

**DOCUMENTATION OF
THE 2002 MOBILE
EMISSION INVENTORY
FOR THE MANE-VU
STATES**

FINAL REPORT

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CONTENTS

	<u>Page</u>
TABLES	v
ACRONYMS AND ABBREVIATIONS	vi
CHAPTER I. INTRODUCTION/BACKGROUND	1
CHAPTER II. 2002 ONROAD EMISSION INVENTORY	3
A. CONNECTICUT	5
1. State-supplied Data	5
2. MOBILE6 Inputs	5
3. VMT Inputs	6
4. Emission Calculation Methodology	6
B. DELAWARE	6
C. DISTRICT OF COLUMBIA	7
1. State-supplied Data	7
2. MOBILE6 Inputs	7
3. VMT Inputs	8
4. Emission Calculation Methodology	8
D. MAINE	8
1. State-supplied Data	8
2. MOBILE6 Inputs	9
3. VMT Inputs	9
4. Emission Calculation Methodology	9
E. MARYLAND	10
1. State-supplied Data	10
2. MOBILE6 Inputs	10
3. VMT Inputs	10
4. Emission Calculation Methodology	12
F. MASSACHUSETTS	12
1. State-supplied Data	12
2. MOBILE6 Inputs	12
3. VMT Inputs	14
4. Emission Calculation Methodology	14
G. NEW HAMPSHIRE	14
1. State-supplied Data	14
2. MOBILE6 Inputs	15
3. VMT Inputs	15
4. Emission Calculation Methodology	16
H. NEW JERSEY	16
1. State-supplied Data	16
2. MOBILE6 Inputs	17
3. VMT Inputs	17
4. Emission Calculation Methodology	18
I. NEW YORK	18
J. PENNSYLVANIA	19

K. RHODE ISLAND	20
1. State-supplied Data	20
2. MOBILE6 Inputs	21
3. VMT Inputs	21
4. Emission Calculation Methodology	21
L. VERMONT	21
CHAPTER III. 2002 NONROAD EMISSION INVENTORY	23
A. CONNECTICUT	25
B. DELAWARE	27
C. DISTRICT OF COLUMBIA	27
D. MAINE	27
E. MARYLAND	28
F. MASSACHUSETTS	28
G. NEW HAMPSHIRE	29
H. NEW JERSEY	29
I. NEW YORK	30
J. PENNSYLVANIA	30
K. RHODE ISLAND	31
L. VERMONT	31
CHAPTER IV. EMISSION SUMMARIES	33
A. ONROAD SUMMARIES	33
B. NONROAD SUMMARIES	33
CHAPTER V. REFERENCES	39

TABLES

Table II-1	Approach for Developing MANE-VU 2002 Emission Inventory by State	3
Table II-2	Details of VMT Data as Provided by the MANE-VU States	4
Table II-3	Data Used in Calculating Connecticut's 2002 Onroad Emission Inventory for MANE-VU	5
Table II-4	Data Used in Calculating the District of Columbia's 2002 Onroad Emission Inventory for MANE-VU.....	7
Table II-5	Data Used in Calculating Maine's 2002 Onroad Emission Inventory for MANE-VU.....	9
Table II-6	Data Used in Calculating Maryland's 2002 Onroad Emission Inventory for MANE-VU.....	11
Table II-7	Data Used in Calculating Massachusetts's 2002 Onroad Emission Inventory for MANE-VU	13
Table II-8	Data Used in Calculating New Hampshire's 2002 Onroad Emission Inventory for MANE-VU	15
Table II-9	Data Used in Calculating the New Jersey's 2002 Onroad Emission Inventory for MANE-VU	17
Table II-10	Data Used in Calculating Rhode Island's 2002 Onroad Emission Inventory for MANE-VU	20
Table III-1	SCCs Addressed by the NONROAD Model	24
Table III-2	Data Source Code Descriptions	25
Table III-3	Summary of 2002 Nonroad Sector Inventory Development by State and Subsector.....	26
Table III-4	Emission Ratios for Gap-Filling Missing Pollutant Records*.....	27
Table IV-1	Annual 2002 Onroad Sector Emissions by MANE-VU State	34
Table IV-2	Annual 2002 Nonroad Sector Emissions by MANE-VU State	35

ACRONYMS AND ABBREVIATIONS

CAP	criteria air pollutant
CERR	Consolidated Emission Reporting Rule
CNG	compressed natural gas
CO ₂	carbon dioxide
EDMS	Emissions and Dispersion Modeling System
EPA	U.S. Environmental Protection Agency
FIPs	Federal Information Processing Standards
GSE	ground support equipment
HAP	hazardous air pollutant
HC	hydrocarbon
I/M	inspection and maintenance
LEV	low emission vehicle
LPG	liquefied petroleum gas
MANE-VU	Mid-Atlantic/Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association
NEI	National Emissions Inventory
NH ₃	ammonia
NIF	NEI input format
NMIM	National Mobile Inventory Model
NO _x	oxides of nitrogen
OTC	Ozone Transport Commission
PM	particulate matter
PM ₁₀	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PM ₁₀ -PRI	primary PM ₁₀
PM _{2.5}	particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
PM _{2.5} -PRI	primary PM _{2.5}
QA	quality assurance
RPO	Regional Planning Organization
SCC	source classification code
SO ₂	sulfur dioxide
VMT	vehicle miles traveled

CHAPTER I. INTRODUCTION/BACKGROUND

This technical support document (TSD) explains the data sources, methods, and results for preparing the 2002 base year criteria air pollutant (CAP) and ammonia (NH₃) emissions inventories for onroad and nonroad mobile sources for the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Regional Planning Organization (RPO). The MANE-VU region includes Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. MANE-VU (and other RPOs) will use these inventories to support air quality modeling, State Implementation Plan (SIP) development, and implementation activities for the regional haze rule and fine PM and ozone National Ambient Air Quality Standards (NAAQS).

The inventories and supporting data prepared include comprehensive, county-level, mass emissions and modeling inventories for onroad and nonroad sources of 2002 emissions for the CAPs and NH₃ for the States included in the MANE-VU region. The mass emissions inventory files were prepared in the National Emissions Inventory (NEI) Input Format Version 3.0 (NIF 3.0). The modeling inventory files and accompanying files were prepared in Sparse Matrix Operator Kernel Emissions (SMOKE) format.

The inventories include annual emissions for sulfur dioxide (SO₂), oxides of nitrogen (NO_x), volatile organic compounds (VOC), carbon monoxide (CO), NH₃, and particles with an aerodynamic diameter less than or equal to a nominal 10 and 2.5 micrometers (i.e., primary PM₁₀ and PM_{2.5}).

The inventories were prepared using the inventories and mobile source input data that State agencies submitted to the United States (U.S.) Environmental Protection Agency (EPA) from May through July of 2004 as a requirement of the Consolidated Emissions Reporting Rule (CERR). In addition, some States provided data directly to MANE-VU for use in this inventory that were not submitted for the CERR. The EPA's format and content quality assurance (QA) programs (and other QA checks not included in EPA's QA software) were run on each inventory to identify format and/or data content issues (EPA, 2004a). E.H. Pechan & Associates, Inc. (Pechan) worked with the MANE-VU State agencies and the staff of the Mid-Atlantic Regional Air Management Association (MARAMA) to resolve QA issues. MARAMA is the MANE-VU organization's employees, whereas MANE-VU is the member S/L agencies plus MARAMA employees.

A draft of the onroad and nonroad mobile source inventories and summary files were provided for stakeholder review during August 2004. No stakeholder comments were received on these mobile source inventories. However, updated data were received from Connecticut and Vermont and these data were incorporated and the inventories were finalized during December 2004. The SMOKE input files were prepared and reviewed by the modelers. The SMOKE input files were finalized during January 2005.

Chapter II of this TSD provides the details of the data sources and methods used to develop the annual onroad mass emissions inventory. Chapter III provides the same information for the nonroad sources. Emission inventory summaries are presented in Chapter IV and references are included as Chapter V.

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CHAPTER II. 2002 ONROAD EMISSION INVENTORY

The MANE-VU 2002 onroad emissions inventory was compiled from data supplied by the MANE-VU State agencies in the form of onroad emissions input data or emissions inventories either directly to MANE-VU or to EPA through their CERR submittal. States provided information in one or more of the following ways: (1) an onroad emission inventory submittal to EPA, (2) MOBILE6 inputs and VMT data in National Mobile Inventory Model (NMIM) format to EPA, (3) portions of MOBILE6 inputs or full MOBILE6 input files and supporting files plus VMT to EPA, or (4) portions of MOBILE6 inputs or full MOBILE6 input files and supporting files plus VMT to MANE-VU. Different procedures were followed in developing the MANE-VU 2002 onroad emission inventory depending upon how the data were submitted. Table II-1 summarizes the approach that was used to develop the final 2002 onroad emission inventory for MANE-VU.

Table II-1. Approach for Developing MANE-VU 2002 Emission Inventory by State

State	Emission Inventory Calculation Approach
Connecticut	Calculated by Pechan using NMIM
Delaware	State-submitted emission inventory
District of Columbia	Calculated by Pechan using NMIM
Maine	Calculated by Pechan using MOBILE6
Maryland	Calculated by Pechan using NMIM
Massachusetts	Calculated by Pechan using MOBILE6
New Hampshire	Calculated by Pechan using NMIM
New Jersey	Calculated by Pechan using NMIM
New York	State-submitted emission inventory
Pennsylvania	State-submitted emission inventory
Rhode Island	Calculated by Pechan using NMIM
Vermont	State-submitted emission inventory

For States submitting onroad emission inventories to EPA, Pechan performed quality assurance checks on the State-provided emission inventory data to ensure completeness, referential integrity, and correct formatting of the data. Where necessary as a result of these QA checks, and with the approval of the affected State, Pechan revised the inventories to meet the necessary inventory standards. However, in most cases, the emission totals of these inventories were not changed. The changes made by State are discussed in more detail in the sections below.

In the cases of MOBILE6 data provided in NMIM format, Pechan made any necessary changes to the NMIM inputs or VMT, with the State's approval, and calculated an onroad emission inventory for that State using the NMIM model. Similarly, in most cases where States submitted MOBILE6 information, either to EPA or MANE-VU, Pechan input the MOBILE6 information and VMT data into the NMIM county-level database and then calculated the inventory using NMIM. In cases where the specificity of the data was greater than what could be handled in NMIM, Pechan ran the MOBILE6 model to generate emission factors and then calculated emissions using the VMT data provided by the State along with the MOBILE6 emission factors.

All States provided information on 2002 onroad activity in the form of vehicle miles traveled (VMT) estimates, although the level of detail of the VMT data varied by State. Table II-2 summarizes the level of detail of the VMT data as provided by each State agency. The State-specific sections below provide information explaining the procedures that were applied to

develop VMT for all States at a consistent level of detail—annual, county-specific VMT for the 12 HPMS road classes and 12 vehicle types.

