Use of the National Mobile Inventory Model (NMIM) for Photochemical Modeling Applications in Texas

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ABSTRACT

The National Mobile Inventory Model (NMIM) enables the user to quickly obtain emission estimates by county for both the on-road and non-road source categories for any calendar year from 1999 to 2050. Texas Commission on Environmental Quality (TCEQ) staff use NMIM to obtain both on-road and non-road emissions for all U.S. states that are outside of Texas, but within its photochemical modeling domain. Significant time, effort, and cost are expended by TCEQ to develop the on-road and non-road emissions for counties within Texas, but this same level of cost and effort is not warranted for states far away from the metropolitan area under consideration for ozone modeling. Inventories of satisfactory quality that can be obtained with minimal time and effort for multiple calendar years are needed for these non-Texas States. NMIM can be freely downloaded and installed with minimal effort. A graphical user interface (GUI) is employed that enables quick setup for any combination of counties, calendar years, pollutants, vehicles, equipment, etc. to be modeled. Estimating on-road emissions for any year beyond 2002 requires the user to provide their own vehicle miles traveled (VMT) estimates by county and calendar year. To estimate VMT growth out to 2050, TCEQ staff projected linear trends from 2007-2050 based on historical VMT by State for 1980-2006 available from the U.S. Federal Highway Administration (FHWA). These VMT projections are imported into the NMIM database. The final NMIM output data are formatted using SAS code for input into Version 3 of the Emissions Processor System (EPS3).

INTRODUCTION

NMIM is a GUI tool released by the Environmental Protection Agency (EPA) that allows the user to run the MOBILE6.2 and NONROAD models for some or all counties within the U.S. for any calendar year from 1999 to 2050. TCEQ staff use NMIM to develop both on-road and non-road emission estimates for all non-Texas counties contained within its photochemical modeling domain. Figure 1 shows that this photochemical modeling domain stretches from western Texas to the east coast, and from Canada to the Gulf of Mexico. In this figure, the fine grid covering the eight-county Houston/Galveston/Brazoria (HGB) area has a spatial resolution of 2 kilometers (km). A medium resolution grid of 12 km is then used for the Texas counties and non-Texas states adjacent to the HGB area. Finally, a coarse grid of 36 km is used for those states located several hundred miles away from HGB. The level of effort expended for inventory development is typically based on the proximity of the emissions to the specific metropolitan area of interest.

When photochemical modeling needs to be performed for State Implementation Plan (SIP) submissions to EPA, TCEQ expends significant time and effort for development of both on-road and non-road emission inventories within Texas. For example, on-road SIP inventories for the greater Dallas/Fort Worth and HGB metropolitan areas typically rely on local travel demand models (TDMs) to obtain hourly vehicle miles traveled (VMT) estimates for each "link" in the roadway network for the various "day types" of Weekday, Friday, Saturday, and Sunday. The significant time and resources needed for obtaining this high level of spatial and temporal resolution is warranted for SIPs that result in implementation of additional control strategies for the metropolitan area of interest. However, this high level of inventory development effort needed for a Texas SIP submission is not warranted for non-Texas areas within the photochemical modeling domain. Instead, NMIM is used to develop on-road and non-road emission inventories that:

- are of satisfactory quality;
- are developed relatively quickly; and
- are of no additional cost to TCEQ because only staff time is expended.

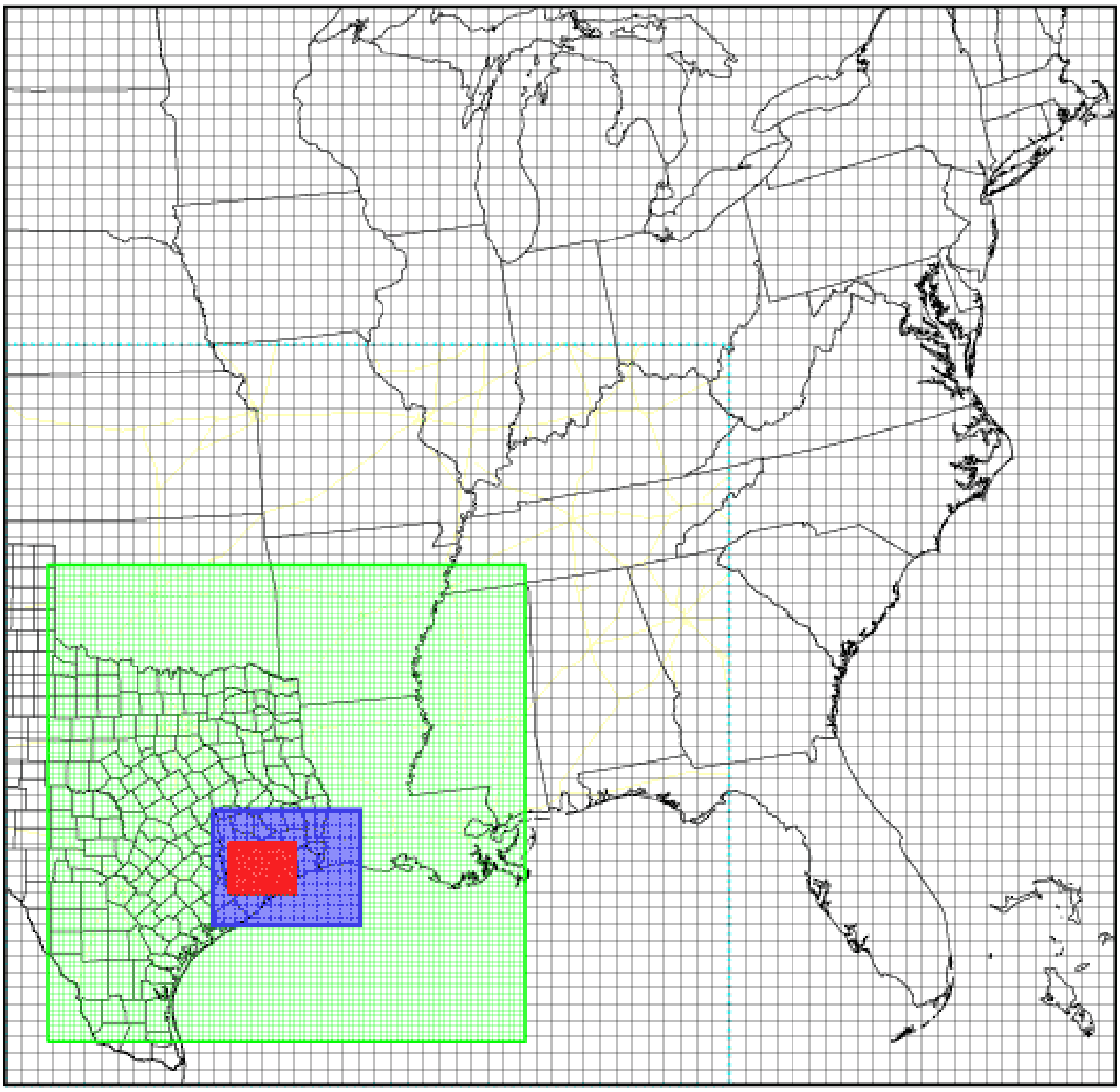
Prior to the availability of NMIM, TCEQ staff relied on the National Emission Inventory (NEI) for both on-road and non-road estimates for these non-Texas areas. However, NEI inventories are only available for historical years in three-year increments (e.g., 1999, 2002, etc.). Either base or future case emission estimates for alternate years needed to be scaled from one of these NEI years based on relative changes in both activity and emission rates.

