non-recreational purposes (industrial ATVs, personnel carriers) are included in this category because of the equipment population estimation methods.

The recreational watercraft (motorboats, marine vessels, etc.) category includes vessels with inboard and outboard engines, vessels with sterndrive engines, and sailboat auxiliary inboard and outboard engines. Inboard engine vessels are typically powered diesel or 4-stroke gasoline engines, while outboard engines are typically 2-stroke. Personal watercraft (e.g., jet skis) has both 2- and 4-stroke inboard engines, and is included in the inboard engine category.

Railroad equipment includes railway maintenance equipment. Railroad locomotives are included in a separate category.

Logging equipment includes chain saws, shredders, skidders, and fellers/bunchers.

4.2.2 Methodology

EPA's latest Nonroad model, "Lockdown C", was selected to be used in this study, as it is assumed to give better predictions. Since the model is not publicly available, we used non-road data given in NEI1999 final v2.0 (EPA, 2003) (which is estimated with "Lockdown C" model) for our inventory. The June 2000 version of EPA's Draft Nonroad Model (EPA, 2000) was run to calculate average summer weekday emissions in 1999 and 2000. The results were further analyzed to calculate the projection factors from 1999 to 2000 by each SCC and county for each pollutant. The inputs for the model are given in Table 4.2-1.

Table 4.2-1 Nonroad Model Inputs for 1999 and 2000 Average Summer Week Day

	1999	2000
RVP	7.0	7.0
Oxygen (%)	0.0	0.0
Gas Sulfur (%)	0.034	0.034
Diesel Sulfur (%)	0.330	0.330
CNG/LPG Sulfur (%)	0.003	0.003
Min Temp (F)	69.7	67.7
Max Temp (F)	93.9	90.4
Avg. Temp (F)	81.8	79.1
Stage II Control (%)	0	0

4.2.3 Sources of Data

EPA NEI1999 final version 2.0 was obtained from http://www.epa.gov/ttn/chief/net/index.html#final2 (EPA, 2003).
The June 2000 version of EPA's Draft Nonroad Model was obtained from http://www.epa.gov/otaq/nonrdmdl.htm (EPA,2000). The Temperature data was obtained from National Climate Data Center http://www.ncdc.noaa.gov/oa/ncdc.html (NCDC, 2001).

4.3 RAILROAD LOCOMOTIVES

4.3.1 Description

Railroad locomotives are considered a combustion source of VOC, NO_X, CO, PM, and SO_2 emissions with the most significant emissions occurring where there is a concentration of railroad activity (such as a large switchyard). Line haul locomotives generally travel between distant locations, while yard locomotives perform yard operations, such as moving railcars within a rail yard. The primary fuel consumed by railroad locomotive is distillate oil (diesel fuel).

4.3.2 Methodology

EPA NEI1999 final v2.0 (EPA, 2003) was used as the base year emission inventory to get the 2000 August emission inventory for railroad locomotives. The projection factor was obtained from Economic Growth Analysis System (EGAS) version 4.0 (EPA, 2001).

4.3.3 Sources of Data

EPA NEI1999 final version 2.0 was obtained from http://www.epa.gov/ttn/chief/net/index.html#final2 (EPA, 2003). EGAS 4.0 was obtained from http://www.epa.gov/ttn/chief/emch/projection/egas40/ (EPA, 2001).

4.4 AIRCRAFT

4.4.1 Description

Aircraft are considered a combustion source of VOC, NO_X, CO, PM, and SO_2 emissions, and include commercial air carrier, air taxi, general or civil aviation, and military aircraft. Aircraft engines are the actual source of the emissions, occurring as the aircraft operate in and around an airport. Engines emit pollutants at different rates during the various phases of aircraft operation, such as: approach for landing, takeoff and climbout, taxiing, and idling while waiting for takeoff or during cargo and passenger loading and unloading. Emissions from aircraft can be estimated based on the number of LTO cycles performed. Each LTO is equal to one landing and one takeoff, or to the number of operations divided by two.

4.4.2 Methodology

Different emission estimates method was employed for commercial air carrier, air taxi, general aviation, and military aircraft.

VOC, NO_X, CO, and SO_X emissions from commercial aircraft were calculated using the Emissions and Dispersion Modeling System (EDMS) 4.01 (FAA, 2001a). Since the fleet mix data was for 2001, the 2001 emissions were projected to 2000 August according to FAA ATADS tower monthly operations data assuming fleet mix didn’t change form 2000 to 2001. PM emissions were calculated by the ratio of PM emission to VOC emission for commercial carriers and air taxi.

$$PM\_EM\_CommercialCarrier = PM\_EM\_AirTaxi \times \frac{VOC\_EM\_CommercialCarrier}{VOC\_EM\_AirTaxi}$$

Emissions from air taxi, general aviation and military aircraft were calculated by applying the appropriate emission factors to the number of LTO cycles.

4.4.3 Sources of Data

EDMS 4.01 model was available at http://www.aee.faa.gov/aee-100/aee-120/edms/banner.htm(FAA, 2001a). The 2001 fleet mix data was obtained from Airport activity Statistics of Certificated Route Air Carriers (DOT/BTS, 2002a). Engine type was assumed same as Hartsfield airport for each aircraft type (FAA, 2001b). Time-in-mode data used the default in EDMS 4.01, and taxiing and idling time was 26 minutes (Eastern Research Group, 2002).

Air taxi, general aviation and military aircraft operations data were obtained from Air Traffic and Activity Data system (ATADS) http://www.apo.data.faa.gov/faaatadsall.HTM (DOT/BTS, 2002b) and NTAD 2001 http://www.bts.gov/gis/download sites/ntad01/maindownload.html (DOT/BTS, 2002c). General aviation and air taxi emission factors were obtained from Emission Inventory Preparation, Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources (EPA, 1992).

EDMS 4.01 was used to develop military aircraft emission factor at civil airport based on the aircraft operations that were typically operated by the military at Hartsfield airport in 1998 (FAA, 2001b). Air force airport emission factors were obtained from Development of 1996 periodic emissions inventory for Atlanta, Georgia Ozone Nonattainment Area (Pechan, 1999).

4.4.4 Emission Factors

Table 4.4-1: Emission Factors for General Aviation, Air Taxi and Military Aircraft

	Lbs per LTO						
Aircraft Category	CO	NO_X	HC	VOC	PM_{10}	$PM_{2.5}$	SO_X
General Aviation	12.01	0.07	0.394	0.382	0.2367	0.1633	0.01
Air Taxi	28.13	0.158	1.234	1.223	0.6033	0.4163	0.015
Military (at civil airport)	30.93	2.65	5.0	6.17	0.6033	0.4163	0.262
Military (at AFB)	14.77	4.04	6.74	7.445	0.6033	0.4163	0.262

4.5 SUMMARY

2000 August daily emissions of CO, NH_3, NO_X, PM_{10}, $PM_{2.5}$, SO_2 and VOC from Nonroad Mobile Category are presented in Table 4.5-1.

