



Development and Analysis of 2007 Hourly Point Source Emissions in the Northeast/Mid-Atlantic Region

Prepared for:

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Acronyms and Abbreviations

Acronym	Description
CAMD	Clean Air Markets Division of EPA
CEM	Continuous Emission Monitoring System
CO	Carbon Monoxide
EGU	Electric Generating Unit
EMS-95	Emissions Modeling System, '95
EPA	U.S. Environmental Protection Agency
FIPS	U.S. Federal Implementation Planning Standards
IDA	Inventory Data Analyzer
MARAMA	Mid-Atlantic Regional Air Management Association
NAICS	North American Industrial Classification System
NIF	NEI Inventory Input Format
NEI	National Emission Inventory
NH3	Ammonia
NIF3.0	National Emission Inventory Input Format Version 3.0
NOx	Oxides of nitrogen
ORIS	Number assigned by the DOE to power plants and other facilities
ORL	One record per line
PM10	Particulate matter 10 micrometers or smaller in diameter, includes filterables and condensibles,
PM2_5	Particulate matter 2.5 micrometers or smaller in diameter, includes filterables and condensibles
PTINV	Point source inventory file for annual and average-day data
PTHOUR	Point source file for hour-specific emissions
QA	Quality Assurance
SIC	Standard Industrial Classification code
SIP	State Implementation Plan
SCC	Source Classification Code
SMOKE	Sparse Matrix Operator Kernel Emissions
SO2	Sulfur dioxide
VOC	Volatile organic compounds

1.0 HOURLY EMISSIONS FOR 2007 FOR POINT SOURCES

1.1 INTRODUCTION

This technical support document (TSD) explains the data sources, methods, and results for preparing 2007 actual hourly emissions for criteria air pollutant (CAP) and ammonia (NH₃) for point sources for the Northeast and Mid-Atlantic/Northeast region. 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 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 includes annual and hourly emissions for sulfur dioxide (SO₂), oxides of nitrogen (NO_x), volatile organic compounds (VOC), carbon monoxide (CO), ammonia (NH₃), and five components of particulate matter (PM).

The sources included in the hourly inventory include all sources that report hourly emissions to EPA's Clean Air Markets Division (CAMD) database as required by market-based regulatory programs including the EPA Acid Rain and NO_x Budget Trading Programs. The hourly inventory also includes distributed generation (DG) units in Virginia. These units are mainly internal combustion engines that participate in some type of demand response program.

The hourly emissions data were prepared in the formats required by the Sparse Matrix Operator Kernel Emissions (SMOKE) emission modeling system.

1.2 DATA SOURCES FOR HOURLY EMISSIONS

The 2007 hourly point source inventory was developed using Version 1 of the 2007 annual emissions inventory developed under Work Order 2 of this contract, data from the EPA's Clean Air Markets Division (CAMD) hourly emissions database, hourly emissions data provided by the Virginia Department of Environmental Quality (VDEQ), and hourly emissions data for 6-month reporting units provided by the Maryland Department of the Environment (MDE).

1.2.1 2007 Annual Emission Inventory

State and local (S/L) agencies prepared and submitted emission inventory files in the National Emissions Inventory (NEI) Input Format Version 3.0 (NIF 3.0). The NIF format includes eight tables: Transmittal (TR), Site (SI), Emission Unit (EU), Emission Release Point (ER), Emission Process (EP), Emission Period (PE), Emission (EM), and Control Equipment (CE). Upon receipt of the NIF submittals, MACTEC performed an initial review of the S/L inventories with the numerous QA checks. After QA issues were resolved, the individual S/L inventories were consolidated into a single database.

As part of the emission inventory development, a crosswalk was developed to match facilities and units in the EPA CAMD hourly database to units in the 2007 Version 1 annual inventory. This process is necessary because the data submitted by the S/L agencies and data submitted by companies to CAMD do not use the same facility or boiler/unit identifiers to identify a particular unit. The crosswalk matched a unit in the NIF annual inventory (using the State, County, PlantID, PointID, StackID and SegmentID) with its counterpart in the EPA CAMD hourly database (using the ORISID and BoilerID). The crosswalk is included in this report as Appendix A.

On October 6, 2009, MARAMA provided a notice to stakeholders of the opportunity to review and comment on the draft 2007 point source inventory data and documentation. . On October 20, MARAMA hosted a conference call that provided an opportunity for stakeholders to ask questions about the draft 2007 point source modeling inventory. Written comments were requested by November 1 and subsequently reviewed by state inventory staff and MARAMA. Stakeholder comments resulted in several changes to the draft documentation and inventory data.

Complete documentation of the development of the annual inventory and crosswalk table can be found at *Development of Point Source Emission Inventory for 2007 in the Northeast/Mid-Atlantic Region*, draft report dated March 15, 2010.

1.2.2 EPA CAMD Hourly Database

The second source of data was the hourly emissions data reported to EPA by facilities to comply with various provisions of the Clean Air Act (CAA). Affected facilities are required to report hourly emissions of NO_x and SO₂, as well as other operational parameters such as hourly emission rate, gross load and heat input. Some units are required to submit hourly emissions data for both NO_x and SO₂ for the entire 12 month reporting period. Other units are required to submit hourly emissions data only for NO_x for the entire 12 month reporting period. Still other units are required to submit hourly

emissions data only for NO_x for the 6 month ozone season. Finally, there are a very small number of units that report hourly emissions for a 9-month period. The EPA CAMD hourly database is subjected to extensive QA/QC by both EPA and the reporting facilities.

