



## Development of Annual Area Source Emission Inventory for 2007 in the Northeast/Mid-Atlantic Region

*Prepared for:*

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## Acronyms and Abbreviations

<b>Acronym</b>	<b>Description</b>
BFCC	Basic Format and Content Checker
CO	Carbon monoxide
EPA	U.S. Environmental Protection Agency
MANE-VU	Mid-Atlantic/Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association
NEI	National Emission Inventory
NH <sub>3</sub>	Ammonia
NIF3.0	National Emission Inventory Input Format Version 3.0
NMIM	National Mobile Inventory Model
NONROAD	no acronym (model name)
NO <sub>x</sub>	Oxides of nitrogen
PM-CON	Primary PM, Condensable portion only (all < 1 micron)
PM-FIL	Primary PM, Filterable portion only
PM-PRI	Primary PM, includes filterables and condensibles PM-PRI= PM-FIL + PM-CON
PM10-FIL	Primary PM10, Filterable portion only
PM10-PRI	Primary PM10, includes filterables and condensibles, PM10- PRI = PM0-FIL + PM-CON
PM25-FIL	Primary PM2.5, Filterable portion only
PM25-PRI	Primary PM2.5, includes filterables and condensibles PM25-PRI= PM25-FIL + PM-CON
RWC	Residential wood combustion
SIP	State Implementation Plan
SCC	Source Classification Code
SMARTFIRE	No acronym (model name)
SO <sub>2</sub>	Sulfur dioxide
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
VOC	Volatile organic compounds

## **1.0 ANNUAL EMISSIONS FOR 2007 AREA SOURCES**

### **1.1 INTRODUCTION**

This technical support document (TSD) explains the data sources, methods, and results for preparing Version 1 of the 2007 criteria air pollutant (CAP) and ammonia (NH<sub>3</sub>) emission inventory for area sources for the Northeast and Mid-Atlantic/Northeast region. The region includes Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia. Local air planning agencies include Philadelphia and Allegheny County, Pennsylvania. The inventory will be used to support air quality modeling, State Implementation Plan (SIP) development, and implementation activities for the regional haze rule and fine particulate matter (PM) and ozone National Ambient Air Quality Standards (NAAQS).

The inventory includes annual emissions for sulfur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), volatile organic compounds (VOC), carbon monoxide (CO), ammonia (NH<sub>3</sub>), and five components of particulate matter (PM). The PM species in the inventory are categorized as: all filterable and condensable particles with an aerodynamic diameter less than or equal to a nominal 10 and 2.5 micrometers (i.e., PM<sub>10</sub>-PRI and PM<sub>25</sub>-PRI); filterable particles with an aerodynamic diameter less than or equal to a nominal 10 and 2.5 micrometers (i.e., PM<sub>10</sub>-FIL and PM<sub>25</sub>-FIL); and condensable particles (PM-CON). Note that PM<sub>10</sub>-PRI equals the sum of PM<sub>10</sub>-FIL and PM-CON, and PM<sub>25</sub>-PRI equals the sum of PM<sub>25</sub>-FIL and PM-CON.

This report provides an overview of the data sources and quality assurance steps used in preparing the 2007 area source sector inventory for the MANE-VU States. The area source sector is comprised of all stationary sources not included in the point source and nonroad sectors of the inventory.

### **1.2 Area Source Categories**

The source categories included in the area source inventory are shown in Exhibit 1. MACTEC solicited input from each MARAMA State on what data sources should be used for each source category. A spreadsheet containing the information shown in Exhibit 1 was prepared and provided to each MARAMA State for them to indicate what data source - state supplied or EPA 2008 National Emission Inventory - should be used in developing the emission inventory for that category.

**Exhibit 1 – Major Source Categories of the Area Source Inventory**

<b>SCC</b>	<b>Source Category</b>
21-01-xxx-xxx	Fuel - Electric Utility
21-02-xxx-xxx	Fuel - Industrial
21-03-xxx-xxx	Fuel - Comm/Inst
21-04-xxx-xxx	Fuel - Residential except Wood
21-04-008-xxx	Fuel - Residential Wood
22-94-xxx-xxx	Paved Road
22-96-xxx-xxx	Unpaved Roads
23-xx-xxx-xxx	Industrial Processess
24-01-xxx-xxx	Surface Coating
24-15-xxx-xxx	Degreasing
24-20-xxx-xxx	Dry Cleaning
24-25-xxx-xxx	Graphic Arts
24-60-xxx-xxx	Consumer/Commercial Prods
24-61-xxx-xxx	Commercial Products
24-65-xxx-xxx	Consumer Products
25-01-xxx-xxx	Petroleum Product Storage
25-05-xxx-xxx	Petroleum Product Transport
26-xx-xxx-xxx	Waste (Incineration, Open Burning, landfills, wastewater, etc.)
28-01-xxx-xxx	Agriculture - Crops
28-05-xxx-xxx	Agriculture - Livestock
28-06-xxx-xxx	Domestic Animals Waste
28-07-xxx-xxx	Wild Animals Waste
28-10-001-xxx	Forest Wildfires
28-10-xxx-xxx	Other Combustion (prescribed burn, structural, charcoal grills, etc.)

For several categories, unless specifically instructed otherwise by the States, MACTEC used the most recent data from EPA. These sources included ammonia emissions from livestock and fertilizers which came from a recent application of the Carnegie Mellon University (CMU) ammonia model to produce 2007 emissions and output from a version of the Residential Wood Combustion (RWC) model developed by EPA and run with updated 2007 data to produce emission estimates for that source category. In addition, a number of States requested that MACTEC include EPA data on wildfire emissions developed as part of EPA's SMARTFIRE system.

### **1.2.1 Processing of State Data Submittals**

Once the States had determined which source categories were to be State submitted data and which would be filled with EPA's latest inventory data, MACTEC initiated collection of the State supplied data. Data files from each State supplying data for specific source categories were uploaded to the MACTEC FTP site. Where possible, MACTEC requested that the States provide the data in NIF3 format. However, for a number of States, data

were provided in spreadsheets in a State-specific format or in the new EIS Emissions format. State-specific formatted data were converted to NIF format to the extent possible. Without exception, States included the minimum data required to complete the NIF EM, EP, and PE tables. In some cases, control information was also provided and incorporated into the NIF CE table.

### 1.2.2 Addition of EPA Data

After processing all of the data files submitted by the States, MACTEC inserted ammonia emissions from the CMU model, data from the EPA 2008 NEI, data from wildfires from EPA's SMARTFIRE dataset, and emissions generated from running the EPA RWC model to obtain an initial 2007 emissions database. MACTEC used the 2008 NEI without modification to represent 2007 emissions, after discussion with the MARAMA States. Both MACTEC and the MARAMA States felt that due to the downturn in the economy, emissions backcast to 2007 from 2008 were likely to be very similar. Thus, where 2008 EPA NEI data were used for sources that the States did not have data for, no changes were made to the NEI data to account for growth.

### 1.2.3 Tracking of Data Sources

The actual file format used by MACTEC to house the emissions data was the NOF format, which provides additional fields at the end of each table. These fields help identify the source of the data and the revision date of each record. Those data elements provide a better understanding of the lineage of the data for each source category, thus improving the overall quality assurance (QA) of the inventory. For example, the values in the DATA\_SOURCE field in the EM table include the following entries:

Entry	Data Source
State Supp	State Supplied Data
EPA	Data from the EPA or an EPA approved model (e.g., RWC)
EPA - CMU	Data from the EPA updated version of the CMU ammonia model
EPA RWC Mo	EPA Residential Wood Combustion Model
State RWC	EPA Residential Wood Combustion tool run with State Supplied data (NJ only)
2005NEIv2	2005 NEI version 2 (CT only)
2008NEI	2008 NEI (CT only)
NEI0508INT	NEI 2005 to 2008 Interpolation (CT only)
NEI08CTMOD	NEI 2008 CT Modified (CT only)
MARAMA2009	MARAMA 2009 Projection Inventory (NY only)

Based on the information provided in the DATA\_SOURCE field, Exhibit 2 summarizes the data sources used for each MARAMA State and source category.

#### **1.2.4 State Review of the Draft Inventory**

Once all of the data files were processed into NOF format, MACTEC then provided the initial draft version of the inventory to the States for review and comment. To assist the States with their review process, MACTEC provided three queries in the MS Access data base provided to the States. Those queries enabled the States to summarize the emissions by State, county, SCC and pollutant, by SCC and pollutant for the entire State, and by pollutant for the entire State.