Table 4.5-1: 2000 August Nonroad Mobile Category Emissions

Lbs/day	CO	NH_3	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
Augusta Metro							
Richmond	32.98	0.03	4.81	0.41	0.33	0.49	2.11
Columbia	35.51	0.04	2.24	0.15	0.14	0.12	2.81
Mc Duffie	3.98	0.01	0.55	0.02	0.02	0.02	0.37
Macon Metro							
Bibb	43.15	0.06	4.87	0.31	0.30	0.38	2.83
Houston	24.31	0.01	3.76	0.31	0.29	0.34	2.34
Jones	2.01	0.00	1.17	0.04	0.03	0.07	0.17
Peach	3.67	0.01	1.01	0.04	0.04	0.06	0.40
Twiggs	0.68	0.00	0.20	0.01	0.01	0.02	0.10
Columbus Metro							
Muscogee	46.79	0.06	4.40	0.32	0.28	0.38	3.33
Chattahoochee	2.07	0.00	0.77	0.06	0.06	0.08	0.20
TOTAL	203.08	0.22	24.42	1.72	1.55	2.01	15.37

CHAPTER 5 MOBILE SOURCES

Input data for MOBILE6 were provided by Jonathan Morton of Georgia Department of Natural Resources, Environmental Protection Division. Methods used in this process are explained below.

5.1 DEVELOPMENT OF THE HIGHWAY VEHICLE EMISSION INVENTORY

Most of the inputs were set up for inventories at the county and Federal Highway Administration (FHWA) Highway Performance Monitoring System (HPMS) functional classification level. Note that we no longer use this approach for calculating mobile source emissions in the Atlanta nonattainment area, or for transportation conformity determinations in Atlanta. There are typically 12 HPMS functional classifications, shown below with their respective numerical HPMS codes:

1	Rural Interstate
2	Rural Principal Arterial
6	Rural Minor Arterial
7	Rural Major Collector
8	Rural Minor Collector
9	Rural Local
11	Urbanized Interstate
12	Urbanized Freeway and Expressway
14	Urbanized Principal Arterial
16	Urbanized Minor Arterial
17	Urbanized Collector
19	Urbanized Local

The average annual daily vehicle miles traveled (AADVMT) estimates that Georgia DOT (GDOT) reports to FHWA every year as part of HPMS include a third area type, "small urban." Per GDOT, the VMT for the "Small Urban" and "Rural" classifications are combined as follows to get the usual 12 functional classifications:

Rural Interstate + Small Urban Interstate + Small Urban Freeway
Rural Principal Arterial + Small Urban Principal Arterial
Rural Minor Arterial + Small Urban Minor Arterial
Rural Minor Collector + Small Urban Collector
Rural Local + Small Urban Local

The VMT data were also summer-adjusted using seasonal factors from GDOT.

The VMT supplied for 1999 and 2000 were the "historical" VMT estimates for those years from GDOT's annual "445 report" (GA DOT, 2003) which had subsequently been summer-adjusted.

The VMT for 2007 were forecast using the linear regression methodology described in section 4.3 of EPA's Section 187 guidance (EPA, 1992b), with summer-adjusted 1995 through 2000 HPMS VMT substituted for 1985 through 1990 VMT. After GDOT's 2001 "445 report" became available in fall of 2002 this regression was updated to use 1996 through 2001 "historical" VMT as the basis for the projections. Note that it is best to enter zeroes where the regression generated negative VMT values.

The speeds processing guidance used for the county-and-functional-classification-level MOBILE6 input files was the "Highway Performance

Monitoring System (HPMS) Roadway Classification Approach," described below, from the Volume IV guidance (EPA, 1992a):

"[U]se FHWA's Highway Performance Monitoring System (HPMS) roadway classification scheme to group portions of VMT by the functional classification of the roadways on which they occur. This results in 12 subsets of VMT. Within each subset, speed is weighted by VMT to calculate an average speed...."

The speeds initially supplied[1] to the modelers were VMT-weighted averages of congested link speeds from a 2004 travel demand model loaded network (with HPMS codes added) for the 13-county Atlanta nonattainment area from the Atlanta Regional Commission (ARC). These 13-county speeds reflected the results of the fall 2000 nonattainment area speed study.[2] Note also that these speeds were based on the previous version of ARC's travel demand model, not on the October 2002 version used for the Limited Update to the 2025 Regional Transportation Plan (RTP).

For attainment area counties (the rest of the state), speeds output from GDOT's last run of an economic model in the Highway Performance Monitoring System Analytical Process (HPMS-AP) software, with 1992 inputs, were provided. Note that HPMS-AP does not output speeds for local streets; the speed for the next higher functional classification (collector) is used for locals.

The VMT-weighted 2004 nonattainment area speeds and the HPMS-AP speeds are shown below, with their respective HPMS functional classification descriptions:

Table 5.1-1: VMT-weighted 2004 nonattainment area speeds and HPMS-AP speed

	2004	HPMS-AP
	miles per hour	
Rural Interstate	61.1	52.8
Rural Principal Arterial	58.8	44.0
Rural Minor Arterial	46.9	43.3
Rural Major Collector	44.7	32.0
Rural Minor Collector	41.6	29.0
Rural Local	16.9	29.0
Urbanized Interstate	56.3	50.0
Urbanized Freeway and Expressway	62.3	47.4
Urbanized Principal Arterial	40.2	19.4
Urbanized Minor Arterial	35.0	20.8
Urbanized Collector	33.9	22.0
Urbanized Local	22.1	22.0

[1] On June 1, 2001.
[2] A report on the 2000 speed study is here: http://www.dnr.state.ga.us/dnr/environ/plans_files/plans/Speed_Study.pdf

The Federal Information Processing Standards (FIPS) codes and names of the 13 nonattainment area counties are shown below:

13057 Cherokee
13063 Clayton
13067 Cobb
13077 Coweta
13089 DeKalb
13097 Douglas
13113 Fayette
13117 Forsyth
13121 Fulton
13135 Gwinnett
13151 Henry
13223 Paulding
13247 Rockdale

Subsequently, HPMS codes were added to the links in ARC networks for 1995 and 2000. Revised 13-county VMT-weighted average speeds for those years were developed, and speeds for 1999 were interpolated. A spreadsheet with these revised speeds was submitted[3] and, in the absence of better data, it was recommended that these nonattainment area speeds be used statewide.

In the fall of 2002, loaded networks from a significantly revised and updated travel demand model were received from ARC. Networks for 2004, 2005, 2010, 2015, 2020, and 2025 were processed to:

a. add a field indicating the MOBILE6 "driving cycle"[4] to each link record;
b. apply an HPMS adjustment factor (HPMS VMT / travel model VMT = adjustment factor) to the volume on each link;
c. calculate the VMT on each link; and
d. VMT-weight the congested speeds on each link into average speeds by HPMS functional classification.

Space-delimited UNIX text files of processed networks (without the speeds averaging) were provided to EPD modelers in December 2002.

The link speeds in these networks reflect the results of both the fall 2000 speed study and a second study conducted fall of 2001. A Technical Memorandum on the 2001 speed study is attached (see ARC_2001_pbsj_speedstudyTechMemo.pdf).