For this analysis, we used the “Part 75 Prepackaged Data Sets - hourly emissions data formatted for use with the Sparse Matrix Operator Kernel Emissions (SMOKE) modeling system”. The 2007 hourly data was obtained from the EPA Clean Air Markets web site (<http://www.epa.gov/airmarkets>). The file used was dated 09/01/2009 and is available on the EPA web site.

1.2.3 Virginia Hourly Data for Distributed Generation Units

The third set of data came from VDEQ. Distributed generation units are mainly internal combustion engines that participate in some type of demand response program. These are small units, each usually no more than two or three megawatts in capacity, and they generally run on distillate fuel oil. They are not required to report hourly emissions to EPA’s CAMD. Most are permitted for well under 100 tons of NO_x emissions annually and do not run frequently. Annual emissions of NO_x are usually not very large from these units. However, ozone season daily emissions estimates from previous ozone SIPs show that facilities that have one or more of these types of units can be quite significant NO_x emitters when examined on an ozone season daily basis.

In past modeling efforts, these units were either not included in the emission inventory, or if they were included, were modeled using the SMOKE default temporal profile for the given Source Classification Code. To improve the hourly temporal allocation for these units, VADEQ undertook a substantial effort to develop hourly emission profiles using 2007 operations data obtained from Dominion VA Power for their demand response programs as well as other data. These data were used to create a 2007 profile for when these units generally operated. VDEQ used these generic profiles to prepare SMOKE PTHOUR files for each DG unit listed in the annual emissions inventory.

Complete documentation of the data sources and methods used by VDEQ is included as Appendix B - *VDEQ Conceptual Description for DG draft Feb 25, 2010.doc*.

1.2.4 Maryland Hourly Data for Six Month Reporters

The final set of data came from MDE. MDE was able to fill in the non-ozone season hourly emissions data for certain units that only reported ozone season hourly emissions to the EPA CAMD database. MDE identified which facilities only reported 6 months worth of data to CAMD and submitted requests to the identified facilities requesting data for the other 6 months outside of the ozone season. After a number of repeated requests,

MDE received the requested information in pdf format and manually entered the values into a CAMD-formatted table similar to the Part 75 Prepackaged Data Set format.

1.3 METHODOLOGY FOR DEVELOPING HOURLY SMOKE FILES

SMOKE requires two input files for processing hourly emissions for point sources:

- **PTINV File.** The first file contains annual emissions data, stack parameters, geographic coordinates, and other information. This file can be in Inventory Data Analyzer (IDA), Emission Modeling System-95 (EMS-95), or one-line-per record (ORL) format. The ORL format from SMOKE Version 2.6 was selected for this project and is shown in Exhibit 1.
- **PTHOUR File.** The second file contains the hour-specific data. This file can be in either EMS-95 format or Continuous Emissions Monitoring (CEM) format. The from SMOKE Version 2.6 EMS-95 traditional format was selected for this project and is shown in Exhibit 2.

The following subsections describe how the PTINV ORL annual emissions file and the PTHOUR EMS-95 hour-specific emission files were created.

1.3.1 Conversion of Annual NIF Inventory to SMOKE ORL Format for PTINV

The 2007 annual inventory was developed in NIF format. Flags were added to the NIF EP table to indicate whether a unit was matched to a CAMD hourly unit or a Virginia DG unit. All matching units in the NIF file were converted to SMOKE PTINV ORL format.

Five different ORL files were created (to facilitate QA of files and summarization of emissions. ORL files were created for the following types of sources:

- Annual emissions for units that reported hourly emissions to EPA CAMD for the entire 12 months of 2007;
- Ozone season emissions for units that reported hourly emissions to EPA CAMD for the either 6 or 9 months of 2007 (except for 6 month reporting units in Maryland);
- Non-zone season emissions for units that reported hourly emissions to EPA CAMD for the either 6 or 9 months of 2007 (except for 6 month reporting units in Maryland);
- Units that reported hourly emissions to EPA CAMD for the either 6 or 9 months of 2007 in Maryland;
- Units that are classified as distributed generation units by VDEQ; and

- All other units (these are not associated with the hourly PTHOUR files; temporal allocation for these units will be accomplished using the standard SMOKE V2.6 temporal allocation profiles.

The ORL were quality assured to ensure they conformed to the SMOKE PTINV ORL format and to ensure that there was no double counting of emissions in the five files.