Table II-2. Details of VMT Data as Provided by the MANE-VU States

State	Temporal Resolution	Geographic Detail	Number of Road Type Classes	Number of Vehicle Types
Connecticut	Daily	County-specific	4	Provided VMT mix data
Delaware	Annual	County-specific	12	12
District of Columbia	Annual	County-specific	12	28
Maine	Daily	County-specific	12	No information provided
Maryland	Annual	County-specific	12	12
Massachusetts	Daily	County-specific 6 Counties plus 3 nonattainment areas	12	No information provided
New Hampshire	Summer Day	County-specific	3	28
New Jersey	Daily	County-specific	12	12
New York	Annual	County-specific	12	12
Pennsylvania	Annual	County-specific	12	12
Rhode Island	Daily	State-specific	12	Provided VMT mix data
Vermont	Monthly	County-specific	12	8

In developing and processing the inventories, Pechan added additional NIF plus fields to each NIF tblMobileEM table received from the States or prepared by Pechan. These fields are: Emission Ton Value, Emission Type Period, State FIPs, County FIPs, Revision Date, CAP/HAP, and Year. In addition, in the field labeled Blank Field in the tblMobileEM table, a data source code was added. The values that were used to populate this data source field are as follows:

S – State-provided emission inventory, without supporting MOBILE6 information;
 SI – State-provided emission inventory along with supporting MOBILE6 information;
 I – State-provided MOBILE6 or NMIM information, but no emission inventory provided; and
 E – EPA/NMIM defaults used.

These codes are consistent with those that EPA will be using in its February 2005 release of the draft 2002 onroad NEI. For all of the MANE-VU onroad inventory files, the CAP/HAP field was populated with “CAP”, the Emission Type Period field was populated with “ANNUAL” as all of the inventories prepared here represented annual emissions, and the year field was populated with 2002, indicating that actual 2002 data were used in the emission calculations. In the Emission Ton Value field, the emissions from the Emission Numeric Value field were converted from the units specified in the Emission Unit Numerator field to tons.

Data source codes are included to document the origin of the emissions data. Table III-2 provides a listing of all the data source codes included in the MANE-VU inventories, as well as a definition of each code. State FIPs and County FIPs are separated out to assist in developing area-specific emission summaries, and the Emission Ton Value places all emissions on the same basis. The Emission Type Period describes the temporal basis of the estimates (in this case, they are all annual). Finally, the Revision Date tracks when record-specific changes are made.

The sections below provide details on the data received from each State and how the data were processed to create the 2002 MANE-VU onroad emission inventory.

A. CONNECTICUT

1. State-supplied Data

Connecticut submitted data to MANE-VU in the form of external text file inputs to MOBILE6 or NMIM, text and spreadsheet VMT data, and a brief document summarizing the provided data. Pechan started with the data provided by Connecticut and performed the necessary formatting to make all of the submitted data compliant with the NMIM county-level database format. Table II-3 below summarizes the data submitted by Connecticut and also shows where the NMIM defaults were used.

Table II-3. Data Used in Calculating Connecticut's 2002 Onroad Emission Inventory for MANE-VU

Input Parameter	Source of Input Parameter Data	Coverage	Data Source	File Date
MOBILE6 Input Parameters:				
I/M Data:	CTIM02.D	Statewide	CT	2/26/2004
ATP Data:	CT_MARAMA_File_list.doc	Statewide	CT	11/2/2004
Registration Data:	CTReg02.d	Statewide	CT	10/28/2004
Diesel Sulfur Content:	NMIM defaults for CT	Statewide	EPA	
Temperature Data:	NMIM defaults for CT	Statewide	EPA	
Fuel Data:	Statewide Reformulated gasoline, per CT_MARAMA_File_List.doc	Statewide	CT	10/28/2004
Speeds:	02sdvmtx.cty where x ranges from 1 to 8 to represent each of the 8 CT counties	Statewide	CT	10/27/2004
Humidity Data:	NMIM defaults for CT	Statewide	EPA	
LEV Program Data:	nlevne.d	Statewide	CT	1/7/2002
VMT Data:				
	02CTY27.VMT	Statewide	CT	5/21/2004
	CT_MARAMA_File_list.doc	Statewide	CT	11/2/2004
	cthvmt.def	Statewide	CT	5/21/2004

2. MOBILE6 Inputs

As indicated in Table II-3, Connecticut submitted an inspection and maintenance (I/M) program input, an anti-tampering program input, vehicle registration distribution by age, and a low emission vehicle (LEV) program implementation schedule. All of these inputs were applied Statewide. Pechan converted the anti-tampering program inputs to the necessary text file format and renamed the text files to be compliant with EPA's naming conventions set out in its memorandum of instructions to the States for preparing NMIM inputs as updates to EPA's NMIM county-level database (Pechan, 2004a). The LEV program represented the implementation schedule of the Ozone Transport Commission (OTC) LEV program, starting with a 1999 implementation year followed by a 2001 full implementation of the National LEV program. As indicated above, Connecticut provided county-specific speed files. These files were in the format of MOBILE6 speed file inputs. Pechan converted these to the corresponding NMIM speed file inputs, by putting the freeway and arterial speed data in separate text files and replicating these resulting files nine times such that each county had the full set of nine freeway and nine arterial speed files required for input to NMIM when modeling local speeds. NMIM

default data for Connecticut were used to represent temperature, humidity, and fuels. The NMIM default fuels for Connecticut include reformulated gasoline Statewide.

3. VMT Inputs

The VMT inputs provided by Connecticut were in the form of three sets of data. This included a file with VMT by county and four road types (Expressway, Arterial/Collector, Local, and Ramp), a set of Statewide VMT mixes at the 16 vehicle type-level for each of the four Connecticut road types, and a Statewide hourly VMT distribution file. Additional data provided by Connecticut showing the correspondence between the four Connecticut road types and the 12 HPMS road types were used to first distribute the county VMT to the 12 road types. Average daily miles were converted to annual miles by multiplying the average daily miles by 365. Pechan then developed a simple MOBILE6 input file that used the Connecticut registration distribution and with a separate scenario for each of the VMT mixes provided at the 16 vehicle type level. Pechan used the resulting MOBILE6 output file to extract the 28 vehicle type VMT mix corresponding to each of the four Connecticut road types. The VMT data by county and 12 road types were then multiplied by the 28 vehicle type VMT fractions to obtain a VMT file at the 28 vehicle type level and 12 road type level by county. Pechan converted this file to the NMIM BaseYearVMT table format.

4. Emission Calculation Methodology

Pechan directly updated the MySQL version of the CountyYear table of the NMIM county-level database with the correct file names of the Connecticut I/M program, anti-tampering program, registration distribution, speeds, and hourly VMT distribution data. The State table was also updated with the appropriately named LEV program data file.

After making these updates to the MySQL version of the NMIM county-level database, Pechan ran the NMIM model for Connecticut at the monthly level of detail and obtained output from NMIM in NIF 3.0 format in text tables. Pechan converted these tables to NIF 3.0 format in Access and also populated the NIF plus fields as described above. The Data Source field was populated with the code "I" for all of the Connecticut emission records, since the supporting inputs used to generate Connecticut's onroad emission inventory were provided by Connecticut. Pechan ran EPA's NIF QA Tool on the resulting output. Only several acceptable range errors were found with this program, so no changes were made to the resulting NIF data.

B. DELAWARE

Delaware submitted an onroad criteria pollutant emission inventory to EPA to meet its CERR requirements. In addition to annual 2002 emissions, this data file also contained summer day and winter day emissions. Pechan deleted these daily emissions and activity data from the onroad emission inventory file for MANE-VU. The onroad data were run through the NIF QA Tool. The only potential errors found were five range errors in the emissions table of the NIF file. These range errors were reviewed by both Pechan and Delaware. The data were determined to be correct, so no changes were made to the emissions. Pechan then populated the NIF plus fields as described above. The Data Source field was populated with the code "SI" for all of the Delaware emission records, since the supporting MOBILE6 inputs used to generate the Delaware onroad emission inventory were also provided in the format of updates to the NMIM county-level database.

C. DISTRICT OF COLUMBIA

1. State-supplied Data

The District of Columbia submitted data to EPA in fulfillment of the CERR requirements in the form of NMIM inputs to be used to model the District. Pechan performed the necessary formatting to make all of the submitted data compliant with the NMIM county-level database format. Table II-4 below summarizes the data submitted by the District and also shows where the NMIM defaults were used.

Table II-4. Data Used in Calculating the District of Columbia's 2002 Onroad Emission Inventory for MANE-VU

Input Parameter	Source of Input Parameter Data	Coverage	Data Source	File Date
MOBILE6 Input Parameters:				
I/M Data:	1100102.imp with I/M credit file 11001202.imc	Districtwide	DC	5/18/2004
ATP Data:	1100102.atp	Districtwide	DC	5/18/2004
Registration Data:	1100102.reg	Districtwide	DC	5/18/2004
Weekday Trip Length Distribution:	1100102.wdt	Districtwide	DC	5/18/2004
Diesel Sulfur Content:	NMIM defaults for DC	Districtwide	EPA	
Temperature Data:	NMIM defaults for DC	Districtwide	EPA	
Fuel Data:	NMIM defaults for DC	Districtwide	EPA	
Speeds:	11001_VMT_SPEED.xls	Districtwide	DC	5/21/2004
Humidity Data:	NMIM defaults for DC	Districtwide	EPA	
LEV Program Data:	11001.nlv	Districtwide	DC	5/18/2004
VMT Data				
	NMIM_DC.mdb - BaseYearVMT table	Districtwide	DC	5/21/2004

2. MOBILE6 Inputs

As indicated in Table II-4, the District of Columbia submitted an I/M program input file, an anti-tampering program input, vehicle registration distribution by age, a weekday trip length distribution input, speed data, and a LEV program implementation schedule. The LEV program represented the implementation schedule of the OTC LEV program, starting with a 1999 implementation year followed by a 2001 full implementation of the National LEV program. The District also provided a spreadsheet including the daily average weighted speed by roadway class. Pechan converted these speeds to the necessary NMIM speed files. Although sample MOBILE6 input files were also provided by the District including monthly fuels and temperatures, these data actually represented EPA defaults. Therefore, no District-specific information was used for temperature, humidity, or fuel. Instead the NMIM default data for the District were used in the NMIM modeling.

3. VMT Inputs

The District provided 2002 VMT data in the form of the NMIM BaseYearVMT table. This table included VMT at the 28 vehicle type level for each of the six urban road types in the District. No modifications needed to be made to the VMT data for use with NMIM.

4. Emission Calculation Methodology

Other than the updated information provided by the District in the BaseYearVMT table of the NMIM county-level database, the District also provided updates in the CountyYear table. These updates indicated the file names of the appropriate I/M program data, anti-tampering program data, registration distribution data, and trip length distribution data. After formatting the speed data in the NMIM format, Pechan updated the CountyYear table to include the name of the speed files. The District had also updated the County table from NMIM with onroad Stage 2 refueling control information. However, refueling emissions were not calculated in the onroad portion of the MANE-VU emission inventory. The State table was updated by the District to include the name of appropriately formatted LEV implementation file.

Pechan then updated the NMIM county-level database in MySQL to include the data discussed above for the District of Columbia from the NMIM Access tables. Pechan ran the NMIM model for the District at the monthly level of detail and obtained output from NMIM in NIF3.0 format in text tables. Pechan converted these tables to NIF 3.0 format in Access and also populated the NIF plus fields as described above. The Data Source field was populated with the code "I" for all of the District of Columbia emission records, since the supporting inputs used to generate the District's onroad emission inventory were provided in the format of updates to the NMIM county-level database. Pechan ran EPA's NIF QA Tool on the resulting output. Only a single range error, determined to be reasonable, was detected with this program, so no changes were made to the data.

D. MAINE

1. State-supplied Data

Maine submitted data to MANE-VU in the form of sample MOBILE6 input files, the related external text file inputs to MOBILE6, a web site with Maine fuel information, and a spreadsheet with VMT data and speeds. Pechan started with the data provided by Maine and developed a set of MOBILE6 input files to model the entire State using monthly scenarios for each of the 12 roadway types. Pechan then calculated monthly emissions from the MOBILE6 output emission factors and the VMT provided by Maine and then summed the data to develop an annual 2002 inventory. Pechan converted the data to NIF. Maine used the NIF onroad data to submit to EPA in fulfillment of its CERR requirements and this same inventory was used for the MANE-VU onroad inventory. Table II-5 below summarizes the data submitted by Maine and also shows where defaults were used.