Below are the 1999, 2000, and 2007 VMT-weighted average speeds by HPMS functional classification supplied to the modelers after the initial submittal of 2004 speeds. The 2007 speeds were interpolated between 2005 and 2010 VMT-weighted average speeds by HPMS functional classification derived from the loaded networks for those years:

[3] On August 2, 2002.
[4] The four MOBILE6 driving cycles are Freeway, Arterial/Collector, Ramp, and Local.

Table 5.1-2: 1999, 2000, 2007 VMT-weighted average speeds by HPMS functional classification

	1999	2000	2007
	miles per hour		
Rural Interstate	61.7	67.3*	66.3*
Rural Principal Arterial	59.5	54.9	53.9
Rural Minor Arterial	47.9	40.0	39.1
Rural Major Collector	45.5	40.1	39.4
Rural Minor Collector	42.8	38.9	38.3
Rural Local	17.1	33.2	33.1
Urbanized Interstate	58.0	50.9	50.1
Urbanized Freeway and Expressway	62.7	54.3	54.0
Urbanized Principal Arterial	40.3	34.6	34.1
Urbanized Minor Arterial	35.3	30.7	30.2
Urbanized Collector	35.1	28.5	28.4
Urbanized Local	23.6	30.4	30.1

* (MOBILE6 substitutes its maximum speed of 65.0 mph)

Note that local speeds were skewed high due in part to Georgia DOT's practice of assigning "local" HPMS codes (9 and 19) to ramps. However, because MOBILE6 has no input for local street speeds, this has no effect on emission factors. Note also that speeds on links with missing or invalid HPMS codes were not included in the averaging.

In 1999 and 2000 there were three "mobile source control areas" in Georgia:

a. the 13-county Atlanta ozone nonattainment area, where controls included an enhanced vehicle inspection and maintenance (I/M) program, Stage II gasoline vapor recovery and Phase 1 Georgia gasoline;[5]
b. 12 attainment area counties around Atlanta where Phase 1 Georgia gasoline was required as of 1999; and
c. the rest of the state (134 counties).

The enhanced I/M program in 1999 was a biennial program covering 1975 and newer gasoline-powered cars and light trucks (the MOBILE6 aggregated vehicle types LDGV, LDGT12, and LDGT34).[6] Vehicles of the newest two model years were exempt from inspection. "Newer vehicles," those six model years through three model years old, were tested with a 2500 rpm/idle inspection. Older vehicles, those of model years 1975 through seven models years old, were tested with a single mode ASM (acceleration simulation mode) test. All vehicles were given a gas cap pressure test and a check for catalytic converter tampering.

Annual inspections began in calendar year (CY) 2000. Beginning in CY 2001, the new-vehicle exemption from testing was extended from the two newest to

---

[5] Phase 1 gasoline was a state program to limit the sulfur content and Reid vapor pressure (RVP) of gasoline in June, July, August, and September. Sulfur was limited to a 150 parts per million (ppm) average and RVP to 7.0 pounds per square inch (psi).

[6] LDGV = passenger cars, LDGT12 = "light trucks" up to 6000 pounds gross vehicle weight rating (GVWR), and LDGT34 = light trucks 6001 to 8500 (GVWR).

the three newest model years and "newer vehicles" were redefined as 1996 and newer model years. In CY 2002, single-mode ASM on "older vehicles" (1995 and older) was replaced with 2-mode ASM. Newer vehicles were tested with an onboard diagnostics (OBD II) test.

The vehicles covered by I/M are effectively those in a 25-model-year "rolling window" because "an antique or collector car or truck 25 years old and older" is exempt from inspection [Enhanced Inspection and Maintenance Rules, Chapter 391-3-20-.03(9)(b)]. However, from CY 2000 on there is no difference in emission factors whether specifying that 1975 and newer vehicles are subject or that vehicles 25 model years old and older are exempt -- MOBILE only calculates emission factors for, effectively, 25 model years.

Besides the nonattainment area counties listed above, the 25 counties with Phase 1 Georgia gasoline in 1999 included the following 12 attainment counties:
13013 Barrow
13015 Bartow
13035 Butts
13045 Carroll
13085 Dawson
13139 Hall
13143 Haralson
13157 Jackson
13217 Newton
13227 Pickens
13255 Spalding
13297 Walton

Phase 2 Georgia gasoline[7] will begin in time for ozone season 2004. The 20 additional attainment area counties subject to Phase 2 Georgia gasoline regulation are:

13011 Banks
13055 Chattooga
13059 Clarke
13115 Floyd
13129 Gordon
13149 Heard
13159 Jasper
13169 Jones
13171 Lamar
13187 Lumpkin
13191 Madison
13199 Meriwether
13207 Monroe
13211 Morgan
13219 Oconee
13231 Pike
13233 Polk
13237 Putnam
13285 Troup
13293 Upson

[7] Phase 2 gasoline includes an expansion to 20 additional attainment counties, an annual average sulfur level of 30 ppm, and a seasonal RVP limit of 7.0 psi.

It now appears likely that Atlanta will be reclassified from a serious to a severe ozone nonattainment area effective sometime in 2003. One year later, federal reformulated gasoline (RFG) would be required in the 13-county nonattainment area. Therefore after the 2004 ozone season (e.g., 2007), it's safe to assume only two mobile source control areas, with I/M, Stage II vapor recovery, and federal RFG in the 13-county area and no state mobile source controls elsewhere.

The "VMT mix" fractions[8] in the first input files submitted were 1999 distributions derived from the 1999 FHWA Highway Statistics Table VM-4. This series of tables, published by FHWA from 1993 through 1999, shows percent of VMT traveled by various types of vehicles on seven of the 12 HPMS functional classifications in each state. The seven Georgia travel distributions in the 1999 table[9] were VMT-weighted into an overall distribution for each of two areas using two sets of summer-adjusted 1999 VMT on those same seven roadway types in those areas:

a. the 13-county nonattainment area; and
b. the rest of the state (146 counties).

Guidance from EPA (EPA, 1996) was used to convert the FHWA vehicle classifications to MOBILE5 vehicle types. A methodology in chapter 5 of the MOBILE6 user guide (EPA, 2002) was then used to convert the resulting MOBILE5 VMT mixes to MOBILE6 format. Since submitting the original inputs I have begun projecting future VMT mix fractions by applying adjustments, based on the *change* in the MOBILE6 default VMT fractions between 1999 and the later year, to the 1999 "observed" VMT mix based on the 1999 Table VM-4. Because FHWA ceased publication of Table VM-4 in 2000 (1999 data), efforts are underway to obtain from GDOT travel distribution data by vehicle type and roadway type for 2000 and 2001. Subject to the outcome of discussions with planning partners, the more recent data may be used as the base for projecting future VMT mixes.

The minimum and maximum temperatures in the MOBILE6 input files, the averages of the minimum and maximum on the 10 highest ozone concentration days over the three year period 1988 through 1990, are the same as those used in Georgia's 1990 Base and all control strategy SIPs to date. The temperatures are from the National Weather Service Local Climatological Data (LCD) for Hartsfield Atlanta International Airport.