Exhibit 1 – SMOKE ORL Format for PTINV

Position	Name	Type	Description
A	FIPS	Int	Five digit FIPS code for state and county (required)
B	PLANTID	Char	Plant Identification Code (15 characters maximum) (required; this is the same as the State Facility Identifier in the NIF)
C	POINTID	Char	Point Identification Code (15 characters maximum) (required; this is the same as the Emission Unit ID in the NIF)
D	STACKID	Char	Stack Identification Code (15 characters maximum) (recommended; this is the same as the Emissions Release Point ID in the NIF)
E	SEGMENT	Char	DOE Plant ID (15 characters maximum) (recommended; this is the same as the Process ID in the NIF)
F	PLANT	Char	Plant Name (40 characters maximum) (recommended)
G	SCC	Char	Ten character Source Classification Code (required)
H	ERPTYPE	Char	Emissions release point type (2 characters maximum); indicates type of stack (not used by SMOKE) <ul style="list-style-type: none"> • 01 = fugitive • 02 = vertical stack • 03 = horizontal stack • 04 = goose neck • 05 = vertical with rain cap • 06 = downward-facing vent
I	SRCTYPE	Char	Source type (not used)
J	STKHGT	Real	Stack Height (ft) (required)
K	STKDIAM	Real	Stack Diameter (ft) (required)
L	STKTEMP	Real	Stack Gas Exit Temperature (°F) (required)
M	STKFLOW	Real	Stack Gas Flow Rate (ft ³ /sec) (optional; automatically calculated by Smkinven from velocity and diameter if not given in file)
N	STKVEL	Real	Stack Gas Exit Velocity (ft/sec) (required)

Position	Name	Type	Description
O	SIC	Int	Standard Industrial Classification Code (recommended)
P	MACT	Char	Maximum Available Control Technology Code (6 characters maximum) (optional)
Q	NAICS	Char	North American Industrial Classification System Code (6 characters maximum) (optional)
R	CTYPE	Char	Coordinate system type (1 character maximum) (required) <ul style="list-style-type: none"> • L = Latitude/longitude
S	XLOC	Real	X location (required); Longitude (decimal degrees)
T	YLOC	Real	Y location (required); Latitude (decimal degrees)
U	UTMZ	Int	UTM zone (not used)
V	CAS	Char	Pollutant CAS number or other code (16 characters maximum) (required; this is called the pollutant code in the NIF)
W	ANN_EMIS	Real	Annual Emissions (tons/year) (required)
X	AVD_EMIS	Real	Average-day Emissions (tons/average day) (not used)
Y	CEFF	Real	Control Efficiency percentage (give value of 0-100) (recommended, if left blank, SMOKE default is 0)
Z	REFF	Real	Rule Effectiveness percentage (give value of 0-100) (recommended, if left blank, SMOKE default is 100)
AA	CPRI	Int	Primary Control Equipment Code (not used by SMOKE)
BB	CSEC	Int	Secondary Control Equipment Code (not used by SMOKE)
CC	NEI_UNIQUE_ID	Char	For units that report hourly emissions to CAMD, this field contains a code to indicate how frequently the unit operated in 2007 (i.e., <15%, 15-50%, or >50% of available hours) For Virginia DG units, this field contains the descriptor "VA DG". For units do not have an association in the PTHOUR file, this field contains the descriptor "NonHourly".
DD	ORIS_FACILITY_CODE	Char	DOE Plant ID (generally recommended, and required if matching to hour-specific CEM data)
EE	ORIS_BOILER_ID	Char	Boiler Identification Code (recommended)

Note: Fields not currently used by SMOKE Version 2.6 after field position EE have been excluded from the ORL file to reduce the size of the files.

Exhibit 2 – SMOKE EMS-95 Traditional Format for Individual Hour-Specific Files

Position	Name	Type	Description
1-2	STID	Int	State FIPS Code (required)
3-5	CYID	Int	County FIPS Code (required)
6-20	FCID	Char	Facility ID (a.k.a. plant ID) (required)
21-32	SKID	Char	Point ID (required)
33-44	DVID	Char	Stack ID (required)
45-56	PRID	Char	Segment ID (required)
57-61	POLID	Char	Pollutant name (required)
62-69	DATE	Char	Date in MM/DD/YY format. Years less than 70 are treated as century 2000 (required)
70-72	TZONNAM	Char	Time zone name associated with emissions data. Valid entries are GMT, ADT, AST, EDT, EST, CDT, CST, MDT, MST, PDT, and PST. (required)
73-79	HRVAL1	Real	Hourly emissions for hour 1 (short tons/hour) (required)
80-86	HRVAL2	Real	Hourly emissions for hour 2 (short tons/hour) (required)
87-93	HRVAL3	Real	Hourly emissions for hour 3 (short tons/hour) (required)
...			
234-240	HRVAL24	Real	Hourly emissions for hour 24 (short tons/hour) (required)
241-248	DAYTOT	Real	Daily emissions total (short tons/day)
249	Blank	Blank	Blank
250-259	SCC	Char	SCC (required).
261-276	DATNAM	Char	Blank

1.3.2 PTHOUR Methodology for 12 Month Reporters

For units that reported hourly data to the EPA CAMD database for the entire 12 months of 2007, the annual emissions in the PTINV ORL files were allocated to specific hours using the actual NO_x, SO₂, and heat input-based hour-specific data in the EPA CAMD database. This ensured that the annual emission values provided by the S/L agencies were maintained and distributed to specific hours using actual 2007 hourly data.