States reviewed the files and provided comments to MACTEC for incorporation/change in the revised version of the data. In some cases, the revisions were fairly minor; in other cases updated information for entire source categories was submitted either as revised data for that category or as data for a category that was judged to be missing.

MACTEC processed all of the files and information provided from the States into an updated version of the inventory. MACTEC used a version numbering system to keep track of the changes. The initial draft inventory provided to the States for review was labeled v1 (version 1). The revised data was labeled v1\_1 (version 1, revision 1).

#### **1.2.5 Quality Assurance Procedures**

In addition to the use of the DATA\_SOURCE and REVISION\_DATE fields to keep track of modifications to the data base, MACTEC also utilized the Basic Format and Content Checker (BFCC) to review the files. During the initial development of version 1 (v1) of the inventory, the BFCC was only used to assess whether duplicate records, widows, or orphans existed.

Following the States' review of version 1 of the draft inventory, the BFCC was run again in the critical checks mode to assess any issues with the files. The primary checks were still to determine any issues with duplicate records, widows and orphans, but for version 1\_1 of the file, the output from the QA tool was provided to the States for use in assessing their inventories. The provision of the BFCC output to the States was predominantly for information purposes. The BFCC has not been updated in several years and certain elements of the internal checks that are made using the tool (e.g., incorrect SCCs, out of range values, etc) may no longer be valid since the underlying data tables used to assess those parameters have not been updated.

**Exhibit 2 – Data Sources Generally Used by Each State for Area Sources**

State	State Supp	EPA	EPA - CMU	EPA RWC Mo	State RWC	2005NEIv2	2008NEI	NEI0508 INT	NEI08 CTMOD	MARAMA2009
CT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
DC	<input checked="" type="checkbox"/>									
DE	<input checked="" type="checkbox"/>									
ME	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MD	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>							
MA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
NH	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>							
NJ	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>					
NY	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>							<input checked="" type="checkbox"/>
PA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>							
RI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
VT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
VA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						

Key: State Supp State Supplied Data  
 EPA Data from the EPA or an EPA approved model (e.g., RWC)  
 EPA - CMU Data from the EPA updated version of the CMU ammonia model  
 EPA RWC Mo EPA Residential Wood Combustion Model  
 State RWC EPA Residential Wood Combustion tool run with State Supplied data (NJ only)  
 2005NEIv2 2005 NEI version 2 (CT only)  
 2008NEI 2008 NEI (CT only)  
 NEI0508INT NEI 2005 to 2008 Interpolation (CT only)  
 NEI08CTMOD NEI 2008 CT Modified (CT only)  
 MARAMA2009 MARAMA 2009 Inventory (NY only)

The data source for a specific source category is included in the NOF tables for each county/SCC.



### **1.2.6 Summary of Area Source Emission Inventory Results**

For perspective, the 2007 inventory is compared to previously prepared inventories for 2002 and 2009. The MANEVU version 3 inventories for 2002 and 2009 were used for all States except for VA. For VA this comparison used the VISTAS Best and Final inventory. Exhibit 3 summarizes 2002 emissions for area sources that were developed previously for Version 3 of the MANE-VU and the VISTAS best-and-final inventory for Virginia. Exhibit 4 summarizes the results of the area source inventory discussed in this report for 2007 by State and pollutant.

Exhibit 5 compares the 2002 base year emissions from previous modeling studies to the 2007 emissions. Emissions show both increases and decreases between 2002 and 2007 depending upon the State and the pollutant. SCC level summaries at both the 10- and 4-digit level have shown some potentially missing sources between the 2002 and 2007 inventories. In part, some of these missing sources may be due to the non-availability of supplementary data from EPA with which to backfill missing source categories. Because of funding issues, EPA did not estimate certain area sources for the 2008 NEI. MARAMA States are evaluating whether or not to backfill these source categories with alternative values (e.g., 2005 or 2002 NEI values).

Exhibit 6 summarizes the projected emissions for area sources that were developed previously for Version 3 of the 2009 MANE-VU projection inventory (and the VISTAS 2009 best-and-final projection inventory for Virginia).

Exhibit 7 compares the 2007 emissions to the 2009 emissions used in previous modeling studies. As with the comparison between 2002 and 2007, emissions show both increases and decreases depending upon the pollutant and the State, although the majority of the emissions show increases between 2007 and 2009. The 2009 projected emissions used in previous modeling studies are probably higher than the 2007 emissions because of the fairly optimistic forecasts of growth that were used in projecting 2002 emissions to 2009, as well as differences in the emission estimation methodologies used in the 2007 inventory versus those used in developing the 2002 inventory (and 2009 projections).

Exhibits 8-14 provide a graphical representation of the information presented in Exhibits 3, 4, and 6.

Appendix A is a spreadsheet with 2007 emissions summarized by State, pollutant, and source classification code (SCC).

**Exhibit 3 – 2002\* Area Source Emissions by State (tons/year)**

State	CO	NH3	NOX	PM10- PRI	PM25- PRI	SO2	VOC
Connecticut	70,198	5,318	12,689	48,281	14,247	12,419	87,302
Delaware	14,052	13,278	2,608	13,039	3,204	1,588	15,520
District of Columbia	2,300	14	1,644	3,269	805	1,336	6,432
Maine	109,223	8,747	7,360	168,953	32,774	13,149	100,621
Maryland	141,179	25,835	15,678	95,060	27,318	12,393	120,254
Massachusetts	137,496	18,809	34,281	192,860	42,083	25,488	155,557
New Hampshire	79,647	2,158	10,960	43,329	17,532	7,072	65,371
New Jersey	97,657	17,572	26,692	61,601	19,350	10,744	167,882
New York	356,254	67,422	98,803	369,595	87,155	130,409	507,291
Pennsylvania	266,935	79,911	47,591	391,897	74,925	63,679	240,785
Rhode Island	8,007	883	3,886	8,295	2,064	4,557	31,402
Vermont	43,849	9,848	3,208	56,131	11,065	4,088	23,266
Virginia	155,873	43,905	51,418	237,577	43,989	105,890	172,989
	<b>1,482,669</b>	<b>293,699</b>	<b>316,817</b>	<b>1,689,886</b>	<b>376,510</b>	<b>392,812</b>	<b>1,694,670</b>

\* Based on Version 3 of the 2002 MANE-VU emission inventory (and the VISTAS 2002 best-and-final emission inventory for Virginia).

**Exhibit 4 – 2007 Area Source Emissions by State (tons/year)**

State	CO	NH3	NOX	PM10- PRI	PM25- PRI	SO2	VOC
Connecticut	41,626	4,427	12,338	39,406	9,059	17,968	55,342
Delaware	8,273	12,072	2,237	16,171	2,606	1,144	9,439
District of Columbia	988	145	1,477	5,188	716	1,232	4,944
Maine	49,632	6,030	6,734	54,354	12,452	9,814	39,060
Maryland	74,188	26,006	10,312	94,406	20,216	5,960	63,271
Massachusetts	78,082	4,496	20,214	150,765	23,248	19,853	84,779
New Hampshire	22,836	1,512	4,262	25,176	5,608	5,287	21,505
New Jersey	77,687	15,736	24,175	57,436	14,292	8,811	101,532
New York	153,789	45,693	72,053	321,402	58,348	70,044	380,452
Pennsylvania	219,085	72,598	56,921	250,927	44,325	103,865	176,899
Rhode Island	13,032	625	3,392	11,375	2,748	3,895	24,045
Vermont	51,252	8,013	4,003	10,127	8,034	4,361	14,345
Virginia	129,890	43,437	23,426	164,561	34,817	34,321	144,598
	<b>920,359</b>	<b>240,791</b>	<b>241,543</b>	<b>1,201,293</b>	<b>236,469</b>	<b>286,555</b>	<b>1,120,211</b>

**Exhibit 5 – Percentage Change from 2002 to 2007 by State**

<b>State</b>	<b>CO</b>	<b>NH3</b>	<b>NOX</b>	<b>PM10- PRI</b>	<b>PM25- PRI</b>	<b>SO2</b>	<b>VOC</b>
Connecticut	-68.6	-20.1	-2.8	-22.5	-57.3	30.9	-57.7
Delaware	-69.8	-10.0	-16.6	19.4	-22.9	-38.9	-64.4
District of Columbia	-132.9	90.2	-11.3	37.0	-12.4	-8.5	-30.1
Maine	-120.1	-45.1	-9.3	-210.8	-163.2	-34.0	-157.6
Maryland	-90.3	0.7	-52.0	-0.7	-35.1	-108.0	-90.1
Massachusetts	-76.1	-318.3	-69.6	-27.9	-81.0	-28.4	-83.5
New Hampshire	-248.8	-42.7	-157.2	-72.1	-212.6	-33.8	-204.0
New Jersey	-25.7	-11.7	-10.4	-7.3	-35.4	-21.9	-65.3
New York	-131.7	-47.6	-37.1	-15.0	-49.4	-86.2	-33.3
Pennsylvania	-21.8	-10.1	16.4	-56.2	-69.0	38.7	-36.1
Rhode Island	38.6	-41.1	-14.6	27.1	24.9	-17.0	-30.6
Vermont	14.4	-22.9	19.8	-454.2	-37.7	6.3	-62.2
Virginia	-20.0	-1.1	-119.5	-44.4	-26.3	-208.5	-19.6
	<b>-61.1</b>	<b>-22.0</b>	<b>-31.2</b>	<b>-40.7</b>	<b>-59.2</b>	<b>-37.1</b>	<b>-51.3</b>