Temperature and relative humidity data for those days were used in an Excel workbook to calculate the MOBILE6 absolute humidity input. According to Technical Guidance on the Use of MOBILE6 for Emission Inventory Preparation, section 2.5.3 (http://www.epa.gov/otaq/models/mobile6/m6techgd.pdf):

"For users calculating average minimum and maximum temperatures based on the 10 days with the highest ozone concentrations, the lowest humidity ratio should be determined individually for each of the 10 days and the lowest of these ratios should be used as input in MOBILE6."

---

[8] Specified using the MOBILE6 command "VMT FRACTIONS," this is the fraction of total VMT traveled by each vehicle type.

[9] (http://www.fhwa.dot.gov/ohim/hs99/excel/vm4.xls or http://www.fhwa.dot.gov/ohim/hs99/tables/vm4.pdf)

Because the lowest absolute humidities for the 10 ozone exceedance days were lower than the MOBILE6 default of 75 grains per pound, the MOBILE6 default was considered conservative and was used in the input files.

Now that EPA has apparently chosen 2002 as the base year for 8-hour ozone and PM 2.5 attainment modeling efforts, dates for new minimum and maximum temperatures and absolute humidities, associated with 2000 through 2002 air quality data, are being determined for various areas (Atlanta, Columbus, Macon, Augusta, Chattanooga).

In 2000 EPD had a 13-county local vehicle age distribution extracted from the 1999 vehicle registration database received from the Georgia Department of Revenue, Division of Motor Vehicles. The extraction involved designating vehicles in the registration data to MOBILE5 categories using weight, fuel, and general vehicle type. These characteristics were derived in part by decoding the vehicle identification number (VIN), a 17-digit string embedded with codes representing individual vehicle specifications. For details of the development of the 1999 registration distribution by age, see "Vehicle Registration Records Analysis and Model Year Distribution Report" (http://www.dnr.state.ga.us/dnr/environ/plans_files/plans/Registration_Distribution.pdf). Comments on the report from a consultant to litigants and responses to those comments can be found here: http://www.dnr.state.ga.us/dnr/environ/plans_files/plans/Registration_Distribution_comments.pdf. In response to one comment, that there are only 6,031 heavy duty diesel vehicles (HDDVs) among the 3.5 million vehicles in the database and that EPA guidance recommends use of MOBILE defaults in "areas having relatively few local HDDV registrations, but significant interstate trucking activity within the local area," EPD retained the MOBILE5b default registration distribution by age for HDDVs.

Default registration distribution by age is used outside the 13-county nonattainment area.

Input data for Mobile6 is presented in Figure 5.1-1. Table 5.1-3 shows the highway mobile source emissions for each county.