USING NMIM

Interested parties can download NMIM and its associated User's Manual from EPA's website at http://www.epa.gov/otaq/nmim.htm. It is highly recommended that the step-by-step installation instructions be closely followed. Once the installation process is complete, it is relatively easy and quick to setup a needed run. Provided below is a summary of the basic windows for the user to make selections, most of which are done with point-and-click steps:

- Description window: summarize the analysis by referencing counties, calendar years, etc.
- Geography window: counties of interest (can run just one or all throughout the U.S.)
- Time window: month and calendar year from 1999 to 2050
- Vehicles/Equipment window: categories available for both on-road and non-road sources
- Pollutants window: NO_X, VOC, CO, etc.
- Advanced Features window: used to apply non-default options such as NO REFUELING command for MOBILE6.2 analyses to exclude at-the-pump evaporative emissions
- Geographic Representation window: select either County Group or County
- General Output window: specify database name

Figure 1. Texas photochemical modeling domain for Houston/Galveston/Brazoria area



The scenario can then be saved as a Run Specification, which can later be opened for slight modification (e.g., a different calendar year with all other inputs held constant) and then saved under a different name. Even though it is possible to perform both on-road and non-road scenarios with one Run Specification, it is not recommended for the sake of simplicity. A full description of how to run NMIM will not be provided here. Instead, the NMIM User's Manual should be consulted along with NMIM training materials from previous International Emission Inventory Conferences that are available at:

- http://www.epa.gov/ttn/chief/conference/ei15/index.html; and
- http://www.epa.gov/ttn/chief/conference/ei16/index.html

NMIM run times will vary as a function of both computer processor speed and number of counties selected. For example, a non-road scenario was performed and it took roughly one minute per county on a personal computer with a three gigahertz processor. However, the run time averaged out to approximately three minutes per county on a personal computer that had only a one gigahertz processor. For production runs involving hundreds or thousands of counties, it is recommended that:

- the available personal computer with the fastest processor speed be used; and

- runs be performed either overnight or on weekends.

INVENTORY DEVELOPMENT WITH NMIM

Development of non-road emission estimates is quite easy with NMIM because NONROAD model default inputs are provided for both emission rates and activity data to allow analyses from 1999 to 2050. For on-road emission estimates, the MOBILE6.2 model outputs emission rates in units of grams per mile (gpm), which must then be multiplied by VMT activity data to obtain the final on-road emission inventory estimates. NMIM multiplies VMT by the MOBILE6.2 emission rates for the user, but the currently available database inputs contain only 1999 and 2002 VMT data for every U.S. county for the twelve Highway Performance Monitoring System (HPMS) roadway types shown in Table 1.

Table 1. HPMS roadway types used by NMIM.

Area Type	***HPMS Code***	***Roadway Type***
Rural	110	Interstate
	130	Other Principal Arterial
	150	Minor Arterial
	170	Major Collector
	190	Minor Collector
	210	Local
Urban	230	Interstate
	250	Other Freeways and Expressways
	270	Other Principal Arterial
	290	Minor Arterial
	310	Collector
	330	Local

Developing and importing custom VMT projections into NMIM

NMIM has the capability to estimate on-road emissions after 2002, but users must provide their own VMT estimates for the specified year(s) of interest. Fortunately, annual VMT estimates for each of these twelve HPMS roadway types are available for every state from 1980 through 2006 on the U.S. Department of Transportation FHWA webpage for its Highway Statistics Series (http://www.fhwa.dot.gov/policy/ohpi/hss/index.htm). These data are labeled as “VM-2” in Excel format and can easily be analyzed to establish linear trends based on 1980-2006 for each state and roadway type to project VMT figures for 2007-2050. The full analysis of such an effort is contained in an Excel spreadsheet entitled “us-vmt-nmim-1980-2006.xls” that is available at ftp://ftp.tceq.state.tx.us/pub/OEPAA/TAD/Modeling/Mobile_EI/NMIM/.

Different VMT adjustment factors are not provided for every county within each state. However, different growth rates for both the urban and rural roadway types within each state are available. A graphical example of such an analysis for the state of Georgia is provided in Figure A-1 of the Appendix. To project on-road activity into the future, it is necessary to develop VMT adjustment factor ratios based on 2002, which is the latest year for which VMT data are included within the NMIM database. The Excel spreadsheet referenced above contains such VMT ratios for each state and roadway type for:

- 2005 / 2002;
- 2006 / 2002;
- 2007 / 2002; and
- 2050 / 2002.

These ratio sets can then be exported as comma-separated values (CSV) files for later use. Both 2005 and 2006 were selected because:

- the TCEQ is currently evaluating new ozone episodes from both of these years; and
- 2005 and 2006 historical VMT data were available from the FHWA Highway Statistics website.

Both 2007 and 2050 were selected because they represent the end points of the linear trend line for projected VMT. Provided that two non-consecutive years of VMT figures are included in the database, NMIM will linearly interpolate VMT for the year specified by the user. For example, if 2018 is selected by the user, NMIM will linearly interpolate VMT estimates based on the end points of 2007 and 2050.

Due to the significant size of the database, it would be highly impractical to hand enter VMT inputs for each year, vehicle class, roadway type, county, and state. Instead, the MySQL Query Browser provided with NMIM can be used to export the 2002 VMT data in CSV format, yielding 1,082,592 individual records. The SAS software code included as Exhibit 1 in the Appendix is then used to:

- import the 2002 VMT data from the NMIM database;
- import the VMT adjustment factor ratios in CSV format for the desired year (e.g., 2005 / 2002);
- multiply these adjustment factors by the 2002 VMT data to obtain new base year VMT (e.g., for 2005); and
- export the new base year VMT in a format that can be easily imported into NMIM.

Both to complete this last step and for other useful advice, it is highly recommended that users follow the instructions in Example 13 on Slides 60-66 of the NMIM Training presentation given by Harvey Michaels of U.S. EPA on May 15, 2006 at the 16th International Emission Inventory Conference in New Orleans (http://www.epa.gov/ttn/chief/conference/ei15/training/nmimcourse2006.pdf).