**Exhibit 6 – 2009 Projected\* Area Source Emissions by State (tons/year)**

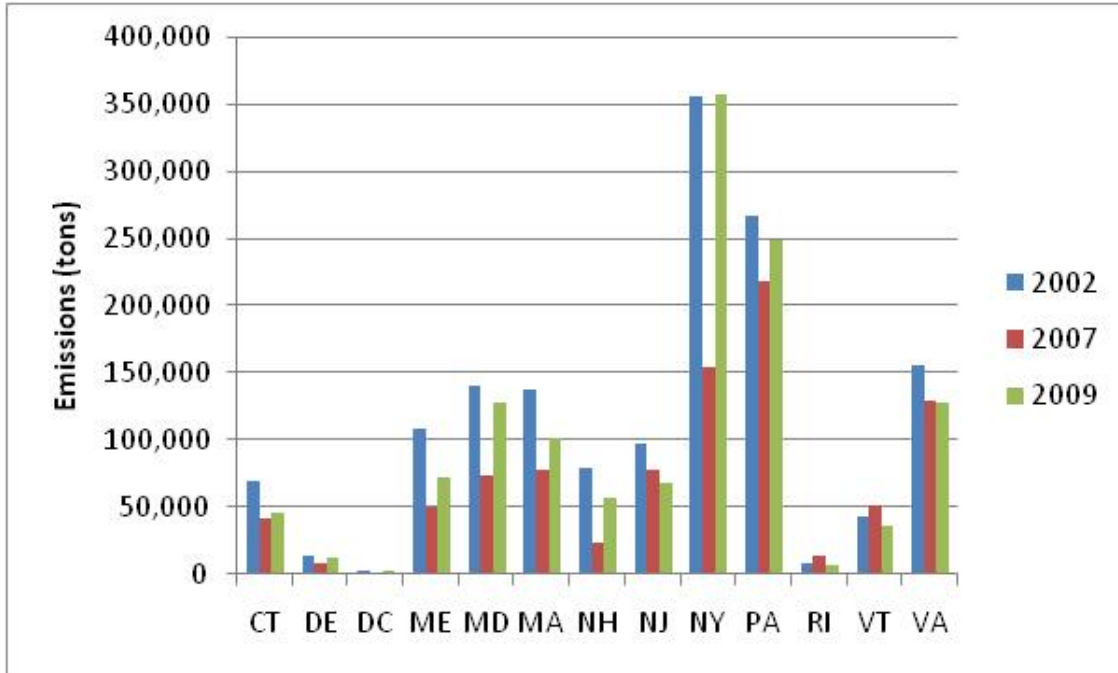
State	CO	NH3	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Connecticut	46,687	5,251	13,250	46,803	11,598	12,592	58,060
Delaware	12,988	13,324	2,835	13,651	3,110	1,601	12,171
District of Columbia	2,300	16	1,962	3,498	847	1,487	5,517
Maine	72,644	10,521	7,598	172,692	29,739	13,794	66,759
Maryland	128,365	31,943	16,969	104,226	27,205	13,700	99,188
Massachusetts	102,338	19,200	35,856	195,214	39,667	25,979	120,899
New Hampshire	57,372	2,509	11,957	43,976	15,882	7,474	46,808
New Jersey	67,746	19,482	26,828	59,019	15,926	10,678	129,585
New York	358,684	81,784	106,630	385,090	90,165	139,632	483,590
Pennsylvania	249,184	98,281	50,267	419,212	77,146	67,549	224,443
Rhode Island	7,428	945	4,154	8,897	2,119	5,024	26,358
Vermont	36,813	12,156	3,450	59,870	10,877	4,651	21,924
Virginia	128,132	46,639	52,618	252,488	44,514	105,984	145,675
	<b>1,270,681</b>	<b>342,051</b>	<b>334,373</b>	<b>1,764,635</b>	<b>368,792</b>	<b>410,145</b>	<b>1,440,977</b>

\* Based on Version 3 of the 2009 MANE-VU projection emission inventory (and the VISTAS 2009 best-and-final projection emission inventory for Virginia), which used the MANE-VU and VISTAS 2002 inventories as the basis for projections.

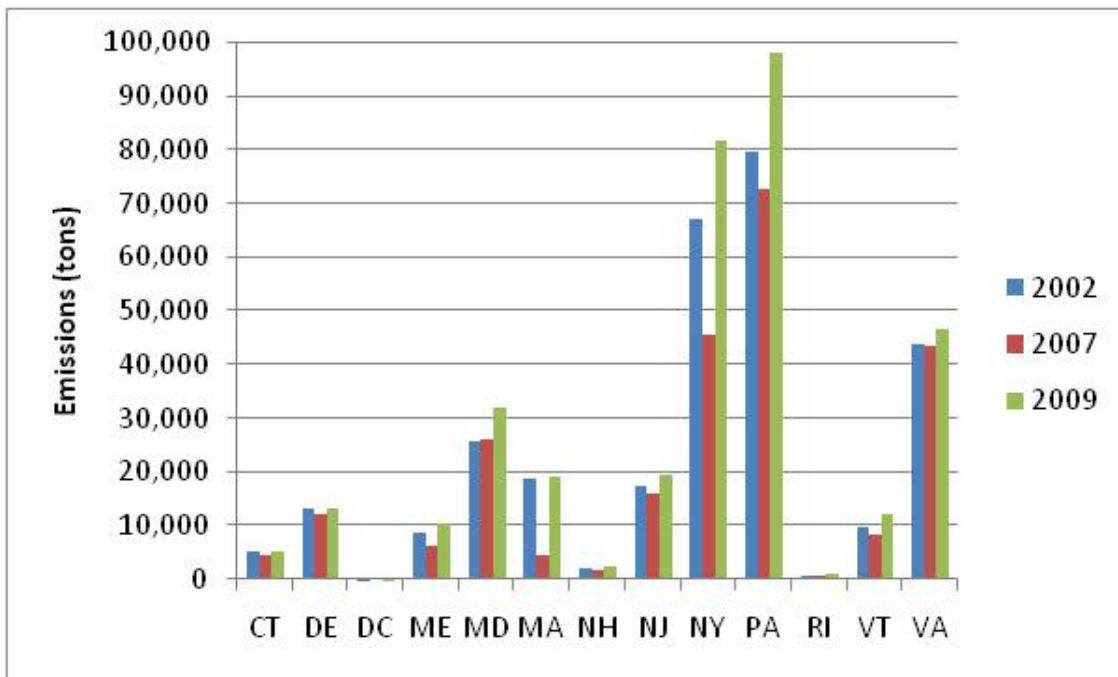
**Exhibit 7 – Percentage Change from 2007 to 2009 by State**

State	CO	NH3	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Connecticut	12.2	18.6	7.4	18.8	28.0	-29.9	4.9
Delaware	57.0	10.4	26.8	-15.6	19.3	40.0	29.0
District of Columbia	132.9	-89.2	32.8	-32.6	18.3	20.7	11.6
Maine	46.4	74.5	12.8	217.7	138.8	40.6	70.9
Maryland	73.0	22.8	64.6	10.4	34.6	129.9	56.8
Massachusetts	31.1	327.0	77.4	29.5	70.6	30.9	42.6
New Hampshire	151.2	65.9	180.6	74.7	183.2	41.4	117.7
New Jersey	-12.8	23.8	11.0	2.8	11.4	21.2	27.6
New York	133.2	79.0	48.0	19.8	54.5	99.3	27.1
Pennsylvania	13.7	35.4	-11.7	67.1	74.0	-35.0	26.9
Rhode Island	-43.0	51.1	22.5	-21.8	-22.9	29.0	9.6
Vermont	-28.2	51.7	-13.8	491.2	35.4	6.6	52.8
Virginia	-1.4	7.4	124.6	53.4	27.9	208.8	0.7
	<b>38.1</b>	<b>42.1</b>	<b>38.4</b>	<b>46.9</b>	<b>56.0</b>	<b>43.1</b>	<b>28.6</b>