The methodology for creating the PTHOUR files is as follows. First, hourly SO₂ and NO_x mass and heat input values in the EPA CAMD database were summed for each unit to

create annual values. Next, annual emission records in the ORL file were matched to a corresponding hourly CAMD unit using the crosswalk file. The hourly values in the PTHOUR file were calculated using the following equations, depending on the pollutant:

Hourly NOx emissions

$$\text{Hourly PTHOUR NOx emissions} = \frac{\text{annual ORL NOx emissions} * \text{hourly CAMD NOx emissions}}{\text{CAMD summed annual NOx emissions}}$$

Hourly SO2 emissions for units with non-zero SO2 emissions in the CAMD database

$$\text{Hourly PTHOUR SO2 emissions} = \frac{\text{annual ORL SO2 emissions} * \text{hourly CAMD SO2 emissions}}{\text{CAMD summed annual SO2 emissions}}$$

Hourly SO2 emissions for units with zero SO2 emissions in the CAMD database

$$\text{Hourly PTHOUR SO2 emissions} = \text{annual ORL SO2 emissions} * \text{annual factor}$$

Where annual factor = hourly CAMD heat input / annual summed CAMD heat input

Hourly emissions for other pollutants (CO, NH3, PM10-PRI, PM25-PRI, VOC)

$$\text{Hourly PTHOUR POLL emissions} = \text{annual ORL POLL emissions} * \text{annual factor}$$

Where annual factor = hourly CAMD heat input / annual summed CAMD heat input

If CAMD heat input data are not available, the steam load was used instead, if available, followed by gross load as a last resort.

1.3.3 PTHOUR Methodology for 6 Month Reporters

About 15 percent of the units in the 2007 CAMD hourly database reported data only for the ozone season, i.e., the second and third quarters, as allowed by their reporting requirements). The units that reported data for only the second and third quarters are referred to as 6-months units in this document. Two separate PTINV ORL files were created – one for the 6-month ozone season and one for the 6-month non-ozone season. The CAMD hourly data for these units were used to develop ozone season PTINV and PTHOUR files. For the non-ozone season, a PTINV file was created and will be used with re-adjusted SMOKE temporal profiles to develop hourly emissions for the non-ozone season.

The CAMD hourly database for 6-month units contains emissions information only for NOx for the 6 month period, as well as heat input and other parameters. The CAMD hourly data for April through September was used directly and summed to calculate the ozone season NOx emissions. To calculate the non-ozone season emissions of NOx, the total CAMD NOx emissions for a 6-month unit was subtracted from the annual NOx

emissions of the corresponding unit in the S/L supplied NIF database. In some cases, the 6-month NO_x emissions in the CAMD database were greater than the annual emissions in the S/L NIF database. For those cases, non-ozone season emissions were set to zero.

For all other pollutants, ozone season emissions are not available. To calculate the ozone season emissions for these other pollutants, we calculated the ratio of ozone season NO_x emissions to annual NO_x emissions, and applied that ratio to the annual emissions from the NIF database to estimate the ozone-season emissions for the other pollutants. To calculate the non-ozone season emissions for the other pollutants, the total ozone season emissions for the 6-month unit was subtracted from the annual emissions of the corresponding unit in the S/L supplied NIF database.

The methodology for creating the PTHOUR files for the ozone season is as follows. First, hourly NO_x mass and heat input values in the EPA CAMD database were summed for each unit to create ozone season values. Next, ozone season emission records in the ORL file were matched to a corresponding hourly CAMD unit using the crosswalk file. The hourly values in the PTHOUR file were calculated using the following equations, depending on the pollutant:

Hourly NO_x emissions

$$\text{Hourly PTHOUR NO}_x \text{ emissions} = \frac{\text{6-month ORL NO}_x \text{ emissions} * \text{hourly CAMD NO}_x \text{ emissions}}{\text{CAMD summed 6-month NO}_x \text{ emissions}}$$

Hourly emissions for other pollutants (CO, NH₃, PM₁₀-PRI, PM₂₅-PRI, SO₂, VOC)

$$\text{Hourly PTHOUR POLL emissions} = \text{annual ORL POLL emissions} * \text{annual factor}$$

$$\text{Where annual factor} = \text{hourly CAMD heat input} / \text{6-month summed CAMD heat input}$$

If CAMD heat input data are not available, the steam load was used instead, if available, followed by gross load as a last resort.

Hourly data for the non-ozone season will be calculate by SMOKE using the non-ozone season PTINV ORL file and re-adjusted SMOKE temporal profiles to represent non-ozone season operation. These re-adjusted SMOKE temporal profiles will be developed under Work Order 9 of this contract.

1.3.4 PTHOUR Methodology for Maryland 6 Month Reporters

MDE identified which facilities only reported 6 months worth of data to CAMD and submitted requests to the identified facilities requesting data for the other 6 months outside of the ozone season. After a number of repeated requests, MDE received the requested

information in pdf format and manually entered the values into a CAMD-formatted table similar to the Part 75 Prepackaged Data Set format. These units included the following:

Plant Name	ORIS	UNIT
Constellation Perryman	1556	CT1
		CT2
		CT3
		CT4
Constellation Riverside	1559	CT6
Constellation Westport	1560	CT5
Mirant Chalk Point	1571	GT2 SMECO
Mirant Morgantown	1573	GT3
		GT4
		GT5
		GT6

The methodology for creating the PTHOUR files for the MD 6-month reporters is as follows. First, hourly SO₂ and NO_x mass and heat input values in the MDE hourly database were summed for each unit to create annual values. Next, annual emission records in the ORL file were matched to a corresponding hourly MDE unit using the crosswalk file. The hourly values in the PTHOUR file were calculated using the following equations, depending on the pollutant:

Hourly NO_x emissions

$$\text{Hourly PTHOUR NO}_x \text{ emissions} = \frac{\text{annual ORL NO}_x \text{ emissions} * \text{hourly MDE NO}_x \text{ emissions}}{\text{MDE summed annual NO}_x \text{ emissions}}$$

Hourly SO₂ emissions for units with non-zero SO₂ emissions in the MDE database

$$\text{Hourly PTHOUR SO}_2 \text{ emissions} = \frac{\text{annual ORL SO}_2 \text{ emissions} * \text{hourly MDE SO}_2 \text{ emissions}}{\text{MDE summed annual SO}_2 \text{ emissions}}$$

Hourly SO₂ emissions for units with zero SO₂ emissions in the MDE database

$$\text{Hourly PTHOUR SO}_2 \text{ emissions} = \text{annual ORL SO}_2 \text{ emissions} * \text{annual factor}$$

$$\text{Where annual factor} = \text{hourly MDE heat input} / \text{annual summed MDE heat input}$$

Hourly emissions for other pollutants (CO, NH₃, PM₁₀-PRI, PM₂₅-PRI, VOC)

$$\text{Hourly PTHOUR POLL emissions} = \text{annual ORL POLL emissions} * \text{annual factor}$$

$$\text{Where annual factor} = \text{hourly MDE heat input} / \text{annual summed MDE heat input}$$

If MDE heat input data are not available, the steam load was used instead, if available, followed by gross load as a last resort.

1.3.5 PTHOUR Methodology for Virginia Distributed Generation Units

Complete documentation of the data sources and methods used by VDEQ is included as Appendix B - *VDEQ Conceptual Description for DG draft Feb 25, 2010.doc*.

1.3.6 QA of PTINV and PTHOUR Files

A number of QA activities were undertaken to ensure that the PTINV and PTHOUR files were complete, consistent with the 2007 NIF annual inventory, and did not double count any emission source. Specific QA steps included:

- The ORL annual emission files were quality assured to ensure they conformed to the SMOKE PTINV ORL format and to ensure that the annual emissions in the ORL file matched the annual emissions in the original NIF file. Exhibit 3 compares the annual emissions by State and pollutant as reported in the original NIF file and the four ORL files listed above.
- The PTHOUR files were quality assured to ensure that they conform to the SMOKE PTHOUR EMS-95 traditional format, the sum of emissions in the PTHOUR file equals the ORL annual emissions, the number of hourly data records equals 8760, the number of days equals 365, and that all pollutants included in the PTHOUR file.

1.3.7 PTINV and PTHOUR File Naming Conventions

Exhibit x identifies the various SMOKE PTINV ORL and PTHOUR EMS-95 created for the 2007 regional air quality modeling study in the Northeast and Mid-Atlantic States. These files are accessible on the MARAMA ftp site in the following location:

[ftp.marama.org](ftp://ftp.marama.org)

User Name: regional_ei

Password: marama2007

Folder: 2007 Hourly Point Source for Review

**Exhibit 3 – Comparison Original NIF Annual 2007 Emissions (tpy) and
the Annual 2007 Emissions (tpy) Contained in the SMOKE PTINV ORL Files**

FIPSST		PLLTCODE	SUM from NIF EM Table	Sum from ORL Files	NIF Minus ORL	Annual for 12 Month Reporters ORL	Ozone Season for 5-month Reporters ORL	NonOzone Season for 5-month Reporters ORL	Annual for MD 5 Month Reporters ORL	Annual for VA DG Units ORL	Annual for Non-Hourly Reporters ORL
09	CT	CO	3,679	3,679	0	1,965	6	0			1,706
09	CT	NH3	0	0	0						
09	CT	NOX	10,061	10,061	0	4,812	74	14			5,161
09	CT	PM10-PRI	1,350	1,350	0	867	8	1			474
09	CT	PM25-PRI	1,242	1,242	0	821	8	1			413
09	CT	SO2	7,971	7,971	0	6,904	5	1			1,061
09	CT	VOC	1,590	1,590	0	249	4	0			1,337
10	DE	CO	7,753	7,753	0	1,384	1	0			6,368
10	DE	NH3	94	94	0	43	0	0			51
10	DE	NOX	15,628	15,628	0	12,911	12	3			2,702
10	DE	PM10-PRI	3,465	3,465	0	2,730	1	0			734
10	DE	PM25-PRI	3,107	3,107	0	2,486	1	0			620
10	DE	SO2	43,088	43,088	0	37,058	13	1			6,016
10	DE	VOC	3,489	3,489	0	116	0	0			3,374
11	DC	CO	311	311	0	83					228
11	DC	NH3	0	0	0	0					0
11	DC	NOX	789	789	0	177					611
11	DC	PM10-PRI	59	59	0	19					40
11	DC	PM25-PRI	53	53	0	17					36
11	DC	SO2	612	612	0	142					470
11	DC	VOC	59	59	0	6					53
23	ME	CO	14,483	14,483	0	460					14,023
23	ME	NH3	665	665	0	59					605