PHOTOCHEMICAL MODELING INPUT FILE PREPARATION

Converting NMIM output into photochemical model processor input

After NMIM runs are completed, various aggregating and output options are available. For eventual input into photochemical models, the "NMIM native, normalized" tab-delimited ASCII text output format is typically selected where the following information is provided on each line:

- Source category code (SCC)
- Year
- Two-digit state identification
- Federal Information Processing Standards (FIPS) county codes
- Month
- Emission type (exhaust, evaporative, etc.)
- Pollutant code
- Emissions

SAS software code is then used to convert this native NMIM output into the Area and Mobile Source (AMS) emissions format used by EPS3. It should be noted that NMIM outputs monthly emission totals, which need to be divided by the number of days in the specified month to obtain average weekday emissions. For example, if June is selected, the NMIM reported totals must be divided by 30, but if either July or August is selected, the NMIM totals must be divided by 31. Examples of both this SAS code and the "master" UNIX scripts that run it for on-road and non-road applications are available at ftp://ftp.tceq.state.tx.us/pub/OEPAA/TAD/Modeling/Mobile_EI/NMIM/.

Running on-road NMIM estimates through a photochemical emissions processor

Whether EPS3 or some other processor is used, the NMIM daily emission totals must be temporally and spatially allocated prior to photochemical model input. The temporal allocation profiles applied to on-road emissions for non-Texas areas are based on the extensive inventory development efforts for all of the Texas counties contained in the photochemical modeling domain. As Table 2 demonstrates, the most intensive on-road inventory development efforts are reserved for the major Texas metropolitan areas of interest, but with significant effort devoted to on-road inventories for rural counties within the State. In no way should this table be used to indicate that the non-Texas on-road inventories based on NMIM are of substandard quality for TCEQ's photochemical modeling applications. Instead, the level of effort indicated is appropriate based on the proximity of the emissions to major Texas metropolitan areas.

After the Texas on-road emission inventory components have been developed and processed for photochemical model input, they are combined using the MRGUAM ("MeRGe UAM") module of EPS3. The message output from this MRGUAM step provides an hourly summary of NO_X, VOC, and CO emission totals by day type for each calendar year of interest. Table 3 provides a summary of how

2005 on-road Weekday emissions for the Texas portion of the photochemical modeling domain compare to those for the day types of Friday, Saturday, and Sunday. These ratios are used by the TMPRL module of EPS3 to convert the average Weekday emissions when preparing Friday, Saturday, and Sunday photochemical model on-road inputs for non-Texas counties.

Table 4 summarizes the Weekday on-road hourly distribution of NO_X, VOC, and CO emissions. These fractions are used to develop separate hourly profiles for NO_X, VOC, and CO that are used by the TMPRL module to temporally allocate the NMIM on-road emissions. Different hourly NO_X, VOC, and CO profiles are then developed and used by the TMPRL module for the other day types of Friday, Saturday, and Sunday. Finally, day type adjustment ratios and hourly profiles for each pollutant are available for other years for which complete sets of Texas on-road emission inventories have been developed (e.g., 2006 and 2018). These profile adjustment factors are provided in integer format for use by TMPRL within a file entitled "tmprl.eps3.onroad.profiles" that is located within a larger compressed file at ftp://ftp.tceq.state.tx.us/pub/OEPAA/TAD/Modeling/Mobile_EI/EPS3/.

Table 2. On-road inventory development for Texas photochemical modeling efforts

On-Road Inventory Development Parameter	***Texas Metropolitan Areas***	***Texas Rural Areas***	***Non-Texas States/Counties***
VMT Source	Travel Demand Models (TDMs)	HPMS Data Sets	NMIM Database
VMT Resolution	Roadway "Links" From TDM	19 Roadway Types	12 Roadway Types
Season Types	School and Summer (i.e., non-School)	Summer Only	Summer Only
Day Types	Weekday, Friday, Saturday, and Sunday	Weekday, Friday, Saturday, and Sunday	Weekday, Friday, Saturday, and Sunday
Hourly VMT?	Yes	Yes	No
VMT Mix Variation By Day/Time Period?	Yes	Yes	No
Roadway Speed Distribution	Varies by Hour and Link	Varies by Hour and Roadway Type	MOBILE6.2 Default
Spatial Resolution	Excellent	Very Good	Good
Temporal Resolution	Excellent	Very Good	Good
MOBILE6.2 Vehicle Types	28	28	12
Temperature/Humidity Diesel NO_X Correction	Yes	Yes	No
"18-Wheeler" Idling Emissions Separation	Yes	No	No

Table 3. Comparison of 2005 Texas weekday on-road emissions to other day types

Day Type	***On-Road Emissions** (tons)*			***Ratio to Weekday***		
	NO_X	*VOC*	*CO*	*NO_X*	*VOC*	*CO*
Weekday	1,510.95	560.03	6,612.93	100.0%	100.0%	100.0%
Friday	1,678.72	648.13	7,648.43	111.1%	115.7%	115.7%
Saturday	1,169.22	480.28	6,110.09	77.4%	85.8%	92.4%
Sunday	961.71	421.07	5,374.24	63.6%	75.2%	81.3%

Using just an hourly VMT profile to temporally allocate total on-road NO_X emissions can lead to significant error due to the difference in activity between the light-duty passenger fleet and "eighteen-wheelers", which are defined here to mean the HDDV8a and HDDV8b vehicle classes within MOBILE6.2. Figure A-2 in the Appendix demonstrates how the hourly NO_X distribution from both the passenger fleet and eighteen-wheelers compares with total fleet VMT for a 2005 summer weekday scenario in the eight-county HGB area. The passenger fleet as a whole is responsible for roughly 91 percent of the total VMT, but only 43 percent of the total NO_X. The eighteen-wheeler contribution to total VMT is roughly 4 percent, but accounts for 41 percent of the total NO_X. Since the temporal distribution of NO_X is critical for appropriate ozone modeling, it can be particularly problematic during rush-hour periods if a simple fleet-wide VMT profile is used as a surrogate for hourly NO_X distribution.

Table 4. 2005 Summer weekday hourly Texas on-road emissions (central standard time)

Hour *(CST)*	***On-Road Emissions*** *(tons)*			***Hourly Distribution***		
	NO_X	*VOC*	*CO*	*NO_X*	*VOC*	*CO*
1	12.72	7.95	55.73	0.8%	1.4%	0.8%
2	11.47	7.72	51.80	0.8%	1.4%	0.8%
3	10.96	7.59	49.91	0.7%	1.4%	0.8%
4	14.44	8.18	62.33	1.0%	1.5%	0.9%
5	30.07	10.86	113.50	2.0%	1.9%	1.7%
6	65.90	21.74	266.47	4.4%	3.9%	4.0%
7	92.75	36.75	456.63	6.1%	6.6%	6.9%
8	82.66	33.32	396.57	5.5%	5.9%	6.0%
9	76.06	26.64	326.00	5.0%	4.8%	4.9%
10	78.35	28.06	337.17	5.2%	5.0%	5.1%
11	85.09	31.07	373.47	5.6%	5.5%	5.6%
12	90.45	33.99	401.64	6.0%	6.1%	6.1%
13	92.12	33.89	400.32	6.1%	6.1%	6.1%
14	96.91	35.55	426.45	6.4%	6.3%	6.4%
15	105.30	40.56	498.01	7.0%	7.2%	7.5%
16	112.71	44.31	517.57	7.5%	7.9%	7.8%
17	117.34	41.85	534.17	7.8%	7.5%	8.1%
18	94.41	32.89	425.05	6.2%	5.9%	6.4%
19	65.77	17.57	257.02	4.4%	3.1%	3.9%
20	52.82	15.07	195.44	3.5%	2.7%	3.0%
21	45.43	13.73	168.02	3.0%	2.5%	2.5%
22	35.11	11.89	131.64	2.3%	2.1%	2.0%
23	24.96	10.12	97.42	1.7%	1.8%	1.5%
24	17.14	8.75	70.58	1.1%	1.6%	1.1%
Total	1,510.95	560.03	6,612.93	100.0%	100.0%	100.0%