Table II-5. Data Used in Calculating Maine's 2002 Onroad Emission Inventory for MANE-VU

Input Parameter	Source of Input Parameter Data	Coverage	Data Source	File Date
MOBILE6 Input Parameters:				
I/M Data:	MEIMTEST.d	Cumberland County only	ME	1/6/2004
ATP Data:	ATP program in CURUN02.inp	Cumberland County only	ME	1/6/2004
Registration Data:	MOBILE6 default	Statewide	EPA	
Diesel Sulfur Content:	NMIM defaults for ME	Statewide	EPA	
Temperature Data:	NMIM defaults for ME	Statewide	EPA	
Fuel Data:	data processed from information provided by ME at http://www.maine.gov/dep/air/mobile/fuelspage.htm	Statewide	ME	5/6/2004
Speeds:	2002 15% Plan.xls	Statewide	ME	1/6/2004
LEV Program Data:	NLEVNE.d	Statewide	EPA	
VMT Data				
VMT:	2002 15% Plan.xls	Statewide	ME	1/6/2004

2. MOBILE6 Inputs

Pechan developed MOBILE6 input files using the I/M and anti-tampering program information provided by Maine for Cumberland County, OTC LEV program data, average speed data by county and roadway type, fuel data supplied by Maine, and temperature and diesel sulfur content data extracted for Maine from the NMIM default county-level database for Maine. From the fuel data supplied by Maine, Pechan extracted Statewide monthly average RVP values. Within the MOBILE6 input files, monthly scenarios were set up for each of the 12 roadway types. The temperature and fuel data were used to represent different months, while speeds were used to represent the various roadway types.

3. VMT Inputs

Maine provided 2002 average daily VMT by county and 12 roadway types. Maine had no information available on the distribution of VMT among vehicle types. Therefore, Pechan developed the VMT by county, roadway type, and vehicle type by using the default MOBILE6 2002 VMT mix by vehicle type. These VMT data were converted to annual VMT by multiplying the average daily VMT by 365.

4. Emission Calculation Methodology

Pechan ran the MOBILE6 model to obtain monthly emission factors by county, 12 roadway types (based on the speed modeled), and 28 vehicle types. These emission factors were mapped to the corresponding VMT by county, vehicle type, and roadway type. The VMT were temporalized by month using the default monthly temporalization factors from the preliminary 2002 NEI before being multiplied by the monthly MOBILE6 emission factors. The resulting monthly emissions were summed to the annual level and converted to the NIF format. The Maine onroad NIF file was then run through the NIF QA Tool. Only several acceptable range errors were found with this program, so no changes were made to the resulting NIF data.

E. MARYLAND

1. State-supplied Data

Maryland submitted data to EPA in fulfillment of the CERR requirements in the form of NMIM inputs to be used to model Maryland. Pechan performed the necessary formatting to make all of the submitted data compliant with the NMIM county-level database format. Table II-6 below summarizes the data submitted by Maryland and also shows where the NMIM defaults were used.

2. MOBILE6 Inputs

As indicated in Table II-6, Maryland submitted an I/M program input, an anti-tampering program input, vehicle registration distributions by age, diesel sales fractions, speed data, a LEV program implementation schedule, diesel sulfur content data, and temperature and humidity data. The LEV program represented the implementation schedule of the OTC LEV program, starting with a 1999 implementation year followed by a 2001 full implementation of the National LEV program. Some of these inputs were county-specific, as noted above. The diesel sales fraction data were supplied only for the Baltimore and Washington, DC area counties and the temperature data applied only to the Baltimore counties. Pechan renamed each of these external data files as needed, according to the naming convention provided in the NMIM instruction memorandum to the States (Pechan, 2004a). Maryland also provided a spreadsheet showing the average speed for each of the 12 roadway types. Pechan converted this information into the NMIM speed file format and applied these data Statewide. The diesel sulfur contents supplied by Maryland replaced the default sulfur content values for Maryland in the NMIM county-level database. Similarly, the temperature and humidity data supplied by Maryland for the Baltimore area counties were used to replace the NMIM defaults for these counties in the CountyMonthHour table.

3. VMT Inputs

Maryland submitted annual VMT data in the form of a NIF tblMobilePE table. This included VMT by county, 12 vehicle types, and 12 road types. In order to use the VMT data as an input to NMIM, Pechan needed to redistribute the VMT from 12 vehicle types to 28 vehicle types. To do this, Pechan first developed a simple MOBILE6 input file for each of the combinations of diesel sales fraction data and registration data used by the Maryland counties. Each of these files was run through MOBILE6 and the resulting VMT mix fractions were extracted corresponding to each input file. This MOBILE6-based VMT mix information was then used to distribute the Maryland VMT data from the 12 vehicle classes to each of the corresponding 28 vehicle subcategories (e.g., the LDGT2 data from the original 12 vehicle class database was split into the LDGT3 and LDGT4 vehicle classes included in the 28 vehicle class system using the VMT mix fraction data in the MOBILE6 output files). In addition, Maryland provided monthly VMT distribution data by county. Pechan reformatted this data from fractional data to percents and replicated the data for all vehicle types as vehicle type was not included in the file. These resulting data were in the format of the NMIM CountyVMTMonthAllocation table.

Table II-6. Data Used in Calculating Maryland's 2002 Onroad Emission Inventory for MANE-VU

Input Parameter	Source of Input Parameter Data	Coverage	Data Source	File Date
MOBILE6 Input Parameters:				
I/M Data:	MD2002.IM with cutpoints in Phasein.C2N	in 14 counties, as indicated in MD-2002-Onroad.mdb - CountyYear table	MD	5/19/2004
ATP Data:	MD2002.atp	in 14 counties, as indicated in MD-2002-Onroad.mdb - CountyYear table	MD	4/26/2004
Registration Data:	REG2002.xxx, where xxx is a three-character county abbreviation	Each county is assigned one of these registration data files, as indicated in MD-2002-Onroad.mdb - CountyYear table	MD	4/26/2004
Diesel Sales Fractions:	DSF2002.xxx, where xxx is a three-character county abbreviation	Apply to Baltimore and Washington area counties	MD	4/26/2004
Diesel Sulfur Content:	MD-2002-Onroad.mdb - CountyYearMonth and Diesel tables	Statewide	MD	5/17/2004
Temperature Data:	MD-2002-Onroad.mdb - CountyMonthHour table for Baltimore area counties, NMIM defaults for remaining counties	Statewide	MD/EPA	5/17/2004
Fuel Data:	NMIM defaults for MD	Statewide	EPA	
Speeds:	AvgSpeed.xls	Statewide	MD	4/26/2004
Humidity Data:	MD-2002-Onroad.mdb - CountyMonthHour table for Baltimore area counties, NMIM defaults for remaining counties	Statewide	MD/EPA	5/17/2004
LEV Program Data:	nlevne.d	Statewide	MD	
VMT Data				
VMT:	Maryland 2002 VMT from tblMobilePE and monthly allocation fractions from CountyVMTMonthAllocation table in MD-2002-Onroad.mdb.	Statewide	MD	5/17/2004

4. Emission Calculation Methodology

Pechan updated the MySQL version of the following NMIM county-level database tables: County, CountyMonthHour, CountyYear, CountyVMTMonthAllocation, CountyYearMonth, Diesel, State, and BaseYearVMT with the correctly formatted Maryland data and file names. After making these updates to the MySQL version of the NMIM county-level database, Pechan ran the NMIM model for Maryland at the monthly level of detail and obtained output from NMIM in NIF3.0 format in text tables. Pechan converted these tables to NIF 3.0 format in Access and also populated the NIF plus fields as described above. The Data Source field was populated with the code "I" for all of the Maryland emission records, since the supporting inputs used to generate Maryland's onroad emission inventory were provided by Maryland. Pechan ran EPA's NIF QA Tool on the resulting output. Only several acceptable range errors were found with this program, so no changes were made to the resulting NIF data.

F. MASSACHUSETTS

1. State-supplied Data

Massachusetts submitted an onroad emission inventory to EPA in fulfillment of the CERR requirements. However, this inventory was calculated without a breakout of emissions or emission factors by vehicle type and by four seasons rather than 12 months. Therefore, with approval from Massachusetts, Pechan calculated the 2002 onroad emission inventory for Massachusetts using MOBILE6 for inclusion in the MANE-VU onroad emission inventory. Pechan used inputs provided by Massachusetts, as summarized in Table II-7 below.

2. MOBILE6 Inputs

Pechan obtained the I/M program and anti-tampering program inputs from Massachusetts. These programs were applied Statewide. Additionally, Massachusetts provided a Statewide 2002 registration distribution. Massachusetts provided monthly maximum and minimum average daily temperatures from four different sites, as well as a listing of which site should be used for each county in the State. Northern reformulated gasoline was modeled throughout the State, with a Reid vapor pressure (RVP) value of 6.7 psi during the ozone season and 13.5 psi during the remaining months. A diesel sulfur content of 350 ppm was also modeled statewide and year-round. (This sulfur content was included in the SMOKE model MOBILE6 input files for Massachusetts. However, the MOBILE6 input files used to generate the onroad NIF emission inventory for Massachusetts incorrectly used a diesel sulfur content of 500 ppm.) Massachusetts provided its own LEV implementation schedule and Tier 2 data. The LEV program in Massachusetts differs from the OTC LEV program. Massachusetts also provided county-specific average speeds for each of the 12 roadway classes. These speeds were modeled in the SMOKE MOBILE6 input files; however, national default speeds by road type were used in calculating the MANE-VU inventory for Massachusetts.

Pechan developed MOBILE6 input files for Massachusetts using the above information. Four sets of input files were created to model each of the four temperature groups. Within each MOBILE6 input file, the I/M and anti-tampering programs, the registration distribution, and the LEV and Tier 2 programs were modeled. Individual scenarios were set up within each file to

Table II-7. Data Used in Calculating Massachusetts's 2002 Onroad Emission Inventory for MANE-VU

Input Parameter	Source of Input Parameter Data	Coverage	Data Source	File Date
MOBILE6 Input Parameters:				
I/M Data:	ma_im02.d with I/M credit file ma2002cp.d	Statewide	MA	4/29/2004
ATP Data:	ATP program in 02_tyo2.inp	Statewide	MA	4/29/2004
Registration Data:	ma_reg02.d	Statewide	MA	1/9/2004
Diesel Sulfur Content:	350 ppm from 02_win.inp and 02_sum.inp	Statewide	MA	4/29/2004
Temperature Data:	MOB6TEMP.XLS, with mapping of temperature data to counties listed in e-mail of 4/29/2004 from Kenneth Santlal (MA) to Angelica Codd (Pechan)	Statewide	MA	2/17/2004
Fuel Data:	Northern reformulated gasoline; 6.7 psi RVP in ozone season, 13.5 RVP rest of year; from 02_win.inp, 02_sum.inp, and 02_tyo3.inp	Statewide	MA	4/29/2004
Speeds:	VMT2002.XLS	Statewide	MA	2/17/2004
Humidity Data:	N/A			
LEV Program Data:	ma_lev2.d	Statewide	MA	5/16/2002
Tier 2 Data:	L2CERT.d, L2EVAP.d, L2EXH.D	Statewide	MA	4/29/2002 and 4/30/2002
VMT Data				
VMT:	VMT2002.XLS	Statewide	MA	2/17/2004

represent each roadway type (as modeled with speed) in each month using the monthly temperature and fuel inputs.