Figure 5.1-1: MOBILE6 Input File Used for 2000 Highway Mobile Sources

```
*
* 7-1-00, default reg. dist., adjusted '99 VMT mix (00restga.in)(00restyh.in)
*
MOBILE6 INPUT FILE :
> This won't take long...
*
POLLUTANTS         : HC CO NOx
PARTICULATES       :
*REPORT FILE        :
*DATABASE OUTPUT    :
*DATABASE OPTIONS   :
*WITH FIELDNAMES    :
*DATABASE EMISSIONS : 2222 2222
*DATABASE FACILITIES: Freeway Arterial Local Ramp None
*DATABASE VEHICLES  : 22222 22222222 2 222 22222222 222
*EMISSIONS TABLE    :

RUN DATA
>
*
*
*  If hourly output is required, replace the 24 temperature values below with
*  episode-day-specific temperatures and comment out the MIN/MAX TEMP line.
*
*HOURLY TEMPERATURES: 60.0 63.0 66.0 69.0 72.0 75.0 78.0 81.0 84.0 87.0 90.0
93.0
*                     93.0 90.0 87.0 84.0 81.0 78.0 75.0 72.0 69.0 66.0 63.0
60.0
```

```
*
MIN/MAX TEMP       : 71. 95.
*
* Reid Vapor Pressure of 9.0 psi outside Georgia gasoline counties
*
FUEL RVP           : 9.0
EXPRESS HC AS VOC  :
*EXPAND EXHAUST     :
*EXPAND EVAPORATIVE :
*EXPAND LDT EFS     :
*EXPAND HDGV EFS    :
*EXPAND HDDV EFS    :
*EXPAND BUS EFS     :

*OXY FUEL           : 0.50 0.50 0.020 0.010 1
*SOAK DISTRIBUTION  : Soakdst.d
*HOT SOAK ACTIVITY  : Hsact.d
*DIURN SOAK ACTIVITY: Dsact.d

*REG DIST           : Regdata.d

*______________________________________________________________________
*
*VMT FRACTIONS      :
*0.663  0.031  0.105  0.047  0.021  0.043  0.004  0.003
*0.002  0.009  0.011  0.012  0.044  0.002  0.001  0.002
*
*______________________________________________________________________
```

```
*
*  The 2000 VMT fractions below were derived by applying adjustments, based
*  on the CHANGE in the MOBILE6 default VMT fractions between 1999 and 2000,
*  to a 1999 "observed" VMT mix based on the 1999 Highway Statistics Table
*  VM-4 ((http://www.fhwa.dot.gov/ohim/hs99/excel/vm4.xls OR
*  http://www.fhwa.dot.gov/ohim/hs99/tables/vm4.pdf -- see jul99Vmx146.xls
*  and julm6Vmx146.xls for details.
*
*  See mobile6-vmix-16-146-table_412a.xls for details on the 2000 VMT mix.
*______________________________________________________________________
*
VMT FRACTIONS      :
0.646  0.033  0.112  0.051  0.022  0.044  0.004  0.003
0.002  0.009  0.011  0.012  0.046  0.002  0.001  0.002
*
*______________________________________________________________________
*
SCENARIO REC       : rural interstate, 67.3
> 7-1-00, default reg. dist., adjusted '99 VMT mix (00restga.in)(00restyh.in)
*
CALENDAR YEAR      : 2000
EVALUATION MONTH   : 7
ALTITUDE           : 1
*ABSOLUTE HUMIDITY  : 75.
*CLOUD COVER        : 0.00
*PEAK SUN           : 10 4
*SUNRISE/SUNSET     : 6 9
*WE VEH US          :
```

```
*SULFUR CONTENT     : 150.0

*

PARTICLE SIZE      : 2.5

*

PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV
PMDDR2.CSV

*

DIESEL SULFUR      : 500.00

*

* next line shows VMT-weighted post-processed 2000 speed from ARC model

AVERAGE SPEED      : 67.3 Non-Ramp 100.0 0.0 0.0 0.0

*

* next line shows speed output from GDOT's 1994 HPMS-AP run (1992 inputs)

*AVERAGE SPEED      : 52.8 Non-Ramp 100.0 0.0 0.0 0.0


*________________________________________________________________________

*

SCENARIO REC       : rural principal arterial, 54.9

> 7-1-00, default reg. dist., adjusted '99 VMT mix, ARC TDM-based speeds
(00restga.in)(00restyh.in)

*

CALENDAR YEAR      : 2000

EVALUATION MONTH   : 7

ALTITUDE           : 1

*ABSOLUTE HUMIDITY  : 75.

*CLOUD COVER        : 0.00

*PEAK SUN           : 10 4

*SUNRISE/SUNSET     : 6 9

*WE VEH US          :
```

```
*SULFUR CONTENT     : 150.0

*

PARTICLE SIZE      : 2.5

*

PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV
PMDDR2.CSV

*

DIESEL SULFUR      : 500.00

*

*  EPA believes that miles traveled on rural principal arterials should be
modeled as a

*  combination of freeway (92% of VMT) and ramp (8% of VMT) travel.  See
Technical Guidance

*  on the Use of MOBILE6 for Emission Inventory Preparation, section 4.2.

*  (http://www.epa.gov/otaq/models/mobile6/m6techgd.pdf)

*

* next line shows VMT-weighted post-processed 2000 speed from 13-county ARC
model

AVERAGE SPEED      : 54.9 Non-Ramp 100.0 0.0 0.0 0.0

*

* next line shows speed output from GDOT's 1994 HPMS-AP run (1992 inputs)

*AVERAGE SPEED      : 44.0 Non-Ramp 100.0 0.0 0.0 0.0


*______________________________________________________________________

*

SCENARIO REC       : rural minor arterial, 40.0

> 7-1-00, default reg. dist., adjusted '99 VMT mix, ARC TDM-based speeds
(00restga.in)(00restyh.in)

*

CALENDAR YEAR      : 2000

EVALUATION MONTH   : 7
```

```
ALTITUDE           : 1

*ABSOLUTE HUMIDITY  : 75.

*CLOUD COVER        : 0.00

*PEAK SUN           : 10 4

*SUNRISE/SUNSET     : 6 9

*WE VEH US          :

*SULFUR CONTENT     : 150.0

*

PARTICLE SIZE      : 2.5

*

PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV
PMDDR2.CSV

*

DIESEL SULFUR      : 500.00

*

* next line shows VMT-weighted post-processed 2000 speed from ARC model

AVERAGE SPEED      : 40.0 Arterial 0.0 100.0 0.0 0.0

*

* next line shows speed output from GDOT's 1994 HPMS-AP run (1992 inputs)

*AVERAGE SPEED      : 43.3 Arterial 0.0 100.0 0.0 0.0


*______________________________________________________________________

*

SCENARIO REC       : rural major collector, 40.1

> 7-1-00, default reg. dist., adjusted '99 VMT mix, ARC TDM-based speeds
(00restga.in)(00restyh.in)

*

CALENDAR YEAR      : 2000

EVALUATION MONTH   : 7
```

```
ALTITUDE           : 1

*ABSOLUTE HUMIDITY  : 75.

*CLOUD COVER        : 0.00

*PEAK SUN           : 10 4

*SUNRISE/SUNSET     : 6 9

*WE VEH US          :

*SULFUR CONTENT     : 150.0

*

PARTICLE SIZE      : 2.5

*

PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV
PMDDR2.CSV

*

DIESEL SULFUR      : 500.00

*

* next line shows VMT-weighted post-processed 2000 speed from ARC model

AVERAGE SPEED      : 40.1 Arterial 0.0 100.0 0.0 0.0

*

* next line shows speed output from GDOT's 1994 HPMS-AP run (1992 inputs)

*AVERAGE SPEED      : 32.0 Arterial 0.0 100.0 0.0 0.0


*______________________________________________________________________

*

SCENARIO REC       : rural minor collector, 38.9

> 7-1-00, default reg. dist., adjusted '99 VMT mix, ARC TDM-based speeds
(00restga.in)(00restyh.in)

*

CALENDAR YEAR      : 2000

EVALUATION MONTH   : 7
```

```
ALTITUDE           : 1

*ABSOLUTE HUMIDITY  : 75.

*CLOUD COVER        : 0.00

*PEAK SUN           : 10 4

*SUNRISE/SUNSET     : 6 9

*WE VEH US          :

*SULFUR CONTENT     : 150.0

*

PARTICLE SIZE      : 2.5

*

PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV
PMDDR2.CSV

*

DIESEL SULFUR      : 500.00

*

* next line shows VMT-weighted post-processed 2000 speed from ARC model

AVERAGE SPEED      : 38.9 Arterial 0.0 100.0 0.0 0.0

*

* next line shows speed output from GDOT's 1994 HPMS-AP run (1992 inputs)

*AVERAGE SPEED      : 29.0 Arterial 0.0 100.0 0.0 0.0


*_____________________________________________________________________

*

SCENARIO REC       : rural local, 33.2

> 7-1-00, default reg. dist., adjusted '99 VMT mix, ARC TDM-based speeds
(00restga.in)(00restyh.in)

* HPMS-AP does not calculate local road speed; collector speed used for
locals w. MOBILE5.

CALENDAR YEAR      : 2000

EVALUATION MONTH   : 7
```

```
ALTITUDE           : 1

*ABSOLUTE HUMIDITY  : 75.

*CLOUD COVER        : 0.00

*PEAK SUN           : 10 4

*SUNRISE/SUNSET     : 6 9

*WE VEH US          :

*SULFUR CONTENT     : 150.0

*

PARTICLE SIZE      : 2.5

*

PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV
PMDDR2.CSV

*

DIESEL SULFUR      : 500.00

*

* Note that 12.9 is the default MOBILE6 average speed for local streets and
cannot be changed.

*

AVERAGE SPEED      : 12.9 local

*


*______________________________________________________________________

*

SCENARIO REC       : urbanized interstate, 50.9

> 7-1-00, default reg. dist., adjusted '99 VMT mix, ARC TDM-based speeds
(00restga.in)(00restyh.in)

*

CALENDAR YEAR      : 2000

EVALUATION MONTH   : 7

ALTITUDE           : 1
```

```
*ABSOLUTE HUMIDITY  : 75.

*CLOUD COVER        : 0.00

*PEAK SUN           : 10 4

*SUNRISE/SUNSET     : 6 9

*WE VEH US          :

*SULFUR CONTENT     : 150.0

*

PARTICLE SIZE      : 2.5

*

PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV
PMDDR2.CSV

*

DIESEL SULFUR      : 500.00

*

* next line shows VMT-weighted post-processed 2000 speed from ARC model

AVERAGE SPEED      : 50.9 Non-Ramp 100.0 0.0 0.0 0.0

*

* next line shows speed output from GDOT's 1994 HPMS-AP run (1992 inputs)

*AVERAGE SPEED      : 50.0 Non-Ramp 100.0 0.0 0.0 0.0


*______________________________________________________________________

*

SCENARIO REC       : urbanized other freeway, 54.3

> 7-1-00, default reg. dist., adjusted '99 VMT mix, ARC TDM-based speeds
(00restga.in)(00restyh.in)

*

CALENDAR YEAR      : 2000

EVALUATION MONTH   : 7

ALTITUDE           : 1
```

```
*ABSOLUTE HUMIDITY  : 75.

*CLOUD COVER        : 0.00

*PEAK SUN           : 10 4

*SUNRISE/SUNSET     : 6 9

*WE VEH US          :

*SULFUR CONTENT     : 150.0

*

PARTICLE SIZE      : 2.5

*

PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV
PMDDR2.CSV

*

DIESEL SULFUR      : 500.00

*

* next line shows VMT-weighted post-processed 2000 speed from ARC model

AVERAGE SPEED      : 54.3 Non-Ramp 100.0 0.0 0.0 0.0

*

* next line shows speed output from GDOT's 1994 HPMS-AP run (1992 inputs)

*AVERAGE SPEED      : 47.4 Non-Ramp 100.0 0.0 0.0 0.0

*______________________________________________________________________

*

SCENARIO REC       : urbanized principal arterial, 34.6

> 7-1-00, default reg. dist., adjusted '99 VMT mix, ARC TDM-based speeds
(00restga.in)(00restyh.in)

*

CALENDAR YEAR      : 2000

EVALUATION MONTH   : 7

ALTITUDE           : 1

*ABSOLUTE HUMIDITY  : 75.
```

```
*CLOUD COVER        : 0.00

*PEAK SUN           : 10 4

*SUNRISE/SUNSET     : 6 9

*WE VEH US          :

*SULFUR CONTENT     : 150.0

*

PARTICLE SIZE      : 2.5

*

PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV
PMDDR2.CSV

*

DIESEL SULFUR      : 500.00

*

* next line shows VMT-weighted post-processed 2000 speed from ARC model

AVERAGE SPEED      : 34.6 Arterial 0.0 100.0 0.0 0.0

*

* next line shows speed output from GDOT's 1994 HPMS-AP run (1992 inputs)

*AVERAGE SPEED      : 19.4 Arterial 0.0 100.0 0.0 0.0

*______________________________________________________________________

*

SCENARIO REC       : urbanized minor arterial, 30.7

> 7-1-00, default reg. dist., adjusted '99 VMT mix, ARC TDM-based speeds
(00restga.in)(00restyh.in)

*

CALENDAR YEAR      : 2000

EVALUATION MONTH   : 7

ALTITUDE           : 1

*ABSOLUTE HUMIDITY  : 75.

*CLOUD COVER        : 0.00
```