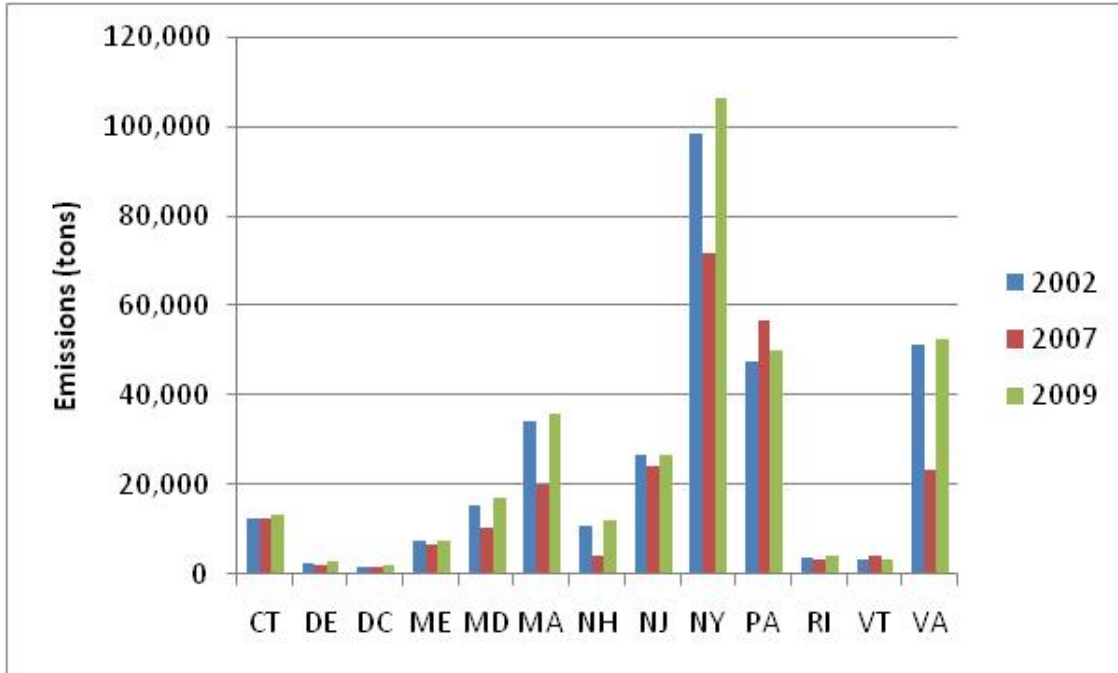
**Exhibit 8 – Comparison of 2002/2007 Actual and 2009 Projected CO Emissions**



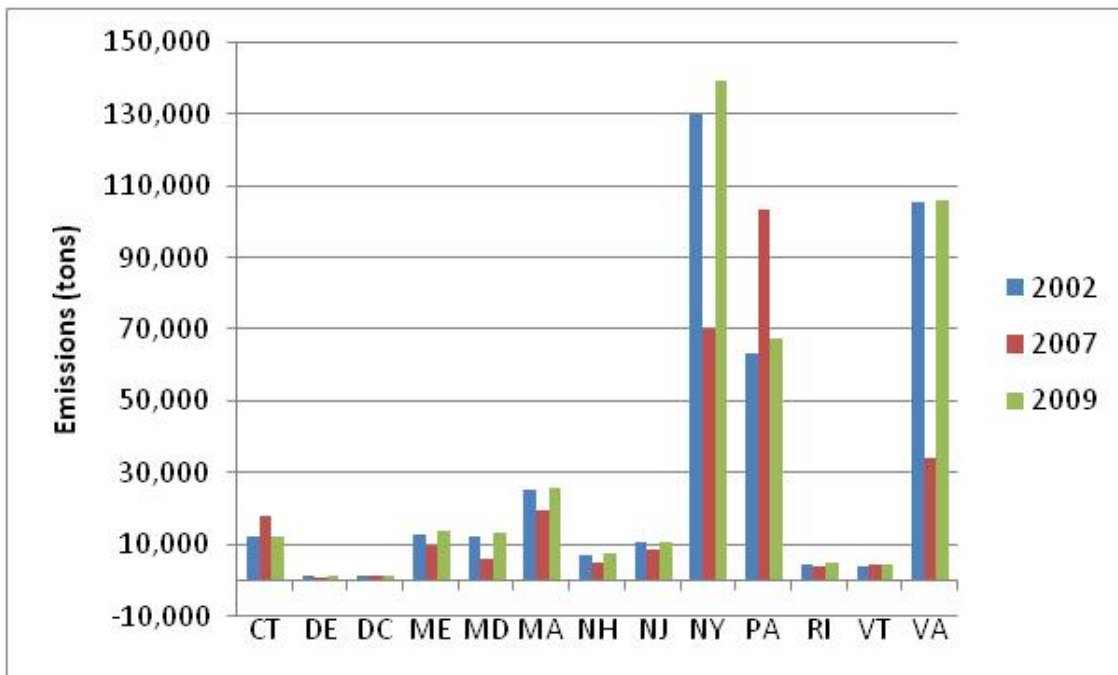
**Exhibit 9 – Comparison of 2002/2007 Actual and 2009 Projected NH3 Emissions**



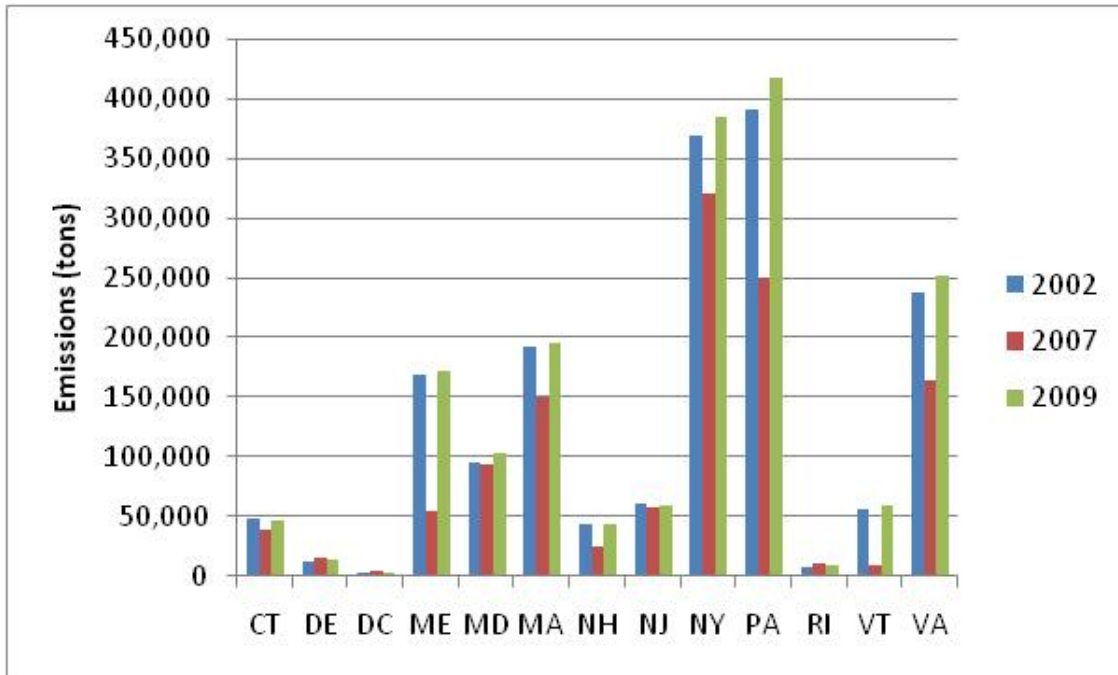
**Exhibit 10 – Comparison of 2002/2007 Actual and 2009 Projected NOx Emissions**