FIPSST		PLLTCODE	SUM from NIF EM Table	Sum from ORL Files	NIF Minus ORL	Annual for 12 Month Reporters ORL	Ozone Season for 5-month Reporters ORL	NonOzone Season for 5-month Reporters ORL	Annual for MD 5 Month Reporters ORL	Annual for VA DG Units ORL	Annual for Non-Hourly Reporters ORL
23	ME	NOX	17,746	17,746	0	696					17,050
23	ME	PM10-PRI	4,896	4,896	0	148					4,748
23	ME	PM25-PRI	3,852	3,852	0	125					3,727
23	ME	SO2	17,248	17,248	0	1,677					15,571
23	ME	VOC	5,022	5,022	0	35					4,987
24	MD	CO	81,770	81,770	0	4,289			19		77,463
24	MD	NH3	137	137	0						137
24	MD	NOX	74,890	74,890	0	53,958			728		20,204
24	MD	PM10-PRI	19,322	19,322	0	14,344			12		4,966
24	MD	PM25-PRI	15,682	15,682	0	12,425			12		3,245
24	MD	SO2	305,383	305,383	0	294,314			112		10,957
24	MD	VOC	4,986	4,986	0	401			3		4,583
25	MA	CO	10,108	10,108	0	5,611	11	8			4,478
25	MA	NH3	2,956	2,956	0	1,129	230	237			1,359
25	MA	NOX	23,628	23,628	0	11,164	44	28			12,391
25	MA	PM10-PRI	5,604	5,604	0	2,686	3	2			2,914
25	MA	PM25-PRI	4,864	4,864	0	2,355	4	3			2,501
25	MA	SO2	63,229	63,229	0	54,595	15	13			8,606
25	MA	VOC	4,557	4,557	0	468	3	1			4,084
33	NH	CO	3,164	3,164	0	909	1	0			2,255
33	NH	NH3	128	128	0	98					30
33	NH	NOX	7,441	7,441	0	4,734	17	4			2,687
33	NH	PM10-PRI	1,925	1,925	0	784	0	0			1,141
33	NH	PM25-PRI	1,663	1,663	0	602	0	0			1,061
33	NH	SO2	45,258	45,258	0	42,519	4	1			2,734
33	NH	VOC	916	916	0	110	0	0			807

FIPSST	PLLCODE	SUM from NIF EM Table	Sum from ORL Files	NIF Minus ORL	Annual for 12 Month Reporters ORL	Ozone Season for 5-month Reporters ORL	NonOzone Season for 5-month Reporters ORL	Annual for MD 5 Month Reporters ORL	Annual for VA DG Units ORL	Annual for Non-Hourly Reporters ORL
34	NJ	CO	10,548	10,548	0	2,411	817	453		6,866
34	NJ	NH3	918	918	0	259	236	217		207
34	NJ	NOX	30,088	30,088	0	16,196	891	507		12,494
34	NJ	PM10-PRI	7,642	7,642	0	4,415	99	56		3,072
34	NJ	PM25-PRI	6,821	6,821	0	4,328	96	56		2,342
34	NJ	SO2	40,703	40,703	0	37,368	43	24		3,267
34	NJ	VOC	10,526	10,526	0	315	79	44		10,089
36	NY	CO	66,357	66,357	0	14,585	117	166		51,489
36	NY	NH3	2,417	2,417	0	1,380	126	181		731
36	NY	NOX	83,033	83,033	0	57,812	696	728		23,797
36	NY	PM10-PRI	9,507	9,507	0	5,379	7	8		4,114
36	NY	PM25-PRI	5,999	5,999	0	3,759	5	4		2,231
36	NY	SO2	152,751	152,751	0	137,651	64	62		14,974
36	NY	VOC	10,891	10,891	0	2,478	2	3		8,407
42	PA	CO	101,440	101,440	0	20,179	1,127	1,651		78,483
42	PA	NH3	2,379	2,379	0	318	1	1		2,060
42	PA	NOX	258,379	258,379	0	187,577	2,297	3,595		64,910
42	PA	PM10-PRI	49,745	49,745	0	27,477	361	462		21,445
42	PA	PM25-PRI	32,460	32,460	0	19,171	246	282		12,761
42	PA	SO2	1,028,056	1,028,056	0	977,008	3,178	4,475		43,395
42	PA	VOC	28,965	28,965	0	803	25	34		28,104
44	RI	CO	1,653	1,653	0	602				1,051
44	RI	NH3	74	74	0	58				16
44	RI	NOX	1,444	1,444	0	494				950
44	RI	PM10-PRI	189	189	0	16				173
44	RI	PM25-PRI	140	140	0	16				124