This same issue is not as significant for the temporal distribution of either VOC or CO on-road emissions. In 2005 HGB, the passenger fleet is responsible for 93 percent of the on-road VOC and 96 percent of the on-road CO, while eighteen-wheelers are responsible for only 3 percent of the VOC and 1 percent of the CO. As Figure A-3 shows, VOC tracks relatively closely by hour with total VMT, but evaporative emissions from parked vehicles do lead to some differences between the two profiles. Figure A-4 shows how CO emissions track most closely with hourly VMT since they are dominated by the gasoline-powered passenger fleet and are emitted only from the tailpipe. Nonetheless, use of simple hourly VMT profiles should be avoided whenever possible for temporal distribution of on-road emissions.

The on-road emission inventories must also be spatially allocated among the appropriate grid cells within the modeling domain. Currently, TCEQ staff allocate on-road emissions for non-Texas areas based on separate spatial surrogates for interstate freeways, state highways, arterials, and population. The various arterials and major collectors are grouped into the "arterial" spatial surrogate, while the minor collectors and locals are allocated based on population. An excerpt from this on-road spatial surrogate is provided in Table 5 for Fulton County in Georgia where Atlanta is located. In this example, the surrogate indicates that 16.44 percent of the interstate roadways in Fulton County are located within the 12 km grid cell that is 1,404 km east and 564 km south of the Lambert Conformal Conic projection origin. Therefore, 16.44 percent of the interstate freeway emission estimates for Fulton County are assigned to that 12 km grid cell.

Table 5. Sample on-road spatial surrogate excerpt for Fulton County in Georgia

FIPS Code	***Grid Cell From Origin***		***Spatial Allocation Fractions***			
	X (meters)	*Y (meters)*	*Interstates*	*Highways*	*Arterials*	*Population*
13121	**1404000**	**-564000**	**0.1644830**	0.0607947	0.0512859	0.0696030
13121	1404000	-552000	0.3315945	0.1667989	0.0588679	0.2851710
13121	1404000	-540000	0.1724678	0.1176801	0.1463896	0.2281220
13121	1404000	-528000	0.0845633	0.1920732	0.0386401	0.0858880

Excessive grouping of roadway types for surrogate allocation can result in poor spatial resolution of the on-road emissions for photochemical model input. However, excessive disaggregation can lead to numerous gaps in spatial coverage because of the incompleteness of geographic information system (GIS) data, particularly for rural areas and smaller roadway types such as locals and collectors. This problem can be minimized by the use of both secondary and tertiary surrogates. For example, if state highway emissions are reported for a specific county, but the surrogate shows that zero state highway miles are located within the county, the gridding module resorts to the arterial surrogate as a backup, and ultimately to the population surrogate as a final backup. Even though these secondary and tertiary options are available, spatial allocation surrogates need periodic improvement as the GIS data sources become more refined. Figure A-5 in the Appendix shows a graphical plot of summer weekday on-road NO_X emissions at 12 km for the south central portion of the U.S. Similar plots for VOC and CO are shown in Figures A-6 and A-7, respectively.

CONCLUSIONS

Prior to the release of NMIM, TCEQ staff relied on National Emission Inventory (NEI) estimates for both on-road and non-road applications in non-Texas states. However, NEI data sets are limited to historical years such as 1999, 2002, etc. Typically, it was necessary to adjust the latest available NEI data sets to specific years needed for both base case and future case modeling (e.g., 2000, 2007, etc.). Unfortunately, such adjustments had the potential to introduce unwanted error. Compared to the NEI, use of NMIM for photochemical modeling applications not only allows both on-road and non-road emissions to be developed more quickly, but also with a higher degree of accuracy for any year from 1999-2050. However, when developing SIP modeling inventories for specific metropolitan areas, NMIM should be avoided as a substitute for the highly detailed work that is typically required for estimating the ozone reduction impacts of specific control strategies.

There are no precise methods for projecting future VMT growth, and so the simple linear trend approach presented here based on 1980-2006 FHWA data is only one option. Ideally, a single set of future VMT projections would be available so that there is consistency among different state and Federal modeling efforts that rely on NMIM. For the purposes of temporally allocating on-road NO_X, VOC, and CO emissions, it is not uncommon to use a VMT distribution profile. However, such an approach can lead to significant error due to the large NO_X contribution from eighteen-wheeler trucks, which typically do not follow the same hourly activity patterns as the passenger fleet. Instead, hourly NO_X, VOC, and CO emission profiles should be used when available from states where extensive on-road inventory development has occurred.

As GIS data sets continue to evolve, so should the spatial allocation surrogates for both on-road and non-road emissions. Most of this ongoing improvement effort should be focused close to the metropolitan areas of specific interest. Less time and effort needs to be focused on “coarse grid” surrogates for areas located several hundred miles away from metropolitan areas of specific interest.

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KEY WORDS

area and mobile source (AMS) format
carbon monoxide (CO)
eighteen-wheeler
emission inventories
Emission Processor System Version 3 (EPS3)
Environmental Protection Agency (EPA)
Federal Highway Administration (FHWA)
gridding
Highway Performance Monitoring System (HPMS)
Highway Statistics Series
Houston/Galveston/Brazoria (HGB)
MOBILE6.2 model
MRGUAM
MySQL
National Emission Inventory (NEI)
National Mobile Inventory Model (NMIM)
nitrogen oxides (NO_X)
non-road sources
NONROAD model
on-road sources
ozone
passenger fleet
photochemical modeling
source category code (SCC)
spatial surrogate
State Implementation Plan (SIP)
temporal surrogate
Texas
Texas Commission on Environmental Quality (TCEQ)
TMPRL
travel demand model (TDM)
vehicle miles traveled (VMT)
volatile organic compounds (VOC)

APPENDIX
Oversize Graphs and Figures

Figure A-1. Georgia VMT projections from 2007-2050 by HPMS roadway types based on linear trends from 1980-2006