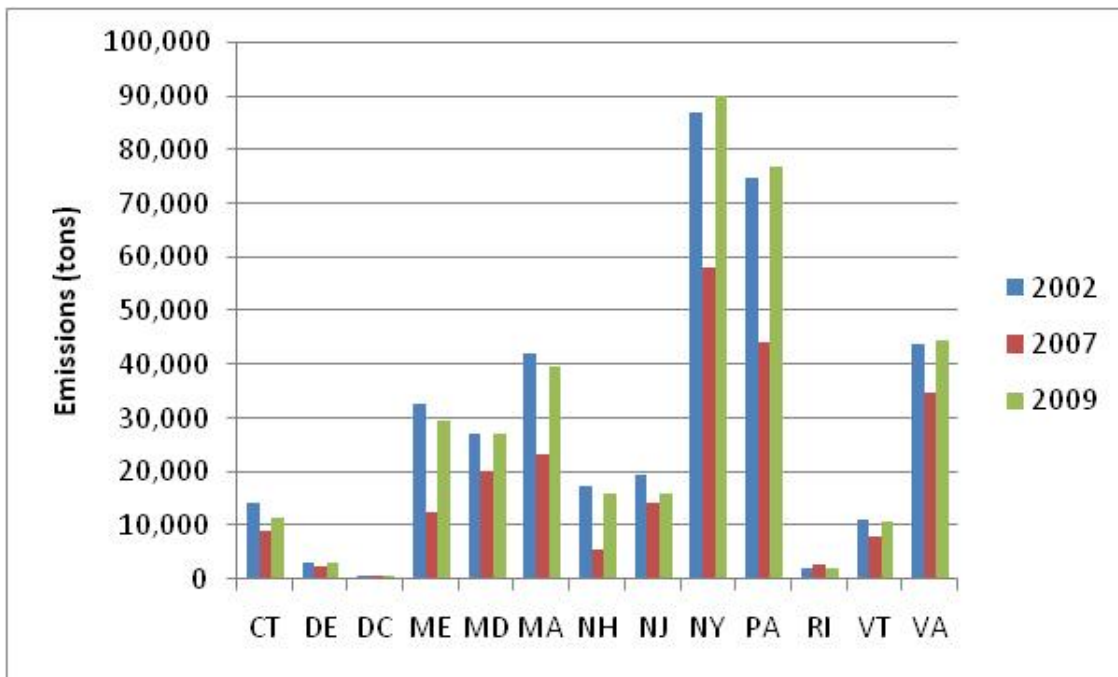
**Exhibit 11 – Comparison of 2002/2007 Actual and 2009 Projected SO2 Emissions**

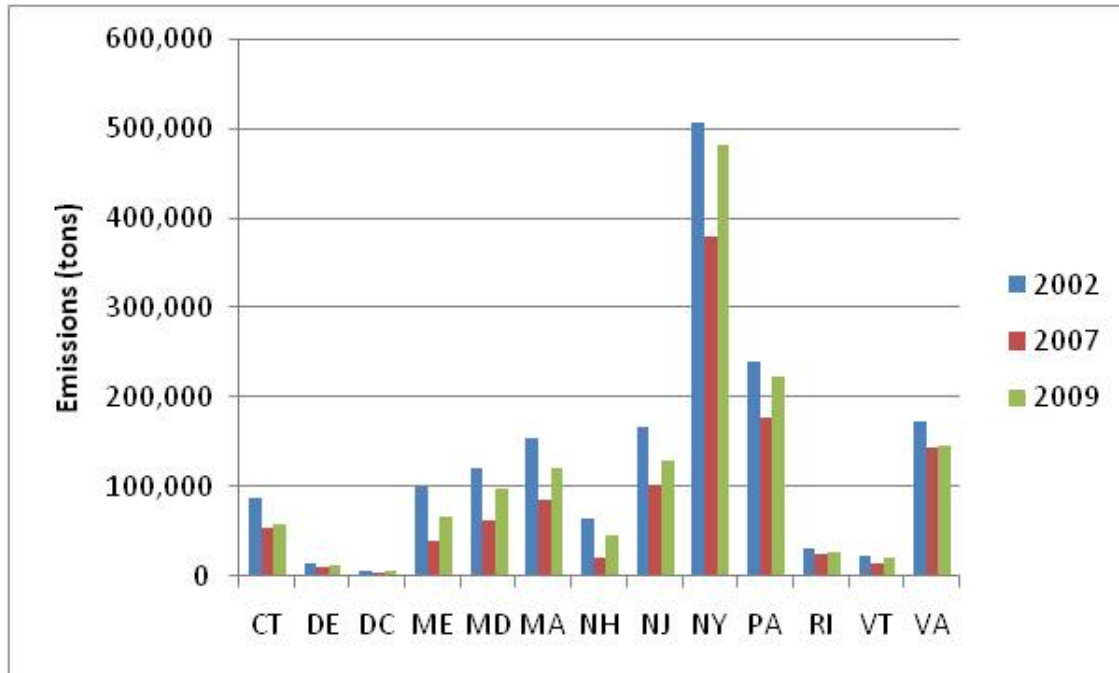


**Exhibit 12 – Comparison of 2002/2007 Actual and 2009 Projected PM10 Emissions**



**Exhibit 13 – Comparison of 2002/2007 Actual and 2009 Projected PM2.5 Emissions**



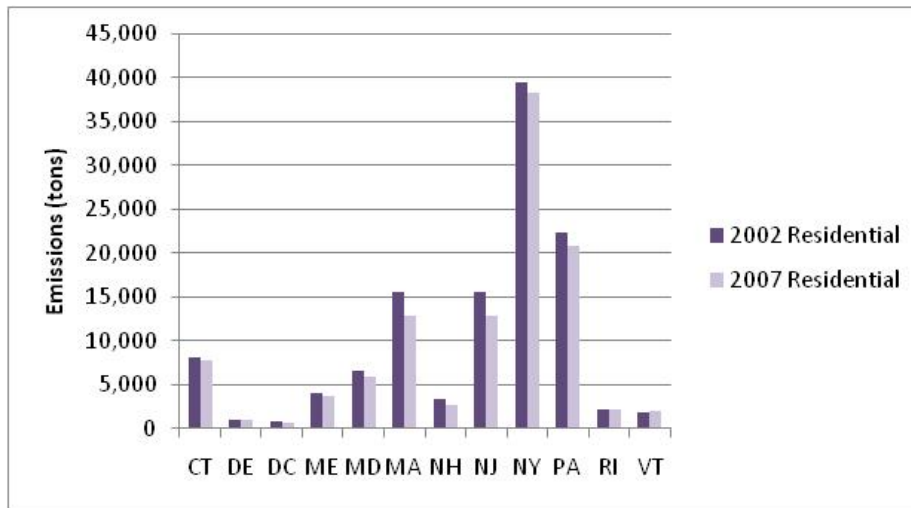
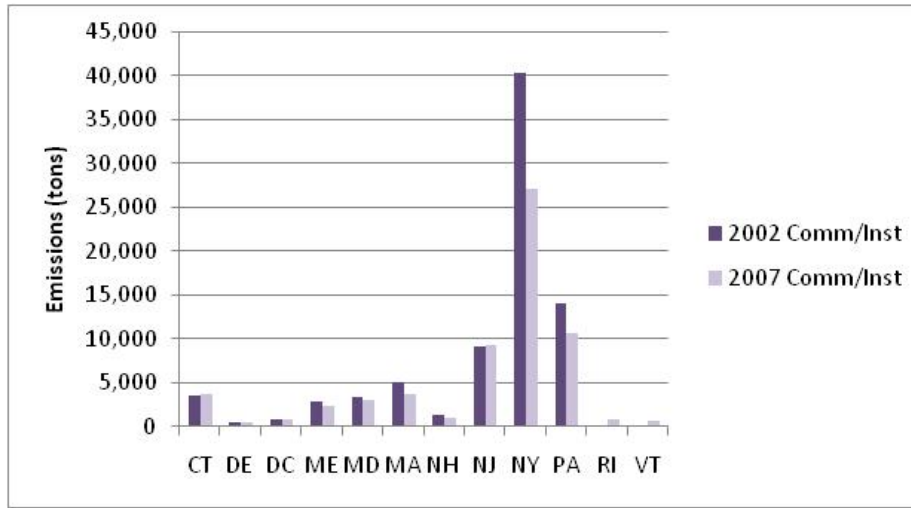
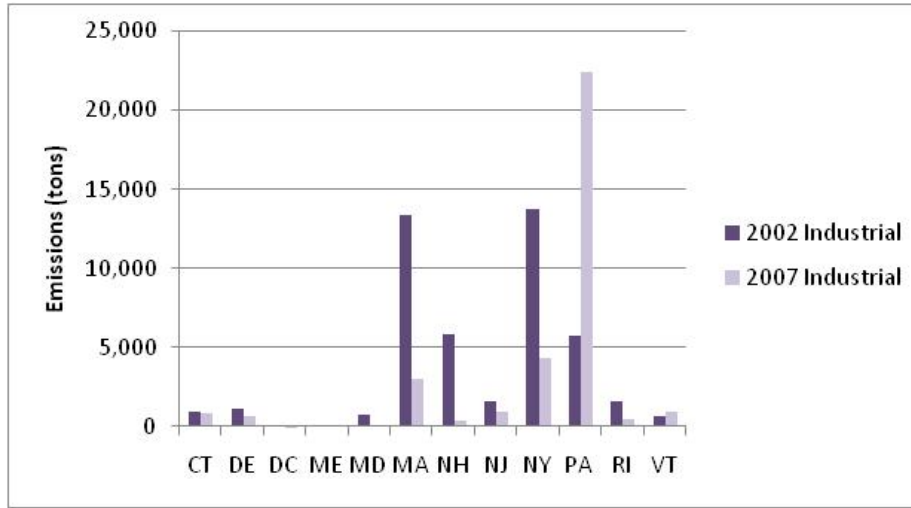
**Exhibit 14 – Comparison of 2002/2007 Actual and 2009 Projected VOC Emissions****1.2.7 Analysis of Differences Between 2002 and 2007 Emissions**

As shown in the previous section, emissions show both increases and decreases between 2002 and 2007 depending upon the State and pollutant. In order to better understand why these differences occur, we prepared a series of charts to graphically depict some of the major differences between the 2002 and 2007 area source inventory.