*PEAK SUN   : 10 4

*SUNRISE/SUNSET   : 6 9

*WE VEH US   :

*SULFUR CONTENT   : 150.0

*

PARTICLE SIZE   : 2.5

*

PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV

*

DIESEL SULFUR   : 500.00

*

* next line shows VMT-weighted post-processed 2000 speed from ARC model

AVERAGE SPEED   : 30.7 Arterial 0.0 100.0 0.0 0.0

*

* next line shows speed output from GDOT's 1994 HPMS-AP run (1992 inputs)

*AVERAGE SPEED   : 20.8 Arterial 0.0 100.0 0.0 0.0

*____

*

SCENARIO REC   : urbanized collector, 28.5

> 7-1-00, default reg. dist., adjusted '99 VMT mix, ARC TDM-based speeds (00restga.in)(00restyh.in)

*

CALENDAR YEAR   : 2000

EVALUATION MONTH   : 7

ALTITUDE   : 1

*ABSOLUTE HUMIDITY   : 75.

*CLOUD COVER   : 0.00

*PEAK SUN   : 10 4

```
*SUNRISE/SUNSET     : 6 9

*WE VEH US          :

*SULFUR CONTENT     : 150.0

*

PARTICLE SIZE      : 2.5

*

PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV
PMDDR2.CSV

*

DIESEL SULFUR      : 500.00

*

* next line shows VMT-weighted post-processed 2000 speed from ARC model

AVERAGE SPEED      : 28.5 Arterial 0.0 100.0 0.0 0.0

*

* next line shows speed output from GDOT's 1994 HPMS-AP run (1992 inputs)

*AVERAGE SPEED      : 22.0 Arterial 0.0 100.0 0.0 0.0


*______________________________________________________________________

*

SCENARIO REC       : urbanized local, 30.4

> 7-1-00, default reg. dist., adjusted '99 VMT mix, ARC TDM-based speeds
(00restga.in)(00restyh.in)

* HPMS-AP does not calculate local road speed; collector speed used for
locals w. MOBILE5.

CALENDAR YEAR      : 2000

EVALUATION MONTH   : 7

ALTITUDE           : 1

*ABSOLUTE HUMIDITY  : 75.

*CLOUD COVER        : 0.00

*PEAK SUN           : 10 4
```

```
*SUNRISE/SUNSET     : 6 9

*WE VEH US          :

*SULFUR CONTENT     : 150.0

*

PARTICLE SIZE      : 2.5

*

PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV
PMDDR2.CSV

*

DIESEL SULFUR      : 500.00

*

* Note that 12.9 is the default MOBILE6 average speed for local streets and
cannot be changed.

AVERAGE SPEED      : 12.9 local

*


*________________________________________________________________________

*

SCENARIO REC       : ramps, no speed input

> 7-1-00, default reg. dist., adjusted '99 VMT mix, ARC TDM-based speeds
(00restga.in)(00restyh.in)

*

CALENDAR YEAR      : 2000

EVALUATION MONTH   : 7

ALTITUDE           : 1

*ABSOLUTE HUMIDITY  : 75.

*CLOUD COVER        : 0.00

*PEAK SUN           : 10 4

*SUNRISE/SUNSET     : 6 9

*WE VEH US          :
```

```
*SULFUR CONTENT      : 150.0

*

PARTICLE SIZE       : 2.5

*

PARTICULATE EF      : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV
PMDDR2.CSV

*

DIESEL SULFUR       : 500.00

*

* Note that 34.6 is the default MOBILE6 average speed for ramps and cannot be
changed.

AVERAGE SPEED       : 34.6 ramp

*


END OF RUN
```

Table 5.1.3: 2000 Mobile Source Emissions

County Name	VOC (lbs/day)	NO_X (lbs/day)	CO (lbs/day)	NH_3 (lbs/day)	SO_2 (lbs/day)	PM_{10} (lbs/day)
Bibb	26,573	26,813	185,084	1,343	1,603	1,397
Chattahoochee	1,172	1,501	7,120	130	20	22
Columbia	10,988	11,749	75,763	779	731	670
Harris	4,852	6,631	30,309	207	257	286
Houston	15,167	16,057	105,748	966	954	882
Jones	4,263	4,711	27,686	206	234	257
McDuffie	4,456	6,009	27,734	185	232	256
Muscogee	22,720	21,326	161,749	1,625	1,301	1,082
Peach	5,167	7,559	31,808	206	339	376
Richmond	27,147	26,026	191,401	1,750	1,484	1,244
Twiggs	3,163	4,583	19,564	92	199	221
TOTAL	125,669	132,966	863,964	7,490	7,352	6,693

CHAPTER 6 BIOGENICS

The Biogenic Emissions was estimated using BEIS3 with the BELD3 plantation database and meteorological parameters that were prepared by MM5.

The county totals of biogenic emissions by species in a typical summer day were listed in the table below.

Table 6.1.1: 2000 Biogenic Emissions

County Name	NO Ozone Season Emissions (lb/day)	VOC Ozone Season Emissions (lb/day)
Bibb Co	400	96400
Chattahoochee	400	131600
Columbia C	400	109000
Harris Co	400	188200
Houston Co	1000	123800
Jones Co	400	172200
Mc Duffie	400	102800
Muscogee C	400	106000
Peach Co	800	53800
Richmond C	1200	113400
Twiggs Co	400	153800
TOTAL	6200	1351000

CHAPTER 7 QUALITY ASSURANCE

7.1 OVERVIEW OF QUALITY ASSURANCE

QA program includes routine quality control (QC) activities by Georgia Tech staff. The QA check includes independent checks on inventory completeness, accuracy, precision, representativeness, and comparability.