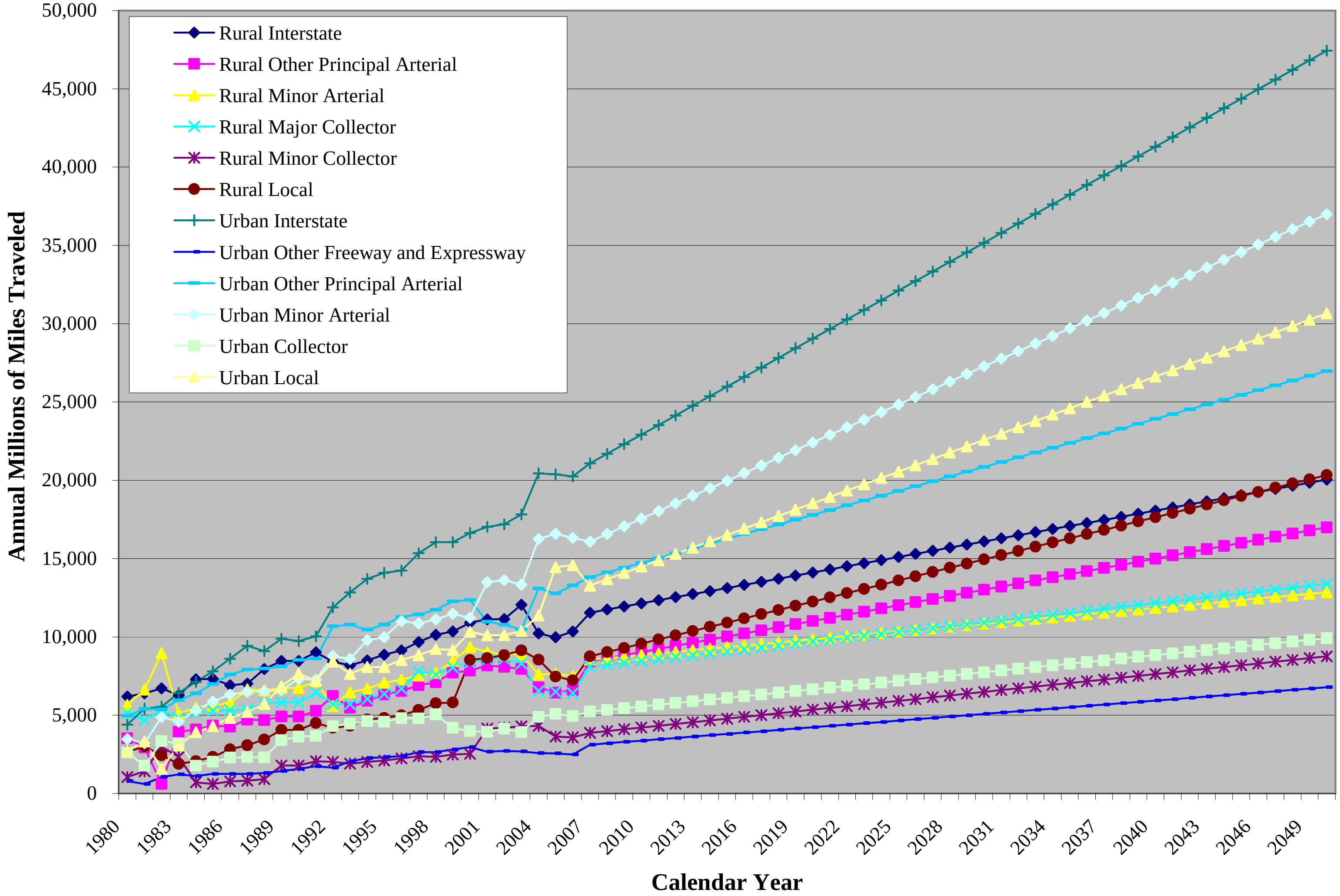

Figure A-2. 2005 hourly distribution of summer weekday on-road NO_X emissions and VMT in HGB area

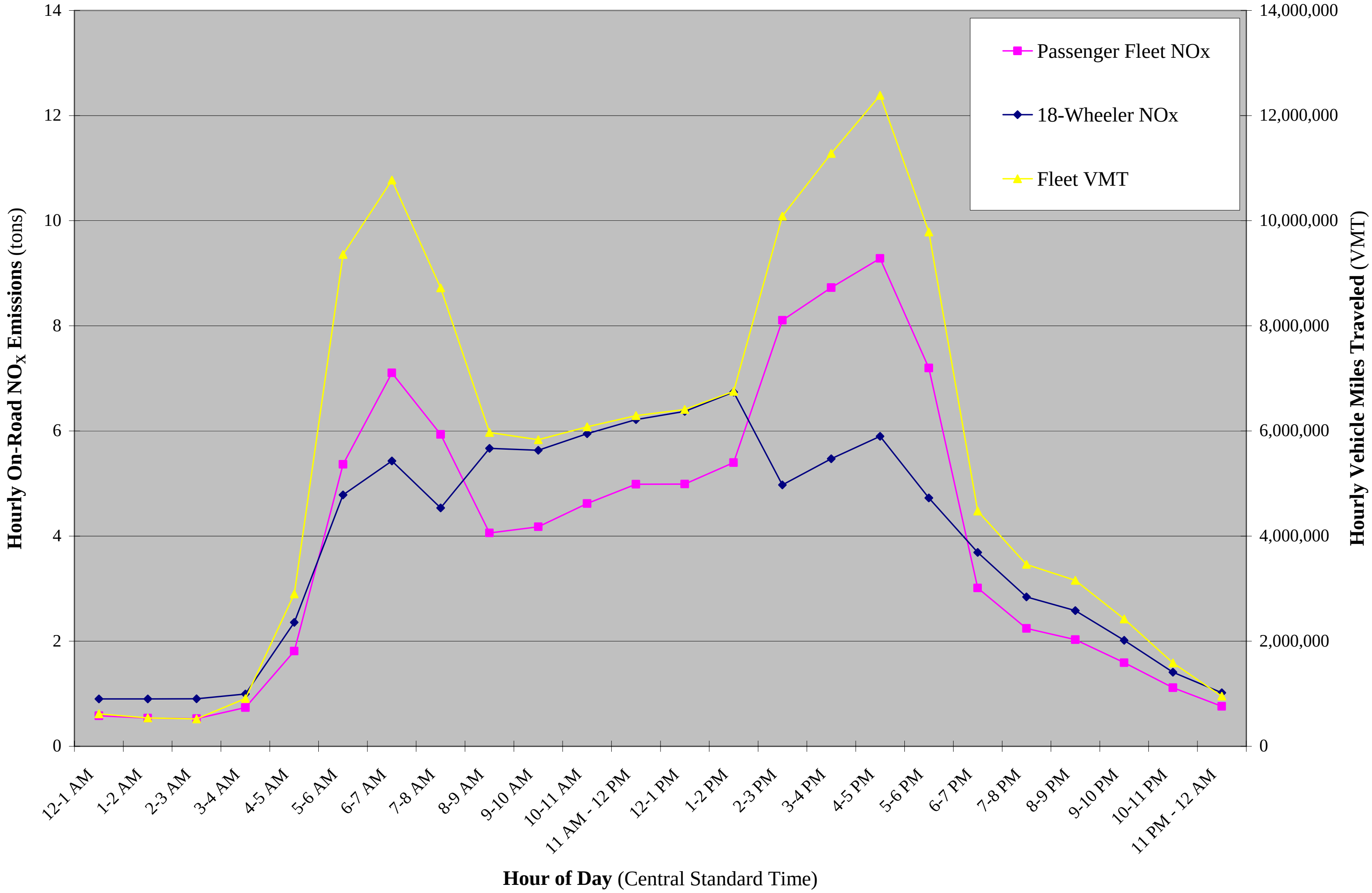

Figure A-3. 2005 hourly distribution of summer weekday on-road VOC emissions and VMT in HGB area