Exhibit 15 shows the 2002 and 2007 NO<sub>x</sub> emissions by State from industrial, commercial/institutional, and residential fuel combustion. Exhibit 16 shows the same information for SO<sub>2</sub>. For both pollutants, Pennsylvania shows a dramatic increase in emissions for the industrial fuel combustion category. New York shows a substantial decrease in both the industrial and commercial/institutional categories. Since the OTC is considering additional control measures for the industrial/commercial/institutional fuel combustion category, these values should be closely scrutinized. Residential NO<sub>x</sub> and SO<sub>2</sub> emissions show a small decrease in emissions from 2002 to 2009, which appears to be reasonable.



**Exhibit 15 – Comparison of 2002/2007 NO<sub>x</sub> Emissions for Industrial, Commercial/Institutional, and Residential Fuel Combustion**



### Exhibit 16 – Comparison of 2002/2007 SO2 Emissions for Industrial, Commercial/Institutional, and Residential Fuel Combustion

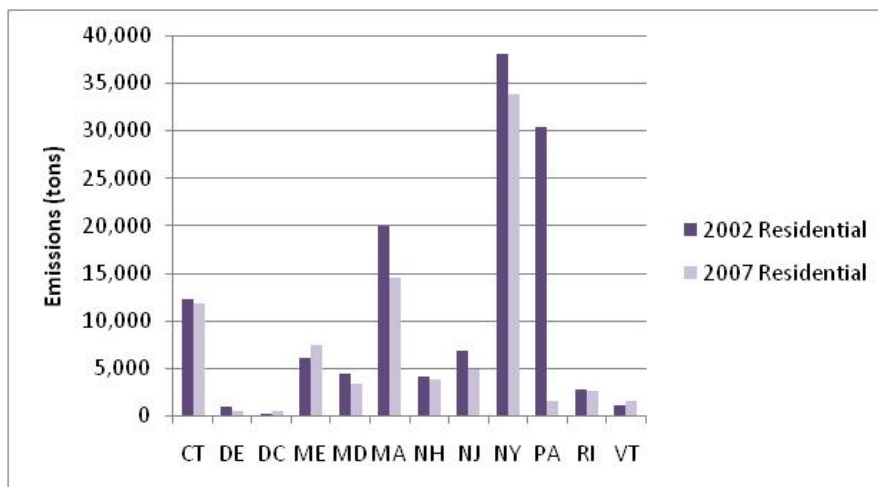
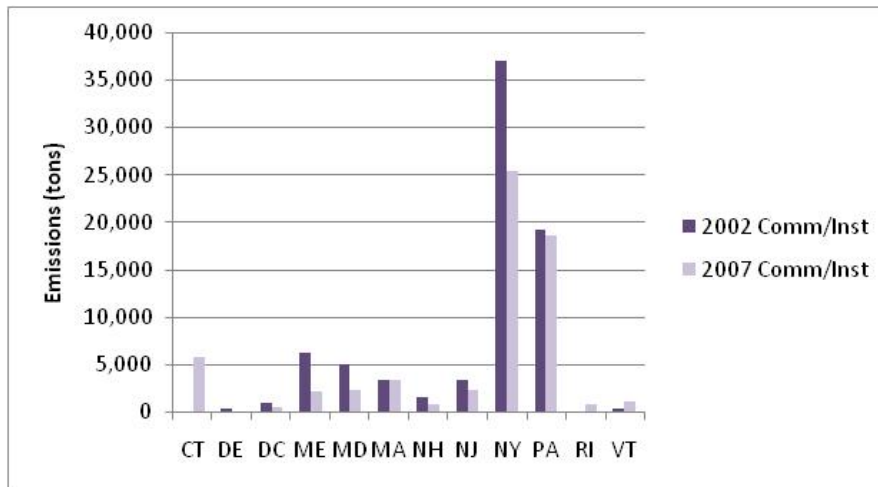
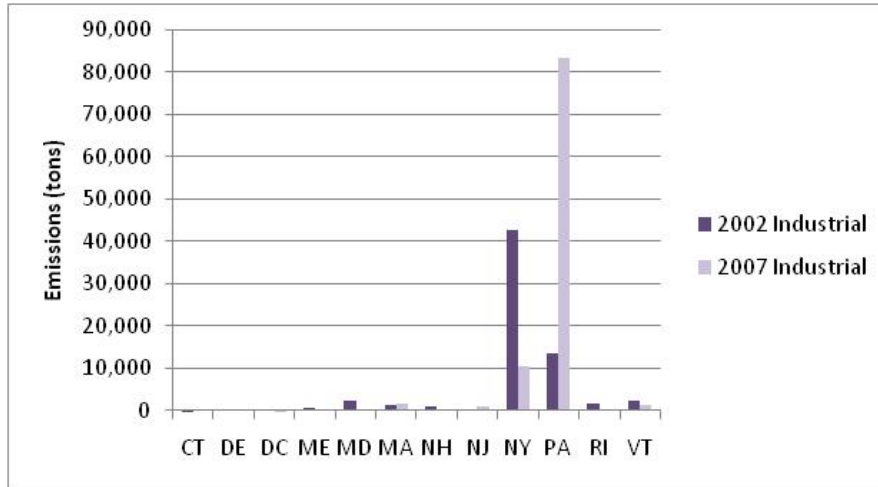


Exhibit 17 shows the 2002 and 2007 CO, PM<sub>2.5</sub>, and VOC emissions by State from the residential wood fuel combustion category. Most States show a dramatic decrease in all three pollutants, most likely due to a change in the emission estimation methodology. Three States – Pennsylvania, Rhode Island, and Vermont – show increases in CO and PM<sub>2.5</sub>.