7.2 POINT SOURCE QUALITY ASSURANCE

QA on the point source portion of the inventory included the following types of checks:

- Checking for valid ranges on data elements   For example, are the stack heights within a reasonable range? A check such as this might identify sources where different units were used for the data element (e.g., meters rather than feet).
- Checking for valid SCCs
- Crosschecking data elements. This includes checking to determine whether the reported activity level times the emission factor results in the reported emission value.
- Another example is whether the reported flow rate matches the flow rate calculated using the stack gas exit velocity and stack diameter (if the velocity is also reported).
- For ozone season daily emissions, a reasonableness check involves calculating the number of days that the source would operate for the daily emissions to sum to the annual emissions. Outliers were examined to ensure that no errors in data input or calculation were made.
- For nonutility point sources, reported data were compared to the previous inventories.

7.3 AREA SOURCE QUALITY ASSURANCE

QA on the area source portion of the inventory included the following types of checks:

- Comparison to the 1999 NET for emission differences.
- Comparison to guidance documents and the 1999 NET to identify missing sources.
- A detailed comparison to the point source inventory to insure no double counting of emissions.
- Detailed checks of all sources with controls to insure controls were correctly applied.

7.4 NONROAD QUALITY ASSURANCE

QA on the nonroad source portion of the inventory included the following types of checks:

- Comparison to output from the beta version of EPA's Nonroad Emissions Model.
- Detailed review of individual spreadsheets to insure correct formulas, emission factors, and activity data.

7.5 MOBILE QUALITY ASSURANCE

QA on the on road source portion of the inventory included the following types of checks:

- Highway vehicle VMT, emissions, and average emission rates were compared to the 1999 NET inventory.

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APPENDIX A PLANT-LEVEL EMISSIONS

Table A-1: PLANT-LEVEL EMISSIONS

County ID	Site ID	Facility	CO (tpy)	NH_3 (tpy)	NO_X (tpy)	PM_{10} (tpy)	SO_2 (tpy)	VOC (tpy)
21	0030	Armstrong World Industries	1256	0	388	1637	0	622
21	0055	Brown & Williamson Tobacco Corp.	651	148	595	188	846	1448
21	0057	Cherokee Brick & Tile Company	26	0	1	890	0	2
21	0080	Chevron Products	2	0	0	0	0	58
21	4444	Medical Center of Central Georgia	5	0	18	2	0	0
21	0062	Pactiv Corp.	82	0	196	17	7	13
21	0001	Riverwood International	5541	20	1619	3993	1399	916
21	0021	Southern Natural Gas, Ocmulgee	20	0	298	5	0	42
Bibb		**Total**	**7584**	**168**	**3115**	**6733**	**2253**	**3101**
73	0004	Georgia Iron Works, Grovetown	1	0	3	1739	0	3
73	0020	Metokite Corporation	1	0	1	0	0	28
73	0003	Quebecor World - Augusta Division	5	1	2	19	6	22
Columbia		**Total**	**6**	**1**	**5**	**1759**	**6**	**54**
153	0014	Anchor Glass Container	0	0	0	0	0	0
153	0042	Mid-Georgia Cogen	87	0	113	4	8	31
153	0003	Southdown, Inc.	15	0	704	23	470	1
153	0011	Tolleson Lumber Perry Sawmill	37	0	44	75	2	272
Houston		**Total**	**139**	**0**	**861**	**102**	**481**	**304**
169	0010	Atlanta Gas Light Company Macon LNG Plant	127	0	239	5	0	3
Jones								
189	0019	Temple-Inland Forest Products	610	4	514	599	26	1319

Table A-1: PLANT-LEVEL EMISSIONS

County ID	Site ID	Facility	CO (tpy)	NH_3 (tpy)	NO_x (tpy)	PM_{10} (tpy)	SO_2 (tpy)	VOC (tpy)
215	0063	Chevron Products	0	0	0	0	0	91
215	0040	Columbus Towel Mill	0	0	0	0	0	0
215	6666	Ft. Benning	0	0	46	1	2	40
215	0089	GNB Industrial Power	82	0	58	56	61	14
215	0002	Goldens' Foundry & Machine Company	0	0	0	146	0	0
215	0156	Litho-Krome Company	0	0	0	0	0	34
215	0035	Ludlow Coated Products	0	0	0	0	0	53
215	8888	Tom's Foods Inc.	1	0	4	943	48	0
Muscogee		**Total**	**83**	**0**	**108**	**1146**	**110**	**232**
225	0019	Arrowhead Fiberglass Industries	0	0	0	0	0	39
245	0126	BP Amoco Polymers	11	0	44	8	7	47
245	0003	DSM Chemicals North America, Inc.	20954	0	760	69	17	299
245	0006	International Paper, Augusta	2674	191	3650	1293	5538	1418
245	0109	Kendall Healthcare	16	0	29	2	3	107
245	0023	Occidental Chemical	8	0	141	40	0	0
245	0002	PCS Nitrogen Fertilizer L.P.	114	627	2193	115	5	9
245	0012	Prayon, Inc.	9	0	11	52	0	1
Richmond		**Total**	**23787**	**818**	**6829**	**1579**	**5571**	**1879**
289	0002	IMERYS Pigment and Additives-Jeffersonville	49	0	0	220	74	14
289	0003	IMERYS Pigments and Additives-Dry Branch	11	0	0	2104	8	0
Twiggs		**Total**	**60**	**0**	**0**	**2324**	**82**	**14**

APPENDIX B VOC PLANT RANKINGS

Table B-1: VOC Plant Ranking

County ID	Site ID	Facility	VOC
21	0055	Brown & Williamson Tobacco Corp.	1,448
245	0006	International Paper, Augusta Lumber Mill	1,418
189	0019	Temple-Inland Forest Products	1,319
21	0001	Riverwood International Corporation Macon Mill	916
21	0030	Armstrong World Industries	622
245	0003	DSM Chemicals North America, Inc.	299
153	0011	Tolleson Lumber Perry Sawmill	272
245	0109	Kendall Healthcare Products Co., A Div. of TYCO	107
215	0063	Chevron Products Co. (Muscogee Cty.)	91
21	0080	Chevron Products Co.	58
215	0035	Ludlow Coated Products	53
245	0126	BP Amoco Polymers, Inc.	47
21	0021	Southern Natural Gas, Ocmulgee Compressor Station	42
215	6666	Ft. Benning	40
225	0019	Arrowhead Fiberglass Industries	39
215	0156	Litho-Krome Company	34
153	0042	Mid-Georgia Cogen	31
73	0020	Metokite Corporation, Plant 14	28
73	0003	Quebecor World - Augusta Division	22
289	0002	IMERYS Pigment and Additives Group-Jeffersonville	14
215	0089	GNB Industrial Power	14
21	0062	Pactiv Corp.	13
245	0002	PCS Nitrogen Fertilizer L.P.	9
73	0004	Georgia Iron Works, Grovetown GA Plant	3
169	0010	Atlanta Gas Light Company Macon LNG Plant	3
21	0057	Cherokee Brick & Tile Company	2
245	0012	Prayon, Inc.	1
153	0003	Southdown, Inc.	1