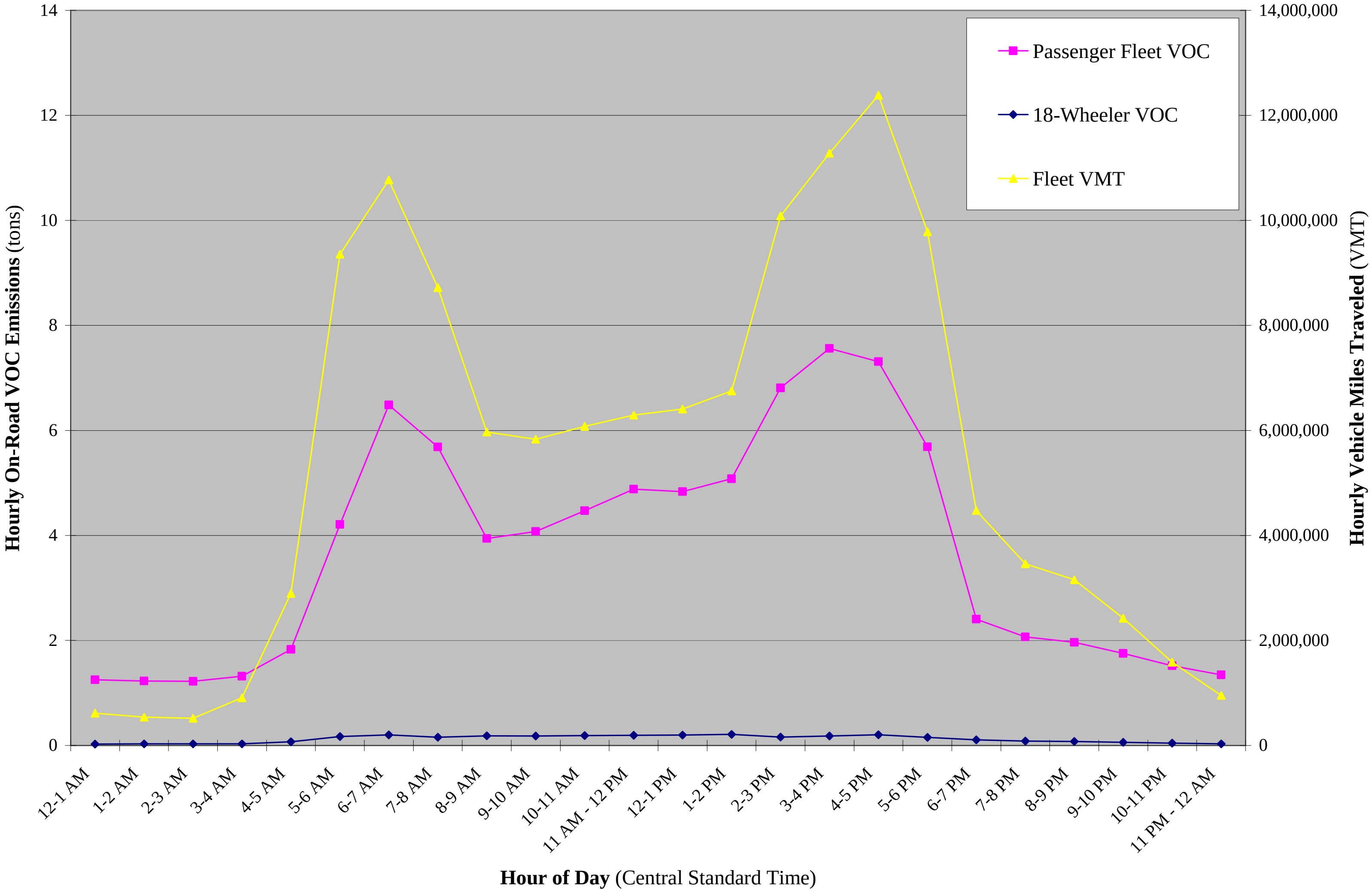

Figure A-4. 2005 hourly distribution of summer weekday on-road CO emissions and VMT in HGB area