3. VMT Inputs

Massachusetts provided 2002 average daily VMT by county on each of the 12 roadway classes. Pechan developed VMT mix fractions for Massachusetts by creating a simple MOBILE6 input file modeling the Massachusetts 2002 registration distribution. The VMT mix in the resulting output MOBILE6 file at the 28 vehicle type level was then applied to the Massachusetts VMT data to obtain VMT by county, 12 roadway types, and 28 vehicle types. The VMT data were converted from daily values to annual by multiplying by 365.

4. Emission Calculation Methodology

Pechan ran the MOBILE6 model to obtain monthly emission factors by county, 12 roadway types (based on the speed modeled), and 28 vehicle types. These emission factors were mapped to the corresponding VMT by county, vehicle type, and roadway type. The VMT were temporalized by month using monthly factors developed from Massachusetts's CERR submittal. These VMT data were provided by county and roadway type for four seasons. Pechan converted these seasonal factors to monthly factors by multiplying the seasonal factor by the number of days in a given month and dividing by the number of days in that season. The resulting monthly VMT were multiplied by the monthly emission factors to obtain monthly emissions by county, 12 roadway types and 28 vehicle types. These emissions were summed to the annual level and converted to the NIF format. The Massachusetts onroad NIF file was then run through the NIF QA Tool. Only several acceptable range errors were found with this program, so no changes were made to the resulting NIF data.

G. NEW HAMPSHIRE

1. State-supplied Data

New Hampshire submitted data to MANE-VU in the form of MOBILE6 input files containing anti-tampering program information and VMT mix by vehicle type data, external text file inputs to MOBILE6 or NMIM with registration data and LEV program data, and a spreadsheet containing VMT data and corresponding speeds. Pechan started with the data provided by New Hampshire and performed the necessary formatting to make all of the submitted data compliant with the NMIM county-level database format. Table II-8 below summarizes the data submitted by New Hampshire and also shows where the NMIM defaults were used.

Table II-8. Data Used in Calculating New Hampshire's 2002 Onroad Emission Inventory for MANE-VU

Input Parameter	Source of Input Parameter Data	Coverage	Data Source	File Date
MOBILE6 Input Parameters:				
I/M Data:	None	Statewide	NH	
ATP Data:	from files 2002-AR.in, 2002-Fr.in, 02ATT-AR.in, and 02ATT-Fr.in	Statewide	NH	7/30/2004
Registration Data:	Nhallage.d	Statewide	NH	1/20/2004
Diesel Sulfur Content:	NMIM defaults for NH	Statewide	EPA	
Temperature Data:	NMIM defaults for NH	Statewide	EPA	
Fuel Data:	NMIM defaults for NH	Statewide	EPA	
Speeds:	7-30-04 2002 MANE-VU Numbers.xls	6 counties plus 3 nonattainment areas covering entire State		7/30/2004
Humidity Data:	NMIM defaults for NH	Statewide	EPA	
LEV Program Data:	nlevne.d	Statewide	NH	1/7/2002
VMT Data				
VMT:	VMT by 12 roadway classes for 6 counties plus 3 nonattainment areas in 7-30-04 2002 MANE-VU Numbers.xls; VMT mix by vehicle type in MOBILE6 files 2002-AR.in, 2002-Fr.in, 02ATT-AR.in, and 02ATT-Fr.in	6 counties plus 3 nonattainment areas covering entire State	NH	7/30/2004

2. MOBILE6 Inputs

As indicated in Table II-8, New Hampshire submitted an anti-tampering program input, vehicle registration distribution by age, and a LEV program implementation schedule. All of these inputs applied Statewide. Pechan extracted the anti-tampering program data from the MOBILE6 files, converted the anti-tampering program inputs to the necessary text file format, and renamed the text file to be compliant with EPA's naming conventions for NMIM inputs. Note that the anti-tampering program was the same Statewide. The LEV program inputs represented the implementation schedule of the OTC LEV program, starting with a 1999 implementation year followed by a 2001 full implementation of the National LEV program. As indicated above, New Hampshire provided average speeds by roadway type and county or nonattainment area. For each county or nonattainment area group, Pechan calculated the VMT-weighted average speed for each of the 18 roadway type/vehicle type combinations for which speed distributions are needed if local speed information is input to NMIM. Then, Pechan developed speed distributions from each of these weighted average speeds, following the guidance in the MOBILE6 user's guide for allocating average speeds to the MOBILE6 speed distribution format. Pechan converted these data to the corresponding NMIM speed file inputs for each of the nine freeway and nine arterial files by county. NMIM default data for New Hampshire were used to represent temperature, humidity, and fuels.

3. VMT Inputs

The VMT inputs provided by New Hampshire were in the form of summer day VMT by county or nonattainment area and roadway type. In addition, New Hampshire provided a Statewide

VMT mix distribution by 16 vehicle types in the MOBILE6 files provided by the State. Pechan then developed a simple MOBILE6 input file that used the New Hampshire Statewide registration distribution and the Statewide VMT mix by vehicle. Pechan used the resulting MOBILE6 output file to extract the 28 vehicle type VMT mix to be applied Statewide to the county/roadway type VMT data. Summer day miles were converted to annual miles by using national data from the Federal Highway Administration's Travel Volume Trends which provides 2002 monthly VMT for groups of road categories. Additionally, the VMT data from the three New Hampshire nonattainment areas represented four counties. To allocate these VMT by county, Pechan first totaled the VMT data from these three nonattainment areas by roadway type. Then, using ratios developed from the preliminary 2002 NEI VMT, Pechan allocated the grouped VMT by county and roadway type. With VMT for the entire State at the county/roadway type level of detail, Pechan then multiplied the VMT data by the 28 vehicle type VMT fractions to obtain a VMT file at the 28 vehicle type level and 12 roadway type level by county. Pechan converted this file to the NMIM BaseYearVMT table format.

4. Emission Calculation Methodology

Pechan updated the MySQL version of the following NMIM county-level database tables: CountyYear, State, and BaseYearVMT with the correctly formatted New Hampshire data and file names. After making these updates to the MySQL version of the NMIM county-level database, Pechan ran the NMIM model for New Hampshire at the monthly level of detail and obtained output from NMIM in NIF3.0 format in text tables. Pechan converted these tables to NIF 3.0 format in Access and also populated the NIF plus fields as described above. The Data Source field was populated with the code "I" for all of the New Hampshire emission records, since the supporting inputs used to generate New Hampshire's onroad emission inventory were provided by the State. Pechan ran EPA's NIF QA Tool on the resulting output. Only two acceptable range errors were found with this program, so no changes were made to the resulting NIF data.

H. NEW JERSEY

1. State-supplied Data

New Jersey submitted data to EPA in fulfillment of the CERR requirements in the form of NMIM inputs to be used to model the State. Pechan performed the necessary formatting to make all of the submitted data compliant with the NMIM county-level database format. Table II-9 below summarizes the data submitted by New Jersey and also shows where the NMIM defaults were used.

Table II-9. Data Used in Calculating the New Jersey's 2002 Onroad Emission Inventory for MANE-VU

Input Parameter	Source of Input Parameter Data	Coverage	Data Source	File Date
MOBILE6 Input Parameters:				
I/M Data:	3400102.imp	Statewide	NJ	5/28/2004
ATP Data:	3400102.imp	Statewide	NJ	5/28/2004
Registration Data:	3400102.reg	Statewide	NJ	5/26/2004
Diesel Sales Fractions:	NJ_M6input_02.in	Statewide	NJ	5/26/2004
Diesel Sulfur Content:	NJ_M6input_02.in	Statewide	NJ	5/26/2004
Temperature Data:	NMIM defaults for NJ	Statewide	EPA	
Fuel Data:	NMIM defaults for NJ	Statewide	EPA	
Speeds:	NMIM defaults	Statewide	EPA	
Humidity Data:	NMIM defaults for NJ	Statewide	EPA	
LEV Program Data:	NMIM defaults for NJ	Statewide	EPA	
VMT Data				
VMT	NJ2002_VMT.xls	By county/3 road types and by county/28 vehicle types	NJ	5/28/2004

2. MOBILE6 Inputs

New Jersey provided NMIM-formatted information on its I/M program and anti-tampering program. In addition, New Jersey provided a Statewide 2002 registration distribution. Pechan extracted Statewide diesel sales fraction data for New Jersey from the MOBILE6 input file submitted by New Jersey. Also, as indicated in the MOBILE6 input file, New Jersey was modeled with the OTC LEV implementation schedule. All speeds, fuel, temperature, and humidity data used in calculating the 2002 onroad emission inventory for New Jersey were the NMIM defaults with no additional State updates. Pechan modified the NMIM CountyYear table to include the diesel sale fraction file name and the NMIM State table to include the LEV table name.

3. VMT Inputs

New Jersey provided two sets of annual 2002 VMT data. The first set is by county and three roadway types (freeways, arterials, and locals). The second set of VMT data is broken down by county and the 28 vehicle types. However, New Jersey was unable to provide the VMT data by county broken down by both roadway type and vehicle type. Therefore, Pechan started with the New Jersey 2002 VMT dataset at the county/vehicle type level, since these are the same vehicle types required for NMIM input. To allocate these VMT data by roadway type, Pechan calculated ratios from the preliminary 2002 NEI of the county/road type VMT to total county VMT in New Jersey. These ratios were multiplied by the VMT supplied by New Jersey at the county/vehicle type level of detail to obtain VMT at the county/roadway type/vehicle type level of detail. The resulting VMT data were then formatted into the BaseYearVMT table format for NMIM.

4. Emission Calculation Methodology

Pechan updated the MySQL version of the following NMIM county-level database tables: CountyYear, State, and BaseYearVMT with the correctly formatted New Jersey data and file names. After making these updates to the MySQL version of the NMIM county-level database, Pechan ran the NMIM model for New Jersey at the monthly level of detail and obtained output from NMIM in NIF3.0 format in text tables. Pechan converted these tables to NIF 3.0 format in Access and also populated the NIF plus fields as described above. The Data Source field was populated with the code "I" for all of the New Jersey emission records, since the supporting inputs used to generate New Jersey's onroad emission inventory were provided by New Jersey. Pechan ran EPA's NIF QA Tool on the resulting output. Only several acceptable range errors were found with this program, so no changes were made to the resulting NIF data.

I NEW YORK

New York submitted an onroad criteria pollutant emission inventory to EPA to meet its CERR requirements. New York made two onroad inventory submittals to EPA. In the first submittal (dated May 28, 2004), the emissions table was missing a number of counties at the end of the file. This file was replaced in New York's second onroad inventory submittal (June 1, 2004), but only the emissions table was sent in this second submission. Therefore, Pechan replaced the tblMobileEM table from the first submission with that from the second submission. In order to run this NIF file through the NIF QA Tool, Pechan first corrected the field names of several of the fields in the tblMobileEM table, as some of the data fields were not correctly matched to the field name and most of the field names were not NIF-compliant. After running the revised file through the NIF QA Tool, several errors were identified. These included: incorrect codes in the tblMobileTR table, duplicate records in the tblMobilePE and tblMobileEM tables, and incorrect SCC codes in the tblMobileEM table (first seven digits of SCC coded as 2201700 that should be coded as 2201070, and diesel vehicle SCC codes ending in "V" for evaporative although all diesel emissions labeled as evaporative totaled 0), and widow and orphan issues relating to the correspondence of records between the tblMobilePE and tblMobileEM tables.