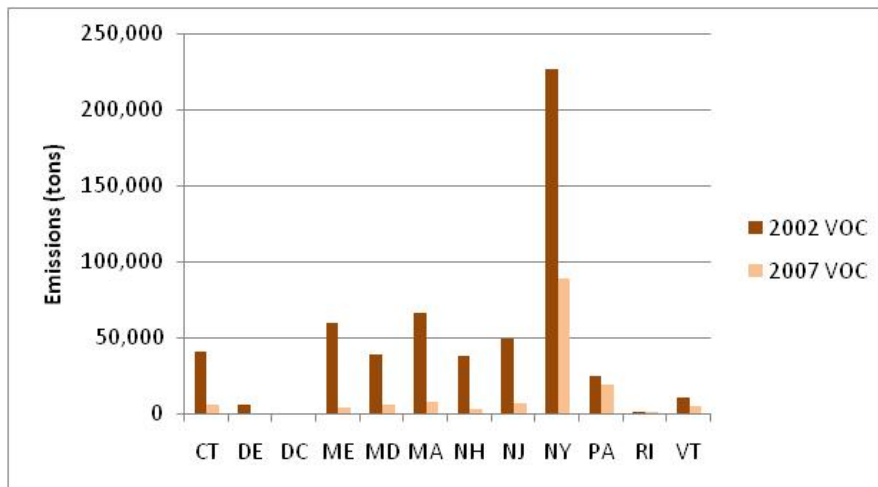
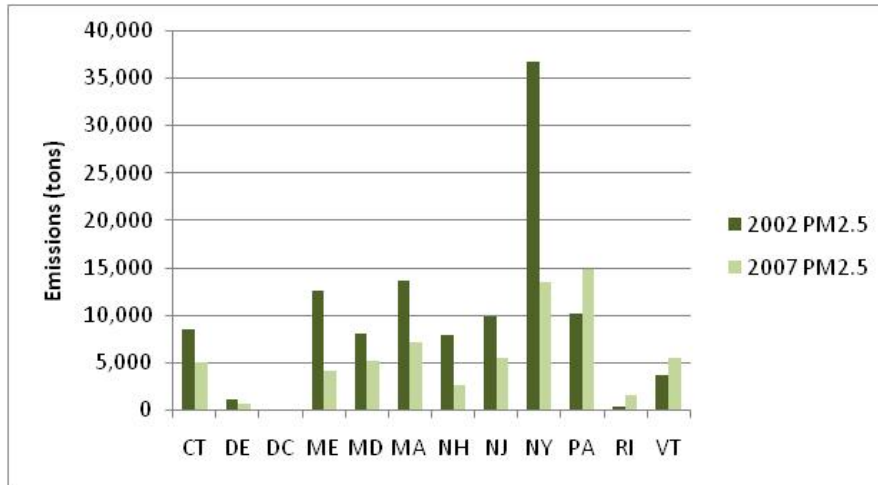
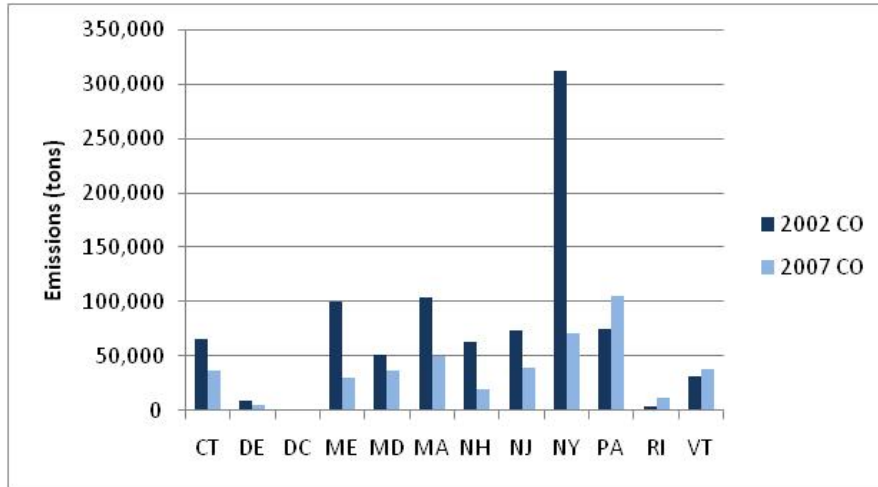
Exhibit 18 shows the 2002 and 2007 NH<sub>3</sub> emissions by State from the agricultural production category – both for fertilizer for crops and livestock waste products. Most States show a decrease in NH<sub>3</sub> emissions between 2002 and 2007.

Exhibit 19 shows the 2002 and 2007 VOC emissions by State for three types of solvent evaporation categories – surface coating, degreasing, and consumer/commercial products. For surface coating, most States show a sizeable reduction in VOC from 2002 to 2007. New York shows an especially large drop in emissions – it appears that New York has not included any industrial surface coating emissions in the 2007 inventory. For degreasing, most States show a decrease in VOC emissions, except for New York, which shows a very large unexplained increase from 2002 to 2007. For consumer/commercial products, most States have similar emissions in 2002 and 2007. Two States – Maine and New York – appear to have double-counted VOC emissions for this category using two different SCCs (24-60-xxx-xx and 24-65-xxx-xx).

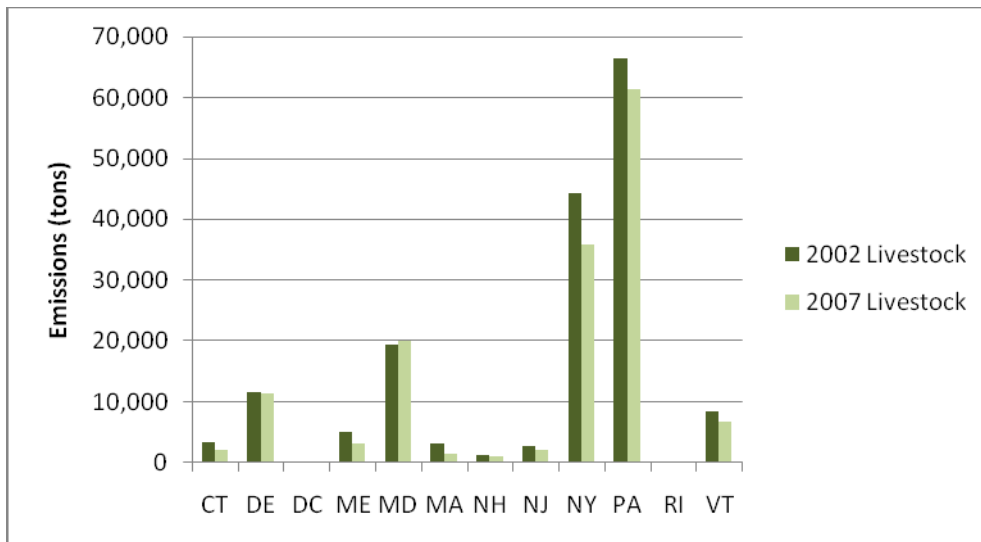
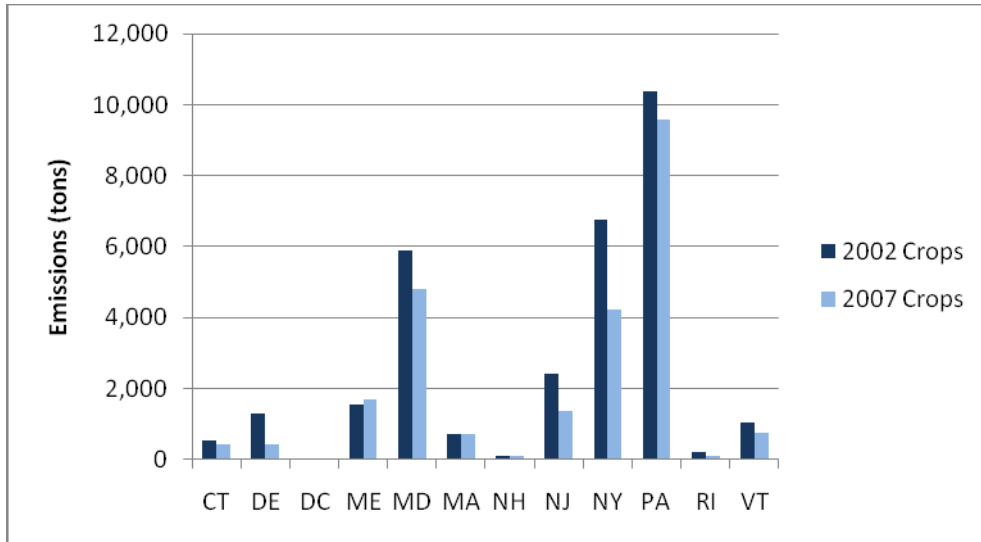
Exhibit 20 shows the 2002 and 2007 VOC emissions by State for two types of gasoline storage, transport and marketing categories – portable fuel containers and gasoline service stations. All States show a decrease in VOC emissions for the portable fuel container category, probably due to the accounting for OTC rules. Maine does not appear to have reported portable fuel container emissions in the 2007 inventory. All States also show a decrease in VOC emissions from gasoline service stations. It should be noted that Maine and Massachusetts have not reported VOC emissions for Stage II operations at gasoline stations (vehicle refueling). MARAMA is considering whether Stage II emissions should be accounted for in the area source inventory or be calculated in the onroad inventory using the MOVES model.

Finally, it should be noted that there are a couple of states with some minor items that are being investigated and will be updated in the next version of the inventory. And there may be some source categories that were in 2002 inventory that are not included at this time in the 2007 inventory. Investigation of these potentially missing categories is continuing.