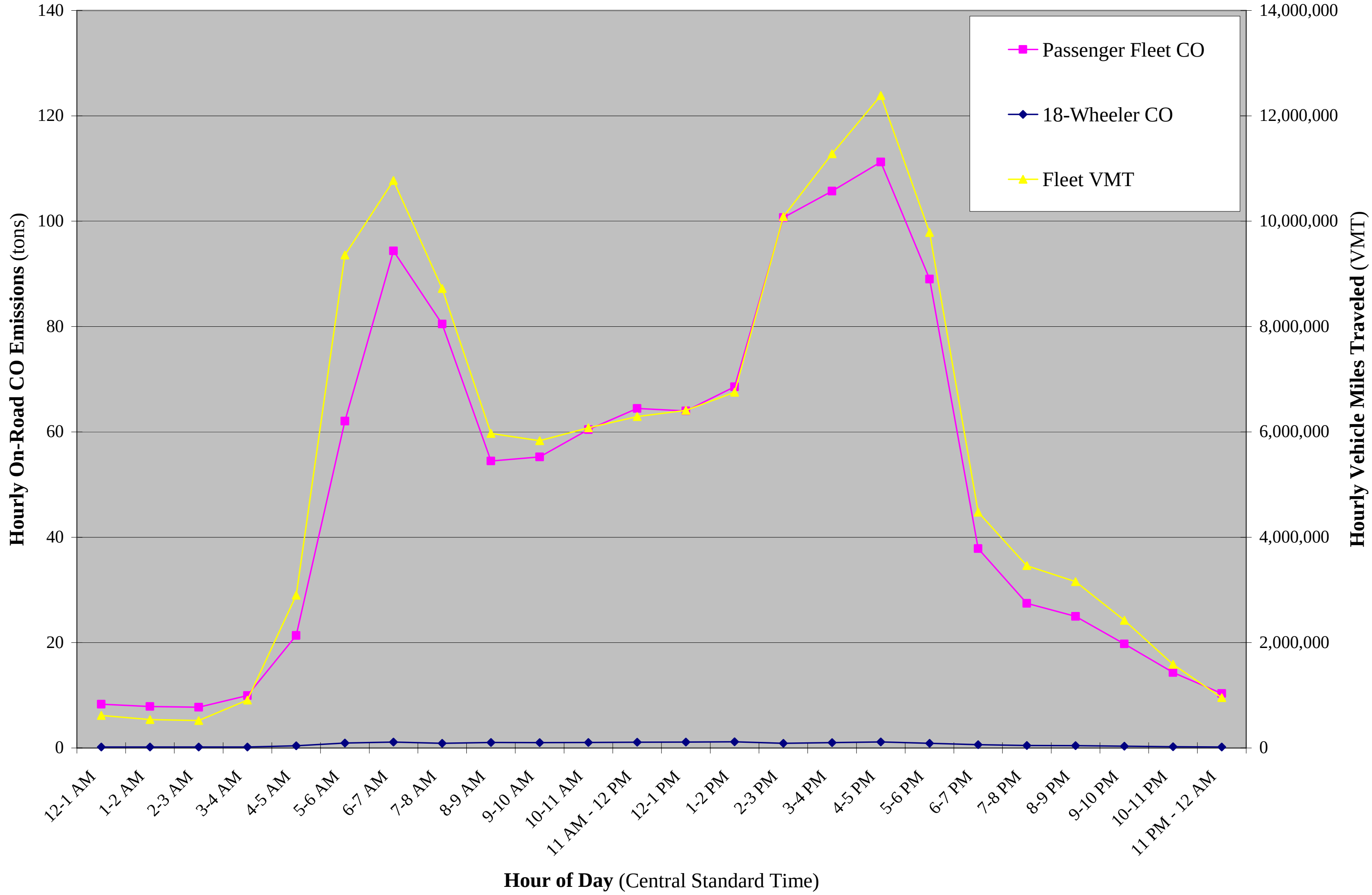

Figure A-5. South central U.S. summer weekday on-road NO_X emissions at 12 km

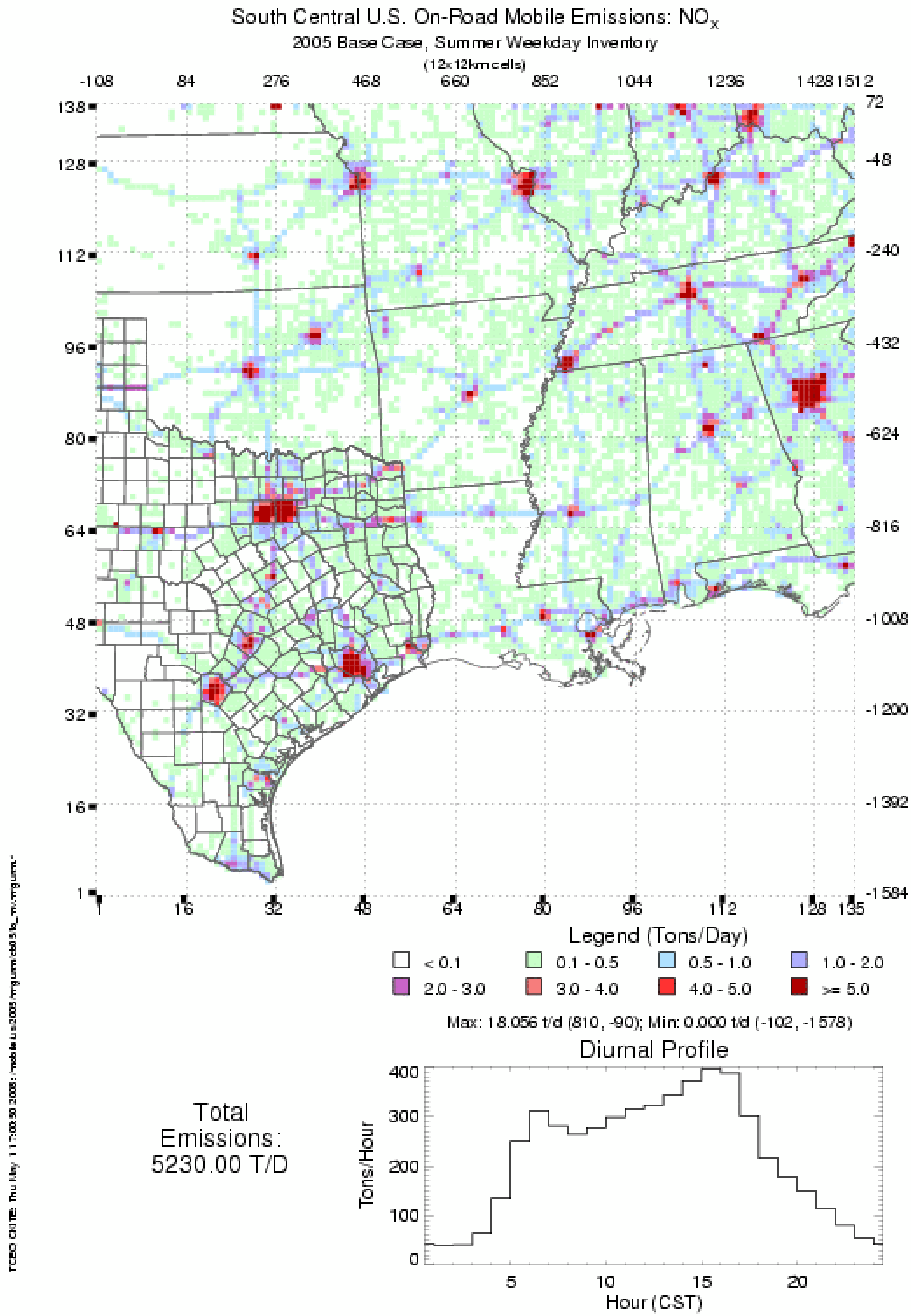

Figure A-6. South central U.S. summer weekday on-road VOC emissions at 12 km

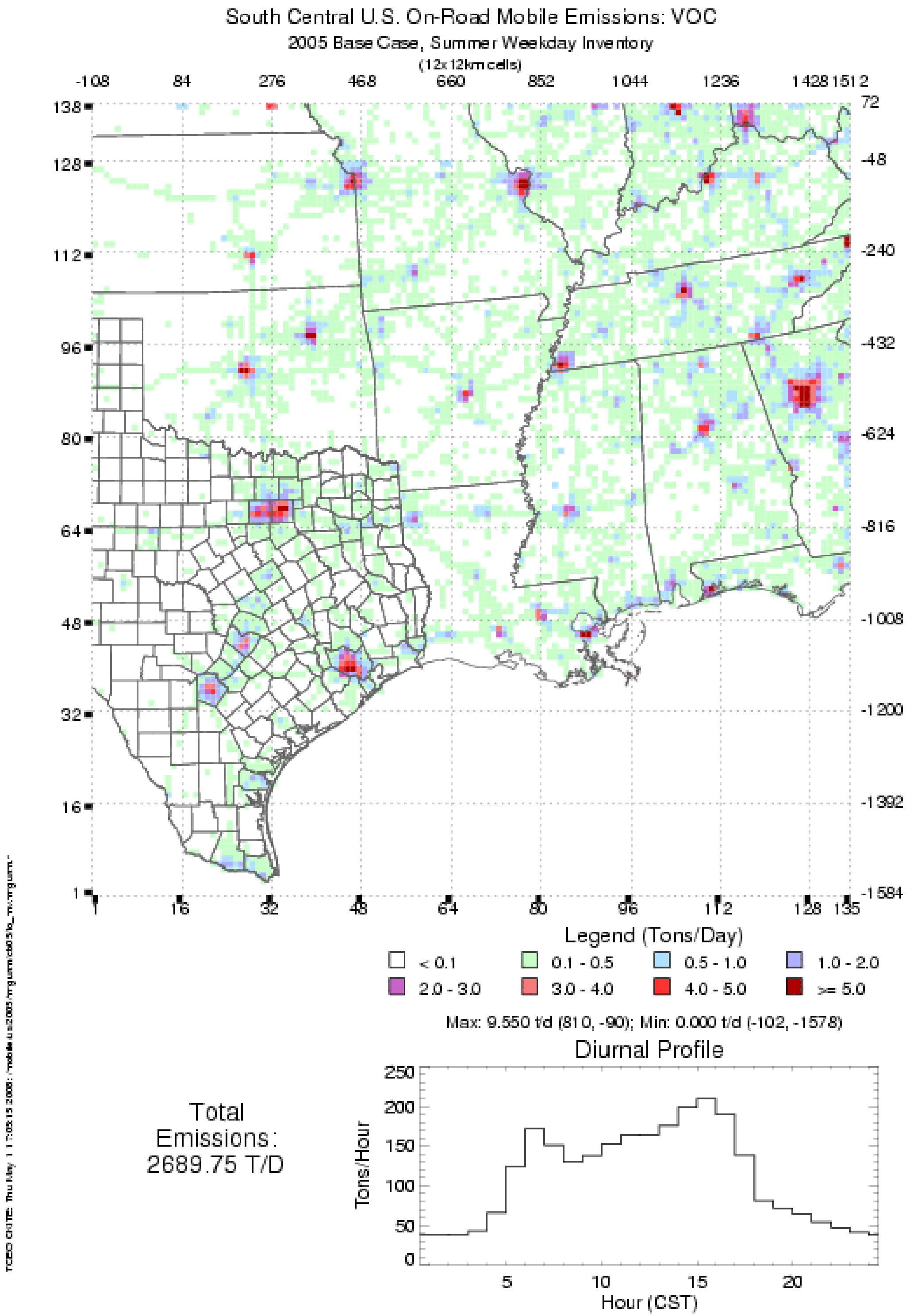

Figure A-7. South central U.S. summer weekday on-road CO emissions at 12 km

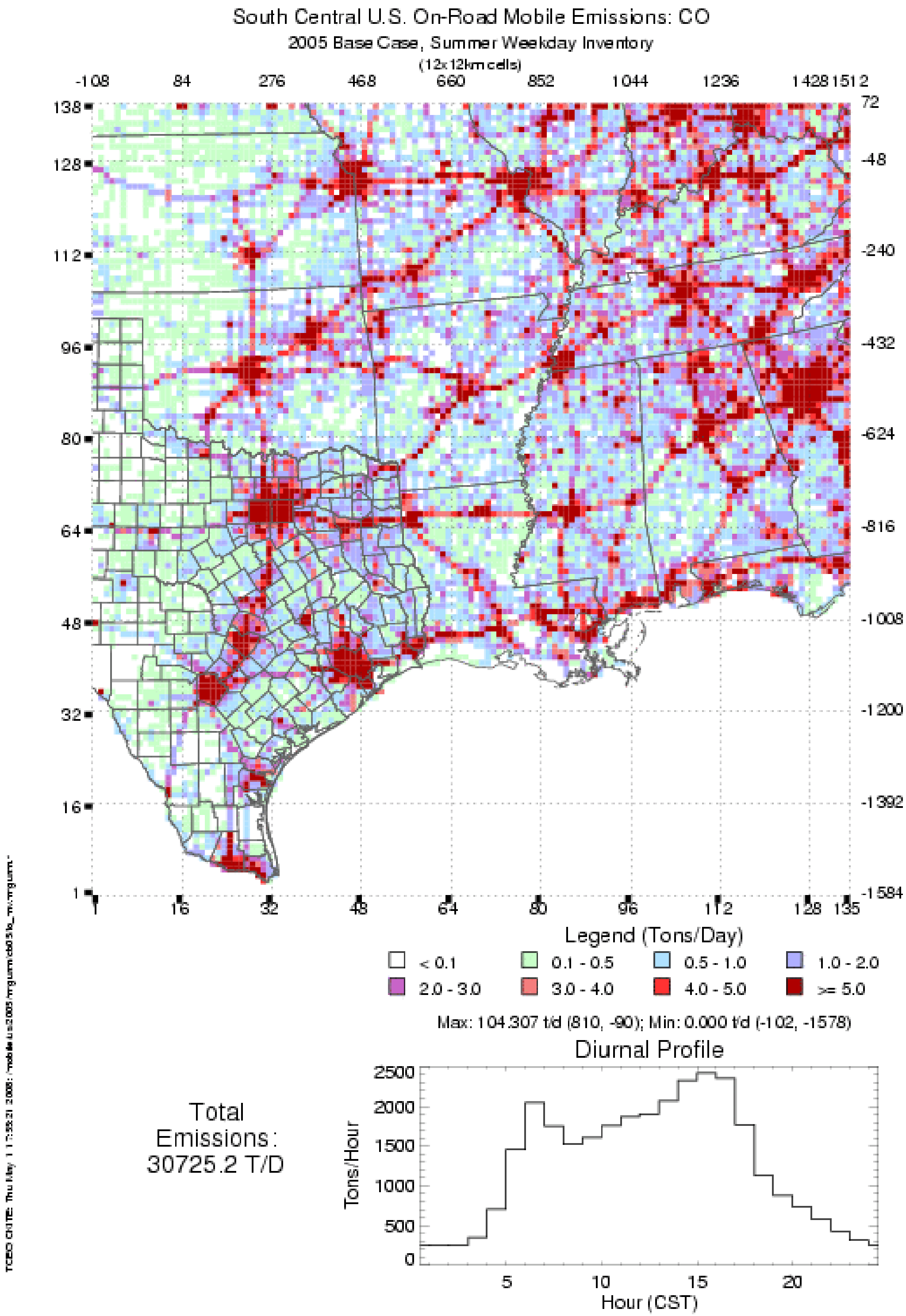

Exhibit A-1. SAS code to apply 2005 VMT adjustment factors to 2002 NMIM database output

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data base_vmt;

  infile "/mobile/nmim/vmt/nmim_vmt_2002.csv"  firstobs = 2  dlm = ','  dsd  missover;
    input baseyear vclass roadtype countyfips statefips vmt;
    drop baseyear;

  proc sort data = base_vmt;
    by statefips roadtype countyfips vclass;

data vmt_adjust;

  infile "/mobile/nmim/vmt/2005_2002_vmt_ratios.csv"  firstobs = 2  dlm = ','  dsd  missover;
    input statefips roadtype vmt_factor;

  proc sort data = vmt_adjust;
    by statefips roadtype;

data combo;

  merge base_vmt vmt_adjust;
    by statefips roadtype;
    new_vmt = round ( vmt * vmt_factor, .0001);
    drop vmt;
    new_base = 2005;

  proc sort data = combo;
    by vclass roadtype countyfips statefips;

data output;

  set combo;
  file "/mobile/nmim/vmt/nmim_vmt_2005.tab"  dlm = '09'X;
    put new_base vclass roadtype countyfips statefips new_vmt;

run
```