APPENDIX C NOX EMISSION PLANT RANKING

Table C-1: NO_X Plant Ranking

County ID	Site ID	Facility	NO_X
245	0006	International Paper, Augusta Lumber Mill	3,650
245	0002	PCS Nitrogen Fertilizer L.P.	2,193
21	0001	Riverwood International Corporation Macon Mill	1,619
245	0003	DSM Chemicals North America, Inc.	760
153	0003	Southdown, Inc.	704
21	0055	Brown & Williamson Tobacco Corp.	595
189	0019	Temple-Inland Forest Products	514
21	0030	Armstrong World Industries	388
21	0021	Southern Natural Gas, Ocmulgee Compressor Station	298
169	0010	Atlanta Gas Light Company Macon LNG Plant	239
21	0062	Pactiv Corp.	196
245	0023	Occidental Chemical Corp.	141
153	0042	Mid-Georgia Cogen	113
215	0089	GNB Industrial Power	58
215	6666	Ft. Benning	46
245	0126	BP Amoco Polymers, Inc.	44
153	0011	Tolleson Lumber Perry Sawmill	44
245	0109	Kendall Healthcare Products Co., A Div. of TYCO	29
21	4444	Medical Center of Central Georgia	18
245	0012	Prayon, Inc.	11
215	8888	Tom's Foods Inc.	4
73	0004	Georgia Iron Works, Grovetown GA Plant	3
73	0003	Quebecor World - Augusta Division	2
21	0057	Cherokee Brick & Tile Company	1
73	0020	Metokite Corporation, Plant 14	1

APPENDIX D CO EMISSION PLANT RANKING

Table D-1: CO Plant Ranking

County ID	Site ID	Facility	CO
245	0003	DSM Chemicals North America, Inc.	20,954
21	0001	Riverwood International Corporation Macon Mill	5,541
245	0006	International Paper, Augusta Lumber Mill	2,674
21	0030	Armstrong World Industries	1,256
21	0055	Brown & Williamson Tobacco Corp.	651
189	0019	Temple-Inland Forest Products	610
169	0010	Atlanta Gas Light Company Macon LNG Plant	127
245	0002	PCS Nitrogen Fertilizer L.P.	114
153	0042	Mid-Georgia Cogen	87
215	0089	GNB Industrial Power	82
21	0062	Pactiv Corp.	82
289	0002	IMERYS Pigment and Additives Group-Jeffersonville	49
153	0011	Tolleson Lumber Perry Sawmill	37
21	0057	Cherokee Brick & Tile Company	26
21	0021	Southern Natural Gas, Ocmulgee Compressor Station	20
245	0109	Kendall Healthcare Products Co., A Div. of TYCO	16
153	0003	Southdown, Inc.	15
289	0003	IMERYS Pigments and Additives Group-Dry Branch Ope	11
245	0126	BP Amoco Polymers, Inc.	11
245	0012	Prayon, Inc.	9
245	0023	Occidental Chemical Corp.	8
21	4444	Medical Center of Central Georgia	5
73	0003	Quebecor World - Augusta Division	5
21	0080	Chevron Products Co.	2
215	8888	Tom's Foods Inc.	1
73	0004	Georgia Iron Works, Grovetown GA Plant	1
73	0020	Metokite Corporation, Plant 14	1

APPENDIX E SO_2 EMISSION PLANT RANKING

Table E-1: SO_2 Plant Ranking

County ID	Site ID	Facility	SO_2
245	0006	International Paper, Augusta Lumber Mill	5,538
21	0001	Riverwood International Corporation Macon Mill	1,399
21	0055	Brown & Williamson Tobacco Corp.	846
153	0003	Southdown, Inc.	470
289	0002	IMERYS Pigment and Additives Group-Jeffersonville	74
215	0089	GNB Industrial Power	61
215	8888	Tom's Foods Inc.	48
189	0019	Temple-Inland Forest Products	26
245	0003	DSM Chemicals North America, Inc.	17
289	0003	IMERYS Pigments and Additives Group-Dry Branch Ope	8
153	0042	Mid-Georgia Cogen	8
245	0126	BP Amoco Polymers, Inc.	7
21	0062	Pactiv Corp.	7
73	0003	Quebecor World - Augusta Division	6
245	0002	PCS Nitrogen Fertilizer L.P.	5
245	0109	Kendall Healthcare Products Co., A Div. of TYCO	3
153	0011	Tolleson Lumber Perry Sawmill	2
215	6666	Ft. Benning	2

APPENDIX F PM_{10} EMISSION PLANT RANKING

Table F-1: PM_{10} Plant Ranking

County ID	Site ID	Facility	PM_{10}
21	0001	Riverwood International Corporation Macon Mill	3,993
289	0003	IMERYS Pigments and Additives Group-Dry Branch Ope	2,104
73	0004	Georgia Iron Works, Grovetown GA Plant	1,739
21	0030	Armstrong World Industries	1,637
245	0006	International Paper, Augusta Lumber Mill	1,293
215	8888	Tom's Foods Inc.	943
21	0057	Cherokee Brick & Tile Company	890
189	0019	Temple-Inland Forest Products	599
289	0002	IMERYS Pigment and Additives Group-Jeffersonville	220
21	0055	Brown & Williamson Tobacco Corp.	188
215	0002	Goldens' Foundry & Machine Company	146
245	0002	PCS Nitrogen Fertilizer L.P.	115
153	0011	Tolleson Lumber Perry Sawmill	75
245	0003	DSM Chemicals North America, Inc.	69
215	0089	GNB Industrial Power	56
245	0012	Prayon, Inc.	52
245	0023	Occidental Chemical Corp.	40
153	0003	Southdown, Inc.	23
73	0003	Quebecor World - Augusta Division	19
21	0062	Pactiv Corp.	17
245	0126	BP Amoco Polymers, Inc.	8
21	0021	Southern Natural Gas, Ocmulgee Compressor Station	5
169	0010	Atlanta Gas Light Company Macon LNG Plant	5
153	0042	Mid-Georgia Cogen	4
245	0109	Kendall Healthcare Products Co., A Div. of TYCO	2
21	4444	Medical Center of Central Georgia	2
215	6666	Ft. Benning	1

APPENDIX G NH_3 EMISSION PLANT RANKING

Table G-1: NH_3 Plant Ranking

County ID	Site ID	Facility	NH_3
245	0002	PCS Nitrogen Fertilizer L.P.	627
245	0006	International Paper, Augusta Lumber Mill	191
21	0055	Brown & Williamson Tobacco Corp.	148
21	0001	Riverwood International Corporation Macon Mill	20
189	0019	Temple-Inland Forest Products	4
73	0003	Quebecor World - Augusta Division	1

APPENDIX H: SAMPLE POINT SOURCE SURVEY FORM