Pechan corrected these issues, with New York's approval. Pechan made the following changes:

- replaced "Onroad Mobile" with "ON-ROAD MOBILE" in the Source Type field and "Mobile Modeling" with "Report Certifier" in the Affiliation Type Code field of tblMobileTR;
- deleted records with 0 VMT in tblMobilePE;
- deleted emission records from tblMobileEM with no corresponding VMT record in tblMobilePE;
- replaced SCC code for records starting with an SCC code of "2201700" with the corrected SCC code starting with "2201070";
- deleted VMT records from tblMobilePE having SCC codes starting with "2230" and ending with "V" which would indicate evaporative emissions from diesel vehicles or trucks as there were no emission records with these SCC codes;
- changed pollutant code in tblMobileEM from PM10-FIL to PM10-PRI and code of PM25-FIL to PM25-PRI;
- created VMT records in tblMobilePE for county/SCC combinations present in tblMobileEM but missing in the original tblMobilePE and populated these new records

with VMT of corresponding VMT records for the same county and with the same first nine digits of the SCC code; and

- corrected VMT values in tblMobilePE for Wayne County (SCC 220107015_) to 4.377771 million miles; Wyoming County (SCC 220107013_) to 0.279191 million miles; Lewis County (SCC 223006021_) to 0.409643 million miles; and Rockland County (SCC 223000133_) to 0.234059 million miles based on corrected data provided by New York.

The revised onroad NIF data were run through the NIF QA Tool. The only remaining errors identified by the NIF QA Tool were range errors in the emissions table of the NIF file. These range errors were reviewed by Pechan. The data were determined to be reasonable, so no changes were made to the emissions. Pechan then populated the NIF plus fields as described above. The Data Source field was populated with the code "SI" for all of the New York emission records, since the supporting MOBILE6 inputs used to generate the New York onroad emission inventory were provided along with the emission inventory data.

J. PENNSYLVANIA

Pennsylvania submitted an onroad criteria pollutant emission inventory to EPA to meet its CERR requirements dated June 1, 2004. In this submittal, among other QA issues, Pechan identified that no transmittal table (tblMobileTR) had been included in the submittal and, in the emissions table, VOC emissions were identified with a pollutant code of HC. Pennsylvania submitted a second file on July 15, 2004 that included the transmittal table and used the correct pollutant code for VOC. After running this second file through the NIF QA Tool, a number of widow and orphan records were identified in the PE and EM tables. This was caused in the tenth digit of the SCC. In tblMobilePE, all SCCs ended in a "0" whereas in tblMobileEM, all SCCs for PM10-PRI and PM25-PRI ended in either "X", "B", "T", or "0". The SCC for all emission records for VOC, NO_x, CO, SO₂, and NH₃ ended in "0". Additionally, Pechan observed double-counting of PM₁₀ and PM_{2.5} emissions and that VOC emissions were not broken into the exhaust and evaporative components (i.e., tenth digit of SCC was reported as "0" instead of "X" and "V").

Pechan corrected these issues, with Pennsylvania's approval. Pechan made the following changes:

- replaced the tenth digit of the SCC code with "X" in tblMobileEM for all emission records of NO_x, CO, SO₂, and NH₃;
- deleted emission records from tblMobileEM with SCC code ending with "0" for pollutant codes of PM10-PRI and PM25-PRI to eliminate the double-counting;
- split VOC records into separate records to record both the exhaust and evaporative portion of the emissions. The following steps were followed to perform this correction:
 - 1) Using preliminary 2002 NEI, summed VOC by county, vehicle type, and road type (e.g., county plus first nine digits of SCC);
 - 2) From Step 1, calculated VOC fractions for exhaust and evaporative emissions (e.g., exhaust VOC/ (exhaust + evaporative VOC) at the county/road type/vehicle type level in the 2002 preliminary NEI;
 - 3) Matched the fractions from Step 2 by county and first nine digits of SCC to VOC emissions provided by PA;

- 4) Multiplied PA VOC emissions by NEI exhaust fraction to get PA exhaust emissions and by NEI evaporative fraction to get PA evaporative emissions at the county/10 digit SCC level;
- replaced SCC from all VMT records in tblMobilePE with the first nine digits of the SCC plus “X” in the tenth digit and then replicated this record up to three additional times to create records with the same VMT values, but with the SCC ending in “V”, “B”, or “T” and then eliminating those with no match at the county/SCC level in tblMobileEM; and
 - in tblMobileTR, changed the Organization Name field for all records from US EPA EFIG to Pennsylvania DEP, Inventory Type Code from CAPHAP to CRIT, and updated the Transaction Creation Date to the date these changes were made.

The revised onroad NIF data were run through the NIF QA Tool. The only remaining errors identified by the NIF QA Tool were range errors in the emissions table of the NIF file. These range errors were reviewed by Pechan. The data were determined to be reasonable, so no changes were made to the emissions. Pechan then populated the NIF plus fields as described above. The Data Source field was populated with the code “SI” for all of the Pennsylvania emission records, since the supporting MOBILE6 inputs used to generate the Pennsylvania onroad emission inventory were provided along with the emission inventory data.

K. RHODE ISLAND

1. State-supplied Data

Rhode Island requested assistance from Pechan through this MANE-VU project to prepare NMIM inputs that could be submitted to EPA to fulfill Rhode Island’s CERR requirements. Pechan then used the resulting Rhode Island NMIM data to calculate its 2002 onroad emission inventory using NMIM. Table II-10 below summarizes the data submitted by Rhode Island and also shows where the NMIM defaults were used.

Table II-10. Data Used in Calculating Rhode Island’s 2002 Onroad Emission Inventory for MANE-VU

Input Parameter	Source of Input Parameter Data	Coverage	Data Source	File Date
MOBILE6 Input Parameters:				
I/M Data:	4400002.imp with I/M credit file 44000102.imc	Statewide	RI	5/28/2004
ATP Data:	No ATP	Statewide	RI	
Registration Data:	4400002.reg	Statewide	RI	5/28/2004
Diesel Sulfur Content:	NMIM defaults for RI	Statewide	EPA	
Temperature Data:	NMIM defaults for RI	Statewide	EPA	
Fuel Data:	NMIM defaults for RI	Statewide	EPA	
Speeds:	4400002.AR _x and 4400002.FW _x where x ranges from 1 to 9 (referenced in NMIM_RHODE_ISLAND_062904_ACC00.mdb)	Statewide	RI	5/28/2004
Humidity Data:	NMIM defaults for RI	Statewide	EPA	
LEV Program Data:	44000.nlv	Statewide	RI	5/28/2004
VMT Data				
VMT:	NMIM_RHODE_ISLAND_062904_ACC00.mdb - BaseYearVMT table	Statewide	RI	6/29/2004

2. MOBILE6 Inputs

Rhode Island provided information on the I/M program that is applied Statewide as well as a file defining the I/M program cutpoints. No anti-tampering program was modeled for Rhode Island. Rhode Island also provided a 2002 Statewide registration distribution and the OTC LEV implementation schedule. In addition, in a MOBILE6 input file, Rhode Island provided Statewide speeds by the 12 roadway types. Pechan formatted these data files as needed for NMIM and also developed a Statewide set of NMIM speed files. The names of the I/M file, the registration distribution file, and the speed files were added to the CountyYear table of the NMIM county-level database and the LEV schedule file name was added to the State table. The fuel, temperature, and humidity values modeled for Rhode Island were the NMIM defaults.

3. VMT Inputs

Rhode Island provided a spreadsheet with the 2002 VMT as well as Statewide 2002 VMT fractions by 16 vehicle types. Pechan prepared a simple MOBILE6 input file including this Rhode Island 2002 VMT mix by vehicle type and the 2002 Rhode Island registration distribution. The VMT mix in the MOBILE6 output file at the 28 vehicle type level was then used to distribute the VMT by vehicle category. The 2002 daily VMT was at the State level, broken down by the 12 roadway types. To allocate these VMT data to the county/road type level of detail, Pechan summed the VMT from the preliminary version of EPA's 2002 NEI for Rhode Island first by State and roadway type and then by county and roadway type. Pechan calculated county/roadway type VMT fractions by dividing the VMT at the county/roadway type level by the State/roadway type VMT for the same roadway type. These fractions were then multiplied by the VMT supplied by Rhode Island at the State/roadway type level of detail to obtain county/roadway type VMT data. These county/roadway type VMT data were then multiplied by the 28 vehicle type VMT fractions to obtain VMT at the level of detail needed to populate the NMIM BaseYearVMT table. The data were also converted from daily VMT to annual by multiplying the average daily VMT by 365.

4. Emission Calculation Methodology

Pechan updated the MySQL version of the following NMIM county-level database tables: CountyYear, State, and BaseYearVMT with the correctly formatted Rhode Island data and file names. After making these updates to the MySQL version of the NMIM county-level database, Pechan ran the NMIM model for Rhode Island at the monthly level of detail and obtained output from NMIM in NIF3.0 format in text tables. Pechan converted these tables to NIF 3.0 format in Access and also populated the NIF plus fields as described above. The Data Source field was populated with the code "I" for all of the Rhode Island emission records, since the supporting inputs used to generate Rhode Island's onroad emission inventory were provided by Rhode Island. Pechan ran EPA's NIF QA Tool on the resulting output. Only several acceptable range errors were found with this program, so no changes were made to the resulting NIF data.

L. VERMONT

Vermont submitted an onroad criteria pollutant emission inventory to EPA to meet its CERR requirements in June 2004. Vermont later found errors in this submittal and provided a replacement inventory on August 18, 2004. This August submittal included hazardous air pollutants (HAPs) along with the criteria pollutants and provided the emissions and VMT at the

monthly level. This submittal did not include PM_{2.5}. The tenth digit of the SCC for both the emissions table and the VMT table ended in a “0” rather than “X”, “V”, “B”, or “T” and the HDDV emissions were coded using the single SCC of “2230070xxx” rather than “2230071xxx”, “2230072xxx”, “2230073xxx”, “2230074xxx”, or “2230075xxx”. Based on these observations, Pechan made the following changes to the Vermont data:

- deleted all HAPs and seasonal emission records from tblMobileEM;
- summed monthly emission values and monthly VMT values to annual values and replaced the start date in all cases with 20020101 and the end date with 20021231;
- split emission records into components—exhaust (“X”), evaporative (“V”), brake wear (“B”), and tire wear (“T”)—using the preliminary 2002 NEI data for Vermont to develop ratios needed for this allocation;
- split emission and VMT records for HDDVs into the five HDDV subcategories using the preliminary 2002 NEI data for Vermont to develop ratios needed for this allocation;
- added PM_{2.5} by using the relationship between PM₁₀ and PM_{2.5} for Vermont from the preliminary 2002 NEI and applying these ratios to the PM₁₀ emission values supplied by Vermont;
- replicated VMT records so that each SCC ending with “0” was replaced by up to four records with the same VMT with SCCs ending in “X”, “V”, “B”, or “T”.

The revised onroad NIF data were run through the NIF QA Tool. The only remaining error identified by the NIF QA Tool was a single range errors in the emissions table of the NIF file. This range error was reviewed by Pechan and the data were determined to be reasonable, so no changes were made to the emissions. Pechan then populated the NIF plus fields as described above. The Data Source field was populated with the code “SI” for all of the Vermont emission records, since the supporting MOBILE6 inputs used to generate the Vermont onroad emission inventory were provided along with the emission inventory data.