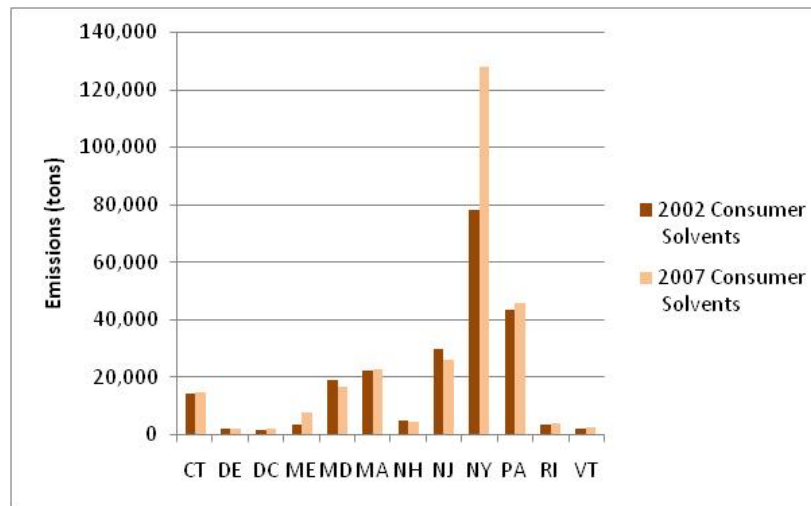
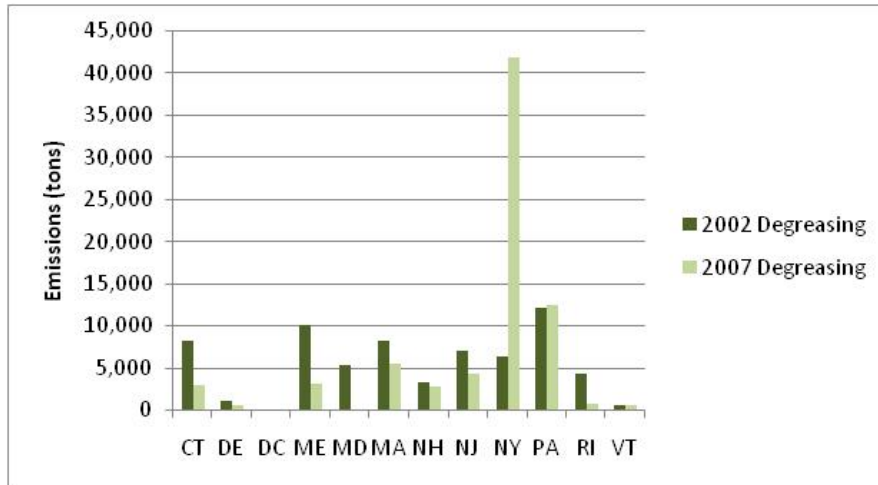
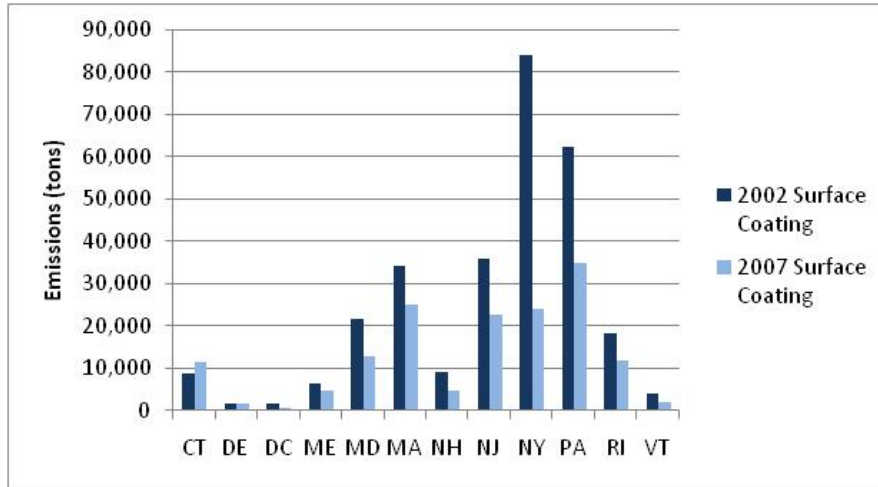
**Exhibit 17 – Comparison of 2002/2007 CO, PM2.5, and VOC Emissions for Residential Wood Fuel Combustion**



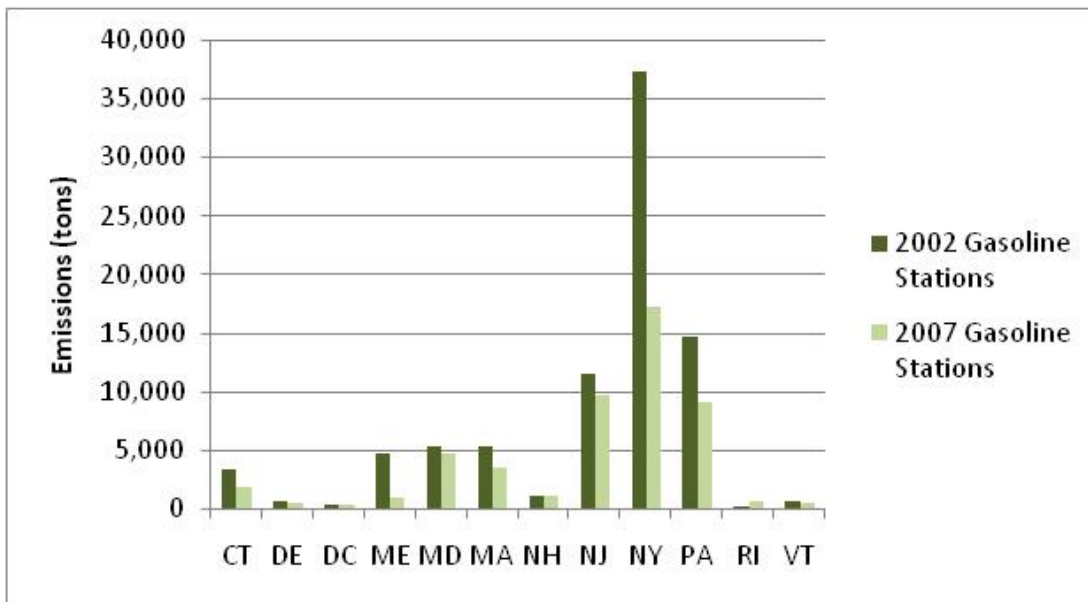
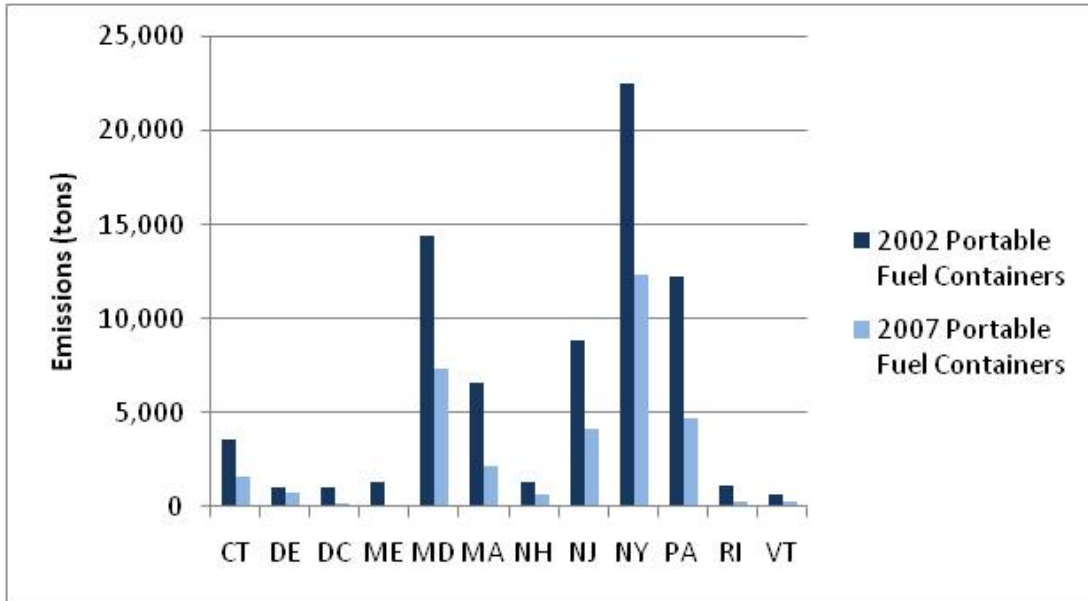
**Exhibit 18 – Comparison of 2002/2007 Ammonia Emissions for  
Agricultural Production - Crops and Livestock**



**Exhibit 19 – Comparison of 2002/2007 VOC Emissions for Solvent Categories:  
Surface Coating, Degreasing, and Consumer/Commercial Products**



**Exhibit 19 – Comparison of 2002/2007 VOC Emissions for Gasoline Storage/Transport: Portable Fuel Containers and Gasoline Stations**



### **1.3 Stakeholder Review and Comment**

**To be Completed**