FIPSST		PLLTCODE	SUM from NIF EM Table	Sum from ORL Files	NIF Minus ORL	Annual for 12 Month Reporters ORL	Ozone Season for 5-month Reporters ORL	NonOzone Season for 5-month Reporters ORL	Annual for MD 5 Month Reporters ORL	Annual for VA DG Units ORL	Annual for Non-Hourly Reporters ORL
44	RI	SO2	1,516	1,516	0	16					1,500
44	RI	VOC	970	970	0	49					922
50	VT	CO	2,146	2,146	0	1,444					702
50	VT	NH3		0	0						
50	VT	NOX	811	811	0	370					441
50	VT	PM10-PRI	146	146	0	0					146
50	VT	PM25-PRI	114	114	0	0					114
50	VT	SO2	322	322	0	6					316
50	VT	VOC	395	395	0	22					373
51	VA	CO	72,029	72,029	0	5,696	896	2,271		388	62,778
51	VA	NH3	1,830	1,830	0	211	2	3		0	1,614
51	VA	NOX	112,938	112,938	0	55,808	3,741	11,241		686	41,462
51	VA	PM10-PRI	19,203	19,203	0	5,521	290	805		37	12,549
51	VA	PM25-PRI	14,888	14,888	0	4,028	247	712		36	9,866
51	VA	SO2	243,048	243,048	0	175,452	5,336	18,615		105	43,540
51	VA	VOC	35,618	35,618	0	603	28	103		37	34,847
		CO	375,441	375,441	0	59,619	2,976	4,550	19	388	307,890
		NH3	11,598	11,598	0	3,555	594	640	0	0	6,809
		NOX	636,877	636,877	0	406,711	7,773	16,119	728	686	204,860
		PM10-PRI	123,054	123,054	0	64,387	769	1,334	12	37	56,515
		PM25-PRI	90,886	90,886	0	50,132	607	1,058	12	36	39,042
		SO2	1,949,185	1,949,185	0	1,764,710	8,658	23,192	112	105	152,408
		VOC	107,986	107,986	0	5,654	141	185	3	37	101,966

Exhibit 4 –SMOKE Annual PTINV ORL Files

File Name	Description
PTINV_2007_12MonthUnits_april2010.orl	SMOKE PTINV ORL file of 2007 annual emissions for units that report hourly emissions to CAMD for the entire 12 months in 2007
PTINV_2007_Ozone_5MonthUnits_april2010.orl	SMOKE PTINV ORL file of 2007 ozone emissions for units that report hourly emissions to CAMD for only 5 months in 2007 (excludes Maryland partial reporters)
PTINV_2007_NonOzone_5MonthUnits_april2010.orl	SMOKE PTINV ORL file of 2007 non-ozone emissions for units that report hourly emissions to CAMD for only 5 months in 2007 (excludes Maryland partial reporters)
PTINV_2007_MD6MonthUnits_march2010.orl	SMOKE PTINV ORL file of 2007 annual emissions for units that report hourly emissions to CAMD for only 6 months in 2007 (Maryland sources only)
PTINV_2007_VADGUnits_march2010.orl	SMOKE PTINV ORL file of 2007 annual emissions for units classified as “distributed generation units” by the Virginia DEQ
PTINV_2007_NonHourly_april2010.orl	SMOKE PTINV ORL file of 2007 annual emissions for all other units included in the Northeast/Mid-Atlantic regional modeling emission inventory

Exhibit 5 – SMOKE Hourly PTHOUR EMS-95 Files

File Name	Description
PTHOUR_EMS95_OTC_12MonthUnits_041610.zip pthour_2007_jan_12MonthUnits_april2010.ems pthour_2007_feb_12MonthUnits_april2010.ems pthour_2007_mar_12MonthUnits_april2010.ems pthour_2007_apr_12MonthUnits_april2010.ems pthour_2007_may_12MonthUnits_april2010.ems pthour_2007_jun_12MonthUnits_april2010.ems pthour_2007_jul_12MonthUnits_april2010.ems pthour_2007_aug_12MonthUnits_april2010.ems pthour_2007_sep_12MonthUnits_april2010.ems pthour_2007_oct_12MonthUnits_april2010.ems pthour_2007_nov_12MonthUnits_april2010.ems pthour_2007_dec_12MonthUnits_april2010.ems	SMOKE PTHOUR EMS-95 zip files with hourly emissions for each month of 2007 for units that report hourly emissions to CAMD for the entire 12 months in 2007. The zip file contains 12 monthly files.
PTHOUR_EMS95_OTC_5MonthUnits_031610.zip pthour_2007_may_5MonthUnits_april2010.ems pthour_2007_jun_5MonthUnits_april2010.ems pthour_2007_jul_5MonthUnits_april2010.ems pthour_2007_aug_5MonthUnits_april2010.ems pthour_2007_sep_5MonthUnits_april2010.ems	SMOKE PTHOUR EMS-95 files with hourly emissions for 5 months of 2007 for units classified as “5-month reporters” in all States except MD. The zip file contains 5 monthly files.
PTHOUR_EMS95_OTC_MD6MonthUnits_031510.zip pthour_2007_jan_MD6MonthUnits_march2010.ems pthour_2007_feb_MD6MonthUnits_march2010.ems pthour_2007_mar_MD6MonthUnits_march2010.ems pthour_2007_apr_MD6MonthUnits_march2010.ems pthour_2007_may_MD6MonthUnits_march2010.ems pthour_2007_jun_MD6MonthUnits_march2010.ems pthour_2007_jul_MD6MonthUnits_march2010.ems pthour_2007_aug_MD6MonthUnits_march2010.ems pthour_2007_sep_MD6MonthUnits_march2010.ems pthour_2007_oct_MD6MonthUnits_march2010.ems pthour_2007_nov_MD6MonthUnits_march2010.ems pthour_2007_dec_MD6MonthUnits_march2010.ems	SMOKE PTHOUR EMS-95 files with hourly emissions for each month of 2007 for units classified as “6-month reporters” in MD. The zip file contains 12 monthly files.
PTHOUR_EMS95_OTC_VADGUnits_031510.zip pthours_2007_jan_VADGunits_march2010.ems pthours_2007_feb_VADGunits_march2010.ems pthours_2007_mar_VADGunits_march2010.ems pthours_2007_apr_VADGunits_march2010.ems pthours_2007_may_VADGunits_march2010.ems pthours_2007_jun_VADGunits_march2010.ems pthours_2007_jul_VADGunits_march2010.ems pthours_2007_aug_VADGunits_march2010.ems pthours_2007_sep_VADGunits_march2010.ems pthours_2007_oct_VADGunits_march2010.ems pthours_2007_nov_VADGunits_march2010.ems pthours_2007_dec_VADGunits_march2010.ems	SMOKE PTHOUR EMS-95 files with hourly emissions for each month of 2007 for units classified as “distributed generation units” by the Virginia DEQ. The zip file contains 12 monthly files.