Vermont submitted new VMT data for three road classifications (rural minor collectors, rural local roads, and urban local roads) in December 2004. These data were received too late for incorporation into the NIF onroad emission inventory files. Therefore, emissions from these three road categories are incorrect for Vermont in the MANE-VU inventory. This VMT change resulted in a Statewide decrease in VMT from about 9.5 billion miles to about 7.8 billion miles. This would cause a decrease in emissions of all pollutants from the three affected road categories. This change did not result in any expected changes in the VMT mix or speeds being modeled. These VMT changes were captured in the final SMOKE VMT files. Therefore, the SMOKE modeling performed by MANE-VU will not match the Vermont emission inventory.

CHAPTER III. 2002 NONROAD EMISSION INVENTORY

The nonroad sector is comprised of nonroad engines included in EPA's NONROAD model, as well as other engines not modeled in NONROAD, including aircraft, commercial marine vessels and locomotive. Note that aircraft ground support equipment (GSE) and rail maintenance equipment are included in NONROAD.

NONROAD model categories include equipment such as recreational marine and land-based vehicles, farm and construction machinery and lawn and garden equipment. These equipment are powered by compression-ignition engines, which are typically diesel-fueled, as well as spark-ignition or gasoline-fueled engines. Compressed natural gas (CNG) and liquefied petroleum gas (LPG) engines are also included in the NONROAD model. Equipment categories are typically defined at the 7-digit SCC level, while specific equipment applications are defined at the 10-digit SCC level. Table III-1 is a list of the SCCs addressed by the NONROAD model. Criteria pollutant emissions may not be reported for all SCCs for all counties in the MANE-VU RPO, and will depend on the geographic allocation methods used by the model, or specific allocation data provided by a State.

Pechan prepared the 2002 nonroad sector inventory based on State-supplied data where provided for the CERR. For aircraft, commercial marine vessels and locomotive categories, missing data were supplemented with estimates from EPA's preliminary 2002 NEI. For the aircraft and commercial marine vessel source categories, the 2002 NEI criteria pollutant emissions were estimated by carrying over the 2001 estimates. 2001 emissions were estimated using the methodologies described in EPA's *Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory* (EPA, 2003). 2002 locomotive emissions were calculated using 2002 activity data and the methodologies described in the above documentation. As noted in the documentation of the preliminary NEI prepared for MANE-VU (Pechan, 2004), the 2002 NEI does not include locomotive category emission estimates for the States of Connecticut, Maine, New Hampshire, and Vermont.

For those States that did not provide NONROAD model engine emissions for the CERR, Pechan generated updated emission estimates using EPA's National Mobile Inventory Model (NMIM), which includes NONROAD2004, the most current NONROAD model version released by EPA (EPA, 2004b). These updated emissions were generated because the preliminary 2002 NEI was based on an earlier version of NONROAD (i.e., NONROAD2002a), which has undergone some notable revisions (EPA, 2004c).

NMIM is a consolidated modeling system that incorporates the NONROAD and MOBILE models, along with a county database of inputs. For each MANE-VU State run, counties with similar temperatures and fuel properties were grouped to minimize the number of NONROAD model runs. All model defaults were used for these runs. Pechan ran NMIM/NONROAD2004 for each county group, by month, for calendar year 2002. After the runs, the NMIM output database was converted to an annual inventory in NIF Version 3.0 format.

Table III-1. SCCs Addressed by the NONROAD Model

Nonroad SCC	SCC Description
2260xxxxxx	2-stroke gasoline engines
2260001xxx	- recreational vehicles
2260002xxx	- construction equipment
2260003xxx	- industrial equipment
2260004xxx	- lawn & garden equipment
2260005xxx	- agricultural equipment
2260006xxx	- light commercial equipment
2260007xxx	- logging equipment
2265xxxxxx	4-stroke gasoline engines
2265001xxx	- recreational vehicles
2265002xxx	- construction equipment
2265003xxx	- industrial equipment
2265004xxx	- lawn & garden equipment
2265005xxx	- agricultural equipment
2265006xxx	- light commercial equipment
2265007xxx	- logging equipment
2265008xxx	- airport service equipment
226501xxxx	- oil field equipment
2267xxxxxx	LPG engines
2267001xxx	- recreational vehicles
2267002xxx	- construction equipment
2267003xxx	- industrial equipment
2267004xxx	- lawn & garden equipment
2267005xxx	- agricultural equipment
2267006xxx	- light commercial equipment
2267008xxx	- airport service equipment
2268xxxxxx	CNG engines
2268002xxx	- construction equipment
2268003xxx	- industrial equipment
2268005xxx	- agricultural equipment
2268006xxx	- light commercial equipment
226801xxxx	- oil field equipment
2270xxxxxx	Diesel engines
2270001xxx	- recreational vehicles
2270002xxx	- construction equipment
2270003xxx	- industrial equipment
2270004xxx	- lawn & garden equipment
2270005xxx	- farm equipment
2270006xxx	- light commercial equipment
2270007xxx	- logging equipment
2270008xxx	- airport service equipment
2270009xxx	- underground mining equipment
227001xxxx	- oil field equipment
2282xxxxxx	Recreational marine equipment
2285xxx015	Railroad support equipment

In developing and processing the inventories, Pechan added the following NIF plus fields to each table:

TblCE : State FIPs, County FIPs, Data Source, Revision Date

TblEM : State FIPs, County FIPs, Data Source, Revision Date, CAP/HAP, Year, Emission Ton Value, Emission Type Period

TblEP : State FIPs, County FIPs, Data Source, Revision Date

TblPE : State FIPs, County FIPs, Data Source, Revision Date

TblTR : State FIPs, County FIPs, Revision Date

Data source codes are included to document the origin of the emissions data. Table III-2 provides a listing of all the data source codes included in the MANE-VU inventories, as well as a definition of each code. State FIPs and County FIPs are separated out to assist in developing area-specific emission summaries, and the Emission Ton Value places all emissions on the same basis. The Emission Type Period describes the temporal basis of the estimates (in this case, they are all annual). Finally, the Revision Date tracks when record-specific changes are made.

Table III-2. Data Source Code Descriptions

Data Source Code	Description
E-02-F	E = EPA-generated data; -02 = year 2002; -F = emissions are carried forward for inclusion in the 2002 base year
E-02-X	E = EPA-generated data; -02 = year 2002; -F = emissions are not grown or carried forward
P-02-X	P = RPO-generated data; -02 = year 2002; -X = emissions are not grown or carried forward
S-02-X	S = State data; -02 = year 2002 data; -X = emissions are not grown or carried forward

Table III-3 provides a summary of the basis for the nonroad sector emissions by State, separated by NONROAD model engines, aircraft, commercial marine vessels, and locomotives. A discussion of the emissions inventory development procedures for each state, including the incorporation and augmentation of State-supplied data, are provided in the following sections. Table III-4 presents a summary of SCC-specific pollutant ratios that were used to develop missing pollutant emission estimates as needed for data augmentation procedures described in more detail below.

A. CONNECTICUT

Pechan developed NONROAD Model SCC emissions for Connecticut using NMIM.

Pechan added aircraft and commercial marine vessel emissions from the preliminary 2002 Nonroad NEI. For commercial aircraft (SCC 2275020000), Pechan estimated PM10-PRI emissions by applying an average PM10-PRI/NO_x ratio to available NO_x emissions. Commercial aircraft PM25-PRI emissions were estimated by multiplying PM10-PRI emissions by a particle size multiplier of 0.976 (ERG, 2004).

There are no locomotive emission estimates in the NEI for Connecticut, so this category is not represented in this State's inventory.

Table III-3. Summary of 2002 Nonroad Sector Inventory Development by State and Subsector

FIPSSST	State	Basis for Subsector of Nonroad Inventory			
		NONROAD Model Inventory	Aircraft	Commercial Marine Vessels	Locomotives
09	Connecticut	Pechan's July 2004 run of EPA's NMIM (NONROAD2004)	2002 Preliminary NEI; Augmented PM10-PRI and PM2.5-PRI estimates for commercial aircraft (SCC 2275020000)	2002 Preliminary NEI	Not supplied by State and not available from NEI
10	Delaware	June 2004 CERR Submittal	June 2004 CERR Submittal	June 2004 CERR Submittal	June 2004 CERR Submittal
11	District of Columbia	Pechan's July 2004 run of EPA's NMIM (NONROAD2004)	Not supplied by State and not available from NEI	2002 Preliminary NEI	June 2004 CERR Submittal
23	Maine	June 2004 CERR Submittal	State supplied in Oct 2004	State supplied in Oct 2004	State supplied in Oct 2004
24	Maryland	June 2004 CERR Submittal; seasonal emissions added to estimate annual emissions	June 2004 CERR Submittal; State supplied modifications in Sep 2004	June 2004 CERR Submittal; State supplied modifications in Oct 2004	June 2004 CERR Submittal
25	Massachusetts	Pechan's July 2004 run of EPA's NONROAD2004	June 2004 CERR Submittal	State-supplied for June 2004 CERR Submittal, with modifications as directed by State	June 2004 CERR Submittal
33	New Hampshire	June 2004 CERR Submittal with Adjustments by Pechan	June 2004 CERR Submittal	2002 Preliminary NEI	June 2004 CERR Submittal
34	New Jersey	June 2004 CERR Submittal	June 2004 CERR Submittal	June 2004 CERR Submittal	June 2004 CERR Submittal
36	New York	June 2004 CERR Submittal	2002 Preliminary NEI	State supplied in Oct 2004	2002 Preliminary NEI
42	Pennsylvania	June 2004 CERR Submittal	State supplied to Pechan in June 2004	State supplied to Pechan in June 2004	State supplied to Pechan in June 2004
44	Rhode Island	Pechan's July 2004 run of EPA's NMIM (NONROAD2004)	State-supplied for June 2004 CERR Submittal, with modifications as directed by State	State-supplied for June 2004 CERR Submittal, with modifications as directed by State	State-supplied for June 2004 CERR Submittal, with modifications as directed by State
50	Vermont	Pechan's July 2004 run of EPA's NMIM (NONROAD2004)	2002 Preliminary NEI	2002 Preliminary NEI	Not supplied by State and not available from NEI

Table III-4. Emission Ratios for Gap-Filling Missing Pollutant Records*

SCC	SCC Description	PM10-PRI/NO _x	PM25-PRI/PM10-PRI	SO ₂ /NO _x
2275001000	Military Aircraft	3.819	0.69	0.095
2275020000	Commercial Aircraft	0.058	0.976	NA
2275050000	General Aviation	3.642	0.69	0.154
2275060000	Air Taxi	3.819	0.69	0.095
2280002100		0.042	0.92	NA
2280003100		NA	0.92	NA
2285000000	Locomotives; All	NA	0.9	NA

*Represent factor by which pollutant emission estimates in denominator is multiplied.

B. DELAWARE

Pechan used Delaware's nonroad sector CERR submittal as the basis for the MANE-VU inventory. This inventory included all NONROAD model SCCs, as well as all relevant aircraft, locomotive and commercial marine vessel categories. Pechan performed QA of the file, and revised the file to address QA issues as approved by Delaware. The only QA issue identified was the inclusion of CO₂ in the inventory, which is not a valid pollutant code in NIF3.0, so these records were removed.

In September 2004, Delaware provided corrections to the general aviation emissions (SCC 227505000) for Kent County. Pechan made these revisions and also recalculated the commercial aircraft (SCC 2275020000) PM25-PRI emissions using the assumption that 97.6% of PM10-PRI is PM25-PRI (ERG, 2004).

C. DISTRICT OF COLUMBIA

District of Columbia provided only locomotive emissions for their nonroad sector CERR submittal. Pechan performed QA of the file, and revised the file to address QA issues as approved by District of Columbia. PM emissions in the inventory were not identified as either PM₁₀ or PM_{2.5}, nor were the emissions identified as primary or filterable. District of Columbia authorized Pechan to change PM to PM10-PRI. Locomotive PM25-PRI emissions were estimated using the assumption that 90% of PM₁₀ is PM_{2.5} (EPA, 2003). Hydrocarbon (HC) pollutant emissions were also removed from the inventory, as this is not a valid pollutant code in NIF3.0.

Pechan developed NONROAD Model SCC emissions for District of Columbia using NMIM.

Pechan added commercial marine vessel emissions from the preliminary 2002 Nonroad NEI. There are no aircraft emission estimates in the NEI for the District of Columbia, so this category is not represented in this State's inventory.

D. MAINE

Pechan used Maine's NONROAD model sector CERR submittal as the basis for the MANE-VU inventory. Pechan performed QA of the file, and revised the file to address QA issues as approved by Maine. The only QA issue identified was the inclusion of CO₂ in the inventory, which is not a valid pollutant code in NIF3.0, so these records were removed.

In October 2004, Maine provided aircraft, commercial marine vessel, and locomotive emissions to be added to their inventory. Pechan estimated general aviation, military aircraft, and air taxi PM₂₅-PRI emissions by multiplying PM₁₀-PRI emissions by a particle size multiplier of 0.69 (EPA, 2003). Commercial aircraft PM₂₅-PRI emissions were estimated by multiplying PM₁₀-PRI emissions by a particle size multiplier of 0.976 (ERG, 2004). For in-port commercial marine emissions (SCC 2280002100), Pechan estimated PM₁₀-PRI emissions by applying a PM₁₀-PRI/NO_x ratio to available NO_x emissions, as shown in Table III-4.

E. MARYLAND

Pechan used Maryland's nonroad sector CERR submittal as the basis for the MANE-VU inventory. This inventory included all NONROAD model SCCs, as well as all relevant aircraft, locomotive and commercial marine vessel categories. Pechan performed QA of the file, and revised the file to address QA issues as approved by Maryland. Emissions for non-valid pollutants, including CO₂ and HC were included in their inventory. Maryland authorized Pechan to maintain the CO₂ and HC emission records in their inventory.

Maryland provided NONROAD model emissions by season (i.e.; winter, spring, summer, fall). Pechan developed a 2002 annual inventory by summing their seasonal NONROAD model estimates. In their seasonal NONROAD model inventory, Maryland only provided PM-PRI emissions. Pechan changed "PM-PRI" to "PM₁₀-PRI" and estimated PM₂₅-PRI emissions using SCC-specific particle size distribution multipliers from NONROAD2004. Maryland also did not provide NH₃ emission estimates for NONROAD model engine SCCs. Pechan added NH₃ emission estimates for all SCC/county combinations reporting non-zero emission values for at least one pollutant.

In September 2004, Maryland provided revised aircraft and commercial marine vessel emission estimates. Pechan replaced the aircraft and commercial marine vessel emissions from their CERR submittal with the revised emissions.

Maryland did not provide PM₂₅-PRI aircraft and commercial marine vessel emissions in their inventory. Pechan estimated general aviation, military aircraft, and air taxi PM₂₅-PRI emissions by multiplying PM₁₀-PRI emissions by a particle size multiplier of 0.69 (EPA, 2003). Commercial aircraft PM₂₅-PRI emissions were estimated by multiplying PM₁₀-PRI emissions by a particle size multiplier of 0.976(ERG, 2004).

F. MASSACHUSETTS

Massachusetts provided annual emissions for aircraft, locomotive and commercial marine vessel categories for their nonroad sector CERR submittal. In addition, Massachusetts provided summer season and winter season daily emissions for the NONROAD model categories. Pechan performed QA of the file, and revised the file to address the following issues. Emissions for the pollutant CO₂ were included in the NONROAD model inventory and this pollutant is not a valid pollutant code in NIF3.0. Massachusetts authorized Pechan to keep the CO₂ emission records in their inventory.

Pechan changed the aircraft SCC "2275050000" to "2275000000," since Massachusetts verified that this emission record represents all aircraft types, not just general aviation. Massachusetts

also requested that Pechan make changes to annual emissions for SCC 2280002010 for Dukes County (25007).

For the NONROAD model categories, Massachusetts only provided summer season and winter season daily emissions for the CERR. As such, Pechan developed an annual 2002 NONROAD Model emissions inventory for Massachusetts using the draft NONROAD2004 Model. Seasonal temperatures specific to four regions in Massachusetts were used as input. To make use of these State-supplied inputs, Pechan ran the NONROAD model outside of NMIM for Massachusetts as an exception to the other States.

G. NEW HAMPSHIRE

Pechan used New Hampshire's nonroad sector CERR submittal as the basis for the MANE-VU inventory. This inventory included all NONROAD model SCCs, as well as aircraft and locomotive categories. Pechan performed QA of the file, and revised the file to address minor QA issues as approved by New Hampshire.

New Hampshire provided NONROAD model emissions in their CERR submittal at an aggregate SCC-level (i.e., by engine type). New Hampshire provided Pechan with the output, in Excel, for the NONROAD model runs they performed. Pechan compiled the output to develop the NONROAD model inventory, in NIF3.0 format, at the 10-digit SCC-level. In their CERR submittal, New Hampshire provided emissions for SCC 2270008000 (Diesel Airport Service Equipment, Total), estimated outside NONROAD using FAA's Emissions & Dispersion Modeling System (EDMS). Pechan added these emissions to the NONROAD model inventory. New Hampshire only included PM₁₀ emissions for SCC 2270008000. Pechan estimated PM_{2.5} emissions from PM₁₀ using the assumption that 97% of PM₁₀ is PM_{2.5} (EPA, 2004b). Pechan also incorporated ammonia (NH₃) emissions from the 2002 preliminary NEI for all gasoline and diesel engine SCCs.

New Hampshire did not provide PM₁₀ and PM_{2.5} aircraft emissions in their inventory. New Hampshire authorized Pechan to develop aircraft PM₁₀ emissions for all aircraft types by applying an average PM₁₀/NO_x ratio to the aircraft NO_x emissions in their inventory, using ratios presented in Table III-4. Pechan estimated general aviation, military aircraft, and air taxi PM₂₅-PRI emissions by multiplying PM₁₀-PRI emissions by a particle size multiplier of 0.69 (EPA, 2003). For commercial aircraft, Pechan estimated PM₂₅-PRI emissions using the assumption that 97.6% of PM₁₀ is PM_{2.5} (ERG, 2004).

Finally, Pechan added commercial marine vessel emissions from the preliminary 2002 Nonroad NEI.

H. NEW JERSEY

Pechan used New Jersey's nonroad sector CERR submittal as the basis for the MANE-VU inventory. This inventory included all NONROAD model SCCs, as well as all relevant aircraft, locomotive and commercial marine vessel categories. Pechan performed QA of the file, and revised the file to address QA issues as approved by New Jersey. The only QA issue identified was the inclusion of CO₂ in the inventory, which is not a valid pollutant code in NIF3.0, so these records were removed.

I. NEW YORK

Pechan used New York's NONROAD model sector CERR submittal as the basis for the MANE-VU inventory. Pechan performed QA of the file, and revised the file to address QA issues as approved by New York. New York authorized Pechan to remove the CO₂ emission records from their inventory, and authorized several other minor changes to make codes NIF3.0 compliant.

PM emissions in the inventory were not identified as either PM₁₀ or PM_{2.5}, nor were the emissions identified as primary or filterable. New York authorized Pechan to change the pollutant code from "PM" to "PM10-PRI." PM_{2.5} emissions in the inventory were not identified as primary or filterable. New York authorized Pechan to change the pollutant code from "PM25" to "PM25-PRI." In addition, NONROAD Model NH₃ emissions in New York's inventory were not reported in the correct emission unit (i.e., the emissions were overstated by a factor of 1,000). As such, New York authorized Pechan to divide the NH₃ emissions by 1,000 to convert the emissions to Tons.

In September, New York provided commercial marine vessel emissions to be added to their inventory. New York did not provide PM_{2.5} commercial marine vessel emissions for some counties in their inventory. Pechan estimated the commercial marine vessel PM_{2.5} emissions from PM₁₀ using the assumption that 92% of PM₁₀ is PM_{2.5} (EPA, 2003).

For the aircraft and locomotive categories, Pechan added emissions from the preliminary 2002 Nonroad NEI. Note that New York is currently in the process of developing a 2002 aircraft and locomotive inventory.

For commercial aircraft (SCC 2275020000), Pechan estimated PM10-PRI emissions by applying a PM10-PRI/NO_x ratio to available NO_x emissions, as shown in Table III-4. Commercial aircraft PM25-PRI emissions were estimated by multiplying PM10-PRI emissions by a particle size multiplier of 0.976 (ERG, 2004).

J. PENNSYLVANIA

Pechan used Pennsylvania's NONROAD model sector CERR submittal as the basis for the MANE-VU inventory. Pechan performed QA of the file, and revised the file to address QA issues as approved by Pennsylvania. Pennsylvania authorized Pechan to remove the CO₂ emission records from their inventory. Pennsylvania submitted an aircraft, locomotive, and commercial marine vessel emissions inventory to MANE-VU after the CERR submittal date. Pechan converted the emission estimates into NIF3.0 format.

The following data augmentation was performed to add missing SCCs and pollutants. Pennsylvania did not provide commercial aircraft emissions in their inventory. Pechan added commercial aircraft emissions from the 2002 preliminary NEI to Pennsylvania's inventory. Pennsylvania did not provide PM10-PRI and PM25-PRI aircraft emissions in their inventory. Pechan developed aircraft PM₁₀ emissions for all aircraft types by applying an average PM₁₀/NO_x ratio to the aircraft NO_x emissions in their inventory. Pechan estimated general aviation, military aircraft, and air taxi PM25-PRI emissions by multiplying PM10-PRI emissions by a particle size multiplier of 0.69 (EPA, 2003). For commercial aircraft, Pechan estimated PM25-PRI emissions using the assumption that 97.6% of PM₁₀ is PM_{2.5} (ERG, 2004).

Pennsylvania also did not provide SO₂ general aviation and air taxi emissions in the inventory. Pechan estimated the SO₂ emissions by applying a SO₂/NO_x ratio to the general aviation and air taxi NO_x emissions, using ratios shown in Table III-4.

K. RHODE ISLAND

Rhode Island provided emissions for aircraft, locomotive and commercial marine vessel categories for their nonroad sector CERR submittal. Pechan performed QA of the file, and revised the file to address QA issues as approved by Rhode Island.

PM₁₀ was not identified as either primary or filterable. Rhode Island authorized Pechan to change it to PM10-PRI. To avoid double counting, Pechan removed the following SCCs from Rhode Island's inventory: 2275000000, 2280002000, 2280002020, 2280003000, and 2280003020. These emissions are accounted for under more aggregate SCCs.

Rhode Island provided updates in September to their county-level railroad equipment emissions. The new emissions fall under SCC 2285002005 and replace all locomotive emissions provided in their CERR submittal. Pechan developed Nonroad Model SCC emissions for Rhode Island using NMIM.

Rhode Island did not provide PM10-PRI and PM25-PRI aircraft emissions in their inventory. Pechan developed aircraft PM₁₀ emissions for all aircraft types by applying an average PM₁₀/NO_x ratio to the aircraft NO_x emissions in their inventory. Pechan estimated general aviation, military aircraft, and air taxi PM25-PRI emissions by multiplying PM10-PRI emissions by a particle size multiplier of 0.69 (EPA, 2003). For commercial aircraft, Pechan estimated PM25-PRI emissions using the assumption that 97.6% of PM₁₀ is PM_{2.5} (ERG, 2004).