1.4 STATE AND STAKEHOLDER REVIEW

On March 15, 2010, MARAMA invited States and stakeholders to review and comment on the draft 2007 hourly inventory of air emissions from specific point sources. States and stakeholders were provided a 4-week comment period. Written comments were reviewed by the State inventory staff and MARAMA, and resulted in several changes to the draft documentation and inventory data. The changes requested by stakeholders and approved by the States are summarized in the following subsections.

1.4.1 Massachusetts

Massachusetts commented that the majority of the Massachusetts facilities reviewed the CAMD-to-NIF crosswalk and indicated they found no major errors. Some facilities expressed concern that several dual fuel units appeared to have their total NO_x emissions doubled, reported separately for both oil and gas. MACTEC reviewed the database and verified that no double counting of emissions occurs. For multiple-fuel units, the Appendix A spreadsheet matches each CAMD record to ALL fuel records in your NIF database, making it appear that the CAMD emissions are counted more than once. MARAMA will be using the NIF emissions from State database in the regional modeling and the hourly data from the matching CAMD unit to allocate NIF emissions to hourly data for modeling. Emissions will not be double counted for units using multiple fuels.

1.4.2 New York

NRG Energy identified an issue with the hourly emissions for those units in the NIF database for the situation where multiple units exhaust from a common stack. In NY's database, multiple units are represented by a single emission unit, whereas in the CAMD database each unit is represented individually. That is why there is a CAMD BLR6ID with no equivalent NIF labels in Appendix A. MACTEC discussed the issue with NRG and devised a solution for the Huntley and Dunkirk Steam Generating Stations by adding emissions units to the NIF tables in cases where there are combined stacks. The annual emissions in the NIF database will be apportioned to each unit based on annual heat input from the EPA CAMD database. This will allow a proper match to the hourly data for each Unit and ensure that the proper CAMD hourly emissions were used in developing the PTHOUR files for the units at these two facilities.

New York State also attempted to improve the linkages between the NIF annual emissions and the CAMD hourly emissions. Not all cases could be resolved, and New York is continuing to review the data.

1.4.3 Pennsylvania

RRI Energy commented that they agree with the approach for calculating hourly emissions as described in Section 1.3 of this report.

1.4.4 Virginia

Virginia reviewed the data in the hourly files and provided three updates that are needed for the VA cross reference between NIF and CAMD information. These updates do not affect large emission units, but these updates were made to make the cross reference as correct as possible, as follows:

- For ORIS CODE 55439, NIF ID 51-065-00021, facility name Tenaska Virginia Generating Station, please add to CAMD Boiler ID CTGDB1 the NIF identifier Stack 1, Point 1, Segment 2. This stack point segment was left out of the current cross reference and represents the emissions from the duct burner on this turbine.
- For ORIS CODE 55439, NIF ID 51-065-00021, facility name Tenaska Virginia Generating Station, please add to CAMD Boiler ID CTGDB3 the NIF identifier Stack 3, Point 9, Segment 2. This stack point segment was left out of the current cross reference and represents the emissions from the duct burner on this turbine.
- For ORIS CODE 52089, NIF ID 51-071-00062, facility name Duke Energy Generation Services of Narrows, please delete the NIF identifier Stack 1, Point 1, Segment 3 from CAMD Boiler ID BLR007. This stack point segment represents the emissions from the ash handling system for the boilers, and the emissions would be better represented by generic profiles rather than CAMD profiles.

Virginia also commented that some facilities have empty date stamps (i.e., MM/DD/YY field is listed as “xx/xx/xxEST“ where x is blank space). For example, in 12 month units files, 51-033-00040 and 51-065-00021 combined have either 21 or 39 lines with empty date stamps. Similarly, in 6 month units files, 09-009-6614 (in New Haven, Connecticut) have 6 or 12 lines without date stamps. MACTEC identified a couple types of errors in the CAMD to NIF crosswalk that caused this situation to occur. Fixing the CAMD to NIF crosswalk resolved all occurrences of this problem.

1.5 ANALYSIS OF HOURLY DATA

MARAMA’s contract with MACTEC for includes a task for various analyses of hourly point source data. This task is currently under development, and MARAMA is finalizing the types of analyses to be completed. It is anticipated that the analyses will be used to show the variability of hourly emissions by time period (by season, episode, day, hour),

type of fuel (coal, oil, natural gas) and type of unit (e.g., base-load, load-following). These analyses will be included in a separate report documenting the analysis of hourly emissions within the OTR.