Rhode Island did not provide yard locomotive, and commercial marine vessel PM25-PRI emissions in their inventory. Pechan estimated the yard locomotive PM_{2.5} emissions from PM₁₀ using the assumption that 90% of PM₁₀ is PM_{2.5} (EPA, 2003). Pechan estimated the commercial marine vessel PM_{2.5} emissions from PM₁₀ using the assumption that 92% of PM₁₀ is PM_{2.5} (EPA, 2003).

L. VERMONT

Pechan developed Nonroad Model SCC emissions for Vermont using NMIM.

Pechan added aircraft emissions from the preliminary 2002 Nonroad NEI. For commercial aircraft (SCC 2275020000), Pechan estimated PM10-PRI emissions by applying an average PM10-PRI/NO_x ratio to available NO_x emissions. Commercial aircraft PM25-PRI emissions were estimated by multiplying PM10-PRI emissions by a particle size multiplier of 0.976(ERG, 2004).

Note that there are no locomotive and commercial marine vessel emissions in the NEI for Vermont, so these categories are not represented in this State's inventory.

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CHAPTER IV. EMISSION SUMMARIES

A. ONROAD SUMMARIES

Table IV-1 presents a summary of the annual 2002 onroad sector pollutant emissions for each MANE-VU State, as well as a regional total.

B. NONROAD SUMMARIES

Table IV-2 presents a summary of the annual 2002 nonroad sector pollutant emissions for each MANE-VU State, as well as a regional total. These emissions include SCCs for all NONROAD model engines, as well as aircraft, commercial marine vessel, and locomotive categories, where applicable for each State.

To show the relative contributions of these nonroad categories to the nonroad sector totals, Figures IV-1 through IV-4 show Region-specific pie charts of VOC, NO_x, SO₂, and PM_{2.5} emissions. In Figure IV-1, the primary contributor of VOC emissions in the MANE-VU region is nonroad gasoline source categories. In Figure IV-2, over half the NO_x emissions in the region are coming from nonroad diesel source categories. Figure IV-3 shows that the primary contributors of SO₂ emissions in the region are both nonroad diesel source categories and commercial marine vessels. In Figure IV-4, the primary contributor of PM_{2.5} emissions in the region is nonroad diesel source categories, with nonroad gasoline source categories also contributing to over 30 percent of the emissions.

**Table IV-1. Annual 2002 Onroad Sector Emissions by MANE-VU State
(tons per year)**

State	VOC	NO _x	CO	SO ₂	PM10-PRI	PM25-PRI	NH ₃
Connecticut	31,755.3	68,816.2	562,124.0	1,666.9	1,580.0	1,041.6	3,293.9
Delaware	10,563.8	21,340.5	160,760.4	583.9	581.1	414.9	902.8
District of Columbia	4,895.3	8,902.0	66,017.6	271.1	222.0	153.0	397.8
Maine	23,037.4	54,686.8	410,957.8	1,803.9	1,239.1	934.4	1,467.5
Maryland	61,846.7	122,210.0	1,000,762.8	4,057.6	3,168.3	2,200.4	5,594.3
Massachusetts	59,897.1	122,625.6	926,078.8	3,655.4	3,327.4	2,337.3	5,516.4
New Hampshire	16,762.3	33,283.0	306,792.5	776.9	814.3	561.8	1,447.0
New Jersey	88,561.5	155,396.7	1,282,307.3	3,757.9	3,863.6	2,591.6	7,629.2
New York	287,845.2	319,732.5	3,711,149.6	10,639.5	8,457.5	5,897.7	14,680.9
Pennsylvania	176,090.3	346,471.5	2,784,196.5	10,924.1	7,351.5	5,331.2	10,532.3
Rhode Island	12,537.8	16,677.2	186,196.8	425.3	345.1	210.5	852.6
Vermont	17,287.8	20,669.9	248,247.6	893.8	669.6	482.8	934.1
Total MANE-VU Region	791,080.6	1,290,812.0	11,645,591.9	39,456.3	31,619.5	22,157.4	53,248.8

Note: Vermont emissions do not include VMT update from December 2004.

**Table IV-2. Annual 2002 Nonroad Sector Emissions by MANE-VU State
(tons per year)**

State	VOC	NO_x	CO	SO₂	PM10-PRI	PM25-PRI	NH₃
Connecticut	27,653.88	24,275.76	272,171.52	2,274.35	2,376.23	2,184.08	28.30
Delaware	7,378.06	16,299.11	68,771.64	4,004.02	1,100.87	998.68	5.44
District of Columbia	1,253.97	2,787.39	13,924.87	284.14	234.27	215.60	3.20
Maine	27,947.15	9,878.96	151,120.02	952.56	1,594.45	1,447.65	11.39
Maryland	44,692.65	34,516.77	410,570.10	7,514.42	5,011.09	4,513.28	42.65
Massachusetts	51,576.18	67,630.02	482,669.78	8,553.89	6,477.49	5,937.10	44.75
New Hampshire	18,017.71	9,095.19	118,089.98	290.74	1,046.88	955.31	12.92
New Jersey	79,793.38	65,863.80	709,809.67	16,845.30	6,594.53	6,003.98	961.40
New York	129,924.69	122,614.65	1,182,027.80	14,617.88	11,565.52	10,624.59	85.15
Pennsylvania	84,638.45	95,034.81	979,784.14	7,805.69	9,699.60	8,410.34	57.31
Rhode Island	6,476.10	4,948.06	70,006.15	374.46	564.52	502.31	6.38
Vermont	9,342.12	4,007.61	61,557.64	367.03	578.07	530.02	7.12
Total MANE-VU Region	488,694.32	456,952.13	4,520,503.33	63,884.49	46,843.52	42,322.94	1,266.02

Figure IV-1. 2002 Nonroad Category VOC Emissions for the MANEVU States

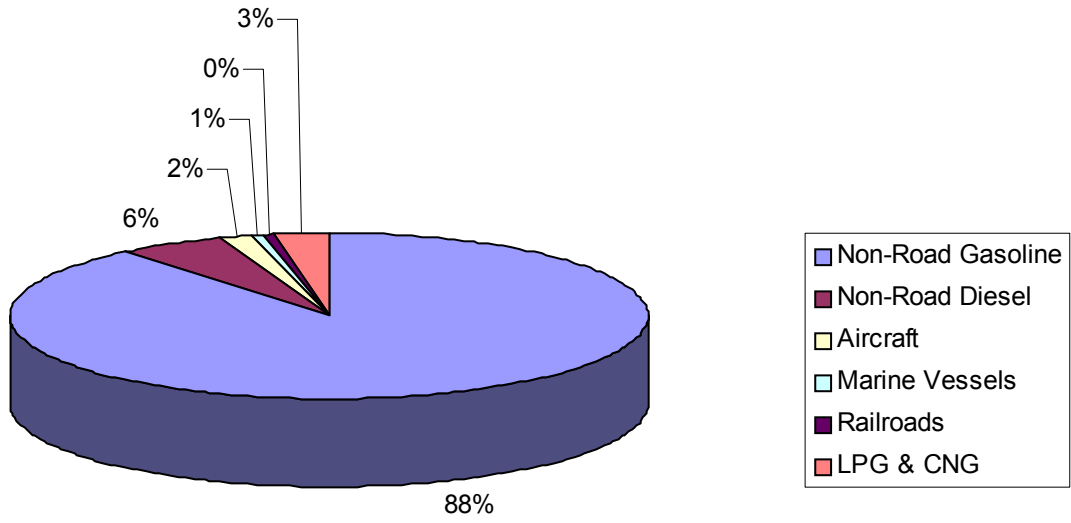


Figure IV-2. 2002 Nonroad Category NOX Emissions for the MANEVU States

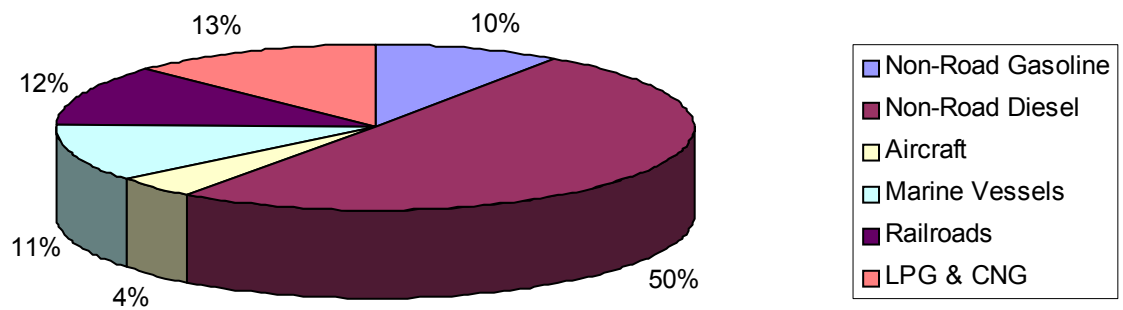


Figure IV-3. 2002 Nonroad Category SO2 Emissions for the MANEVU States

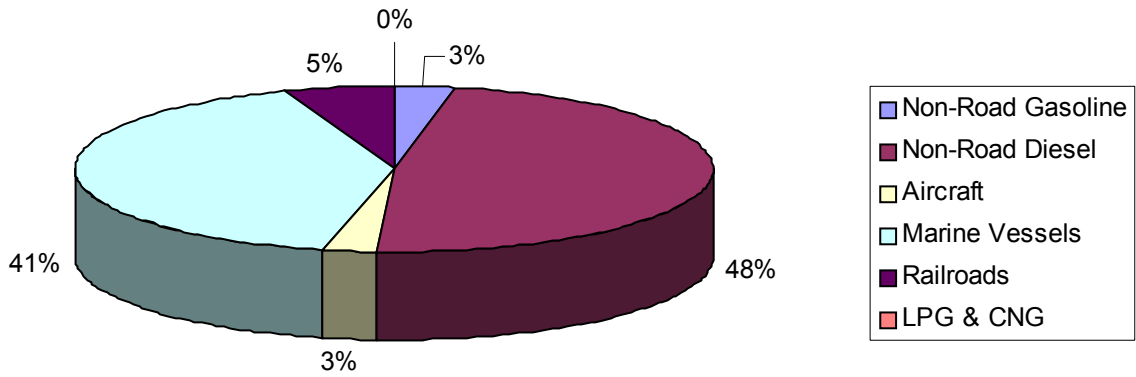
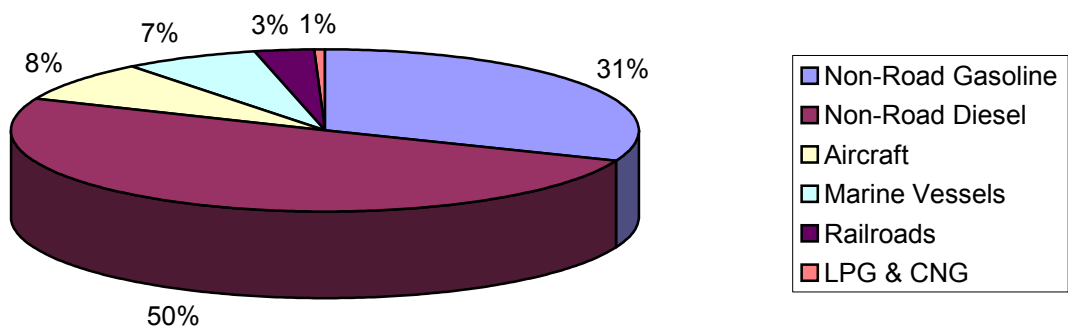


Figure IV-4. 2002 Nonroad Category PM2.5 Emissions for the MANEVU States



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