Appendix C

EMS-HAP User's Guide

United States Environmental Protection Agency

Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

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Air

EPA

USER'S GUIDE FOR THE EMISSIONS MODELING SYSTEM FOR HAZARDOUS AIR POLLUTANTS (EMS-HAP, VERSION 1.1)

Office of Air Quality
Clean Air
OAQPS
Planning and Standards

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USER'S GUIDE FOR THE EMISSIONS MODELING SYSTEM FOR HAZARDOUS AIR POLLUTANTS (EMS-HAP, VERSION 1.1)

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Emissions, Monitoring and Analysis Division
Research Triangle Park, North Carolina 27711

October 2000

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TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

LIST OF TABLES

LIST OF TABLES
(continued)

LIST OF FIGURES

DEFINITION OF ACRONYMS

AIRS	EPA's Aerometric Information Retrieval System
AMS	AIRS Area and Mobile System source category code for area and mobile sources of emissions
ASPEN	Assessment System for Population Exposure Nationwide
CAS	Chemical Abstract Service
EMS-HAP	The Emission Modeling System for Hazardous Air Pollutants
EMS95	The Emissions Modeling System, 1995
EPA	United States Environmental Protection Agency
HAP	Hazardous Air Pollutant, as defined by Section 112 of the Clean Air Act
MACT	Maximum Available Control Technology standards for HAP, established under Section 112 of the Clean Air Act
NTI	EPA's National Toxics Inventory
OAQPS	EPA's Office of Air Quality Planning and Standards
ORD	EPA's Office of Research and Development
OTAQ	EPA's Office of Transportation and Air Quality
SAROAD	Air pollution chemical species classification system used in EPA's initial data base for "Storage and Retrieval of Aerometric Data"
SIC	Standard Industrial Classification code used for Federal economic statistics
SCC	AIRS Source Classification Code used for point sources of emissions
SAF	Spatial Allocation Factor
TAF	Temporal Allocation Factor

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CHAPTER 1
Introduction

1.1 What is EMS-HAP?

The Emissions Modeling System for Hazardous Air Pollutants (EMS-HAP) is a series of computer programs that process emission inventory data for subsequent air quality modeling. EMS-HAP accomplishes two goals.

1. It processes an emission inventory, such as the 1996 National Toxics Inventory, for use in the Assessment System for Population Exposure Nationwide (ASPEN) dispersion model.[1]

2. It allows you to estimate future-year emissions data for use in the ASPEN dispersion model.

To accomplish the first goal, EMS-HAP:

- quality assures point source inventory location and stack parameter data and defaults missing or erroneous data where possible,
- groups and/or partitions individual pollutant species (e.g., groups lead oxide, lead nitrate into a lead group; partitions lead chromate into lead and chromium groups),
- facilitates the selection of pollutants and pollutant groups for modeling,
- spatially allocates county-level area and mobile source emissions to the census tract level using spatial surrogates such as population,
- allocates county-level aircraft emissions to airport locations,
- temporally allocates annual emission rates to annually averaged (i.e., same rate for every day of the year) 3-hour emission rates based on the type of source, and,
- produces emission files formatted for direct input into the ASPEN model.

To accomplish the second goal, EMS-HAP projects base-year emissions to a future year, accounting for growth and emission reductions resulting from emission reduction scenarios such as the implementation of the Maximum Achievable Control Technology (MACT) standards.

The U.S. Environmental Protection Agency's Office of Air Quality Planning and Standards (EPA/OAQPS), referred to hereafter as "we," developed EMS-HAP to facilitate multiple runs of ASPEN and to analyze emission reduction scenarios. ASPEN can be used to estimate annual average ambient air quality concentrations of multiple pollutants emitted from a large number of sources at a large scale (i.e., nationwide) as part of a national air toxics assessment.[1]

Although we tailored EMS-HAP to process the 1996 National Toxics Inventory (NTI), you can use it for any emission inventory following the instructions in this guide. The 1996 NTI is the first comprehensive model-ready national inventory of toxics, containing facility-specific estimates of hazardous air pollutants (HAPs).[2]

While other emission models, such as EMS-95[3] and EPS 2.0,[4] are available, they do not address the details of the 1996 NTI nor the input requirements of the ASPEN model.

1.2 What are the main features of EMS-HAP?

EMS-HAP is written in the SAS® programming language and is designed to run on any UNIX® workstation. EMS-HAP can process three types of emission data: point source data where emission sources are associated with specific geographic coordinates, area source data where emission sources are reported at the county level, and mobile source data where emission sources are also reported at the county level. EMS-HAP requires all emission inventory input data to be SAS® formatted.

EMS-HAP consists of five point source programs, two area source programs, two mobile source programs and one aircraft emissions program:

Point Source Programs
1. PtDataProc – The Data Quality Assurance Program, discussed in Chapter 3
2. PtAspenProc - The ASPEN-Specific Program, discussed in Chapter 4
3. PtTemporal - The Temporal Allocation Program, discussed in Chapter 5
4. PtGrowCntl - The Growth and Control Program, discussed in Chapter 6
5. PtFinalFormat - The ASPEN Final Format Program, discussed in Chapter 7

Area Source Programs
1. AreaPrep - The Area Source AMProc Preparation Program, discussed in Chapter 8
2. AMProc - The Area and Mobile Source Processor, discussed in Chapter 10

Mobile Source Programs
1. MobilePrep - The Mobile Source AMProc Preparation Program, discussed in Chapter 9
2. AMProc - The Area and Mobile Source Processor, discussed in Chapter 10

Aircraft Program
1. AirportProc - The Aircraft Emissions Processing Program, discussed in Chapter 2

Note that AMProc is used for both area and mobile source emissions processing.

Figure 1-1 provides a general overview of EMS-HAP processing. As you can see, the program PtGrowCntl is optional, used only when you want to project the point source inventory to a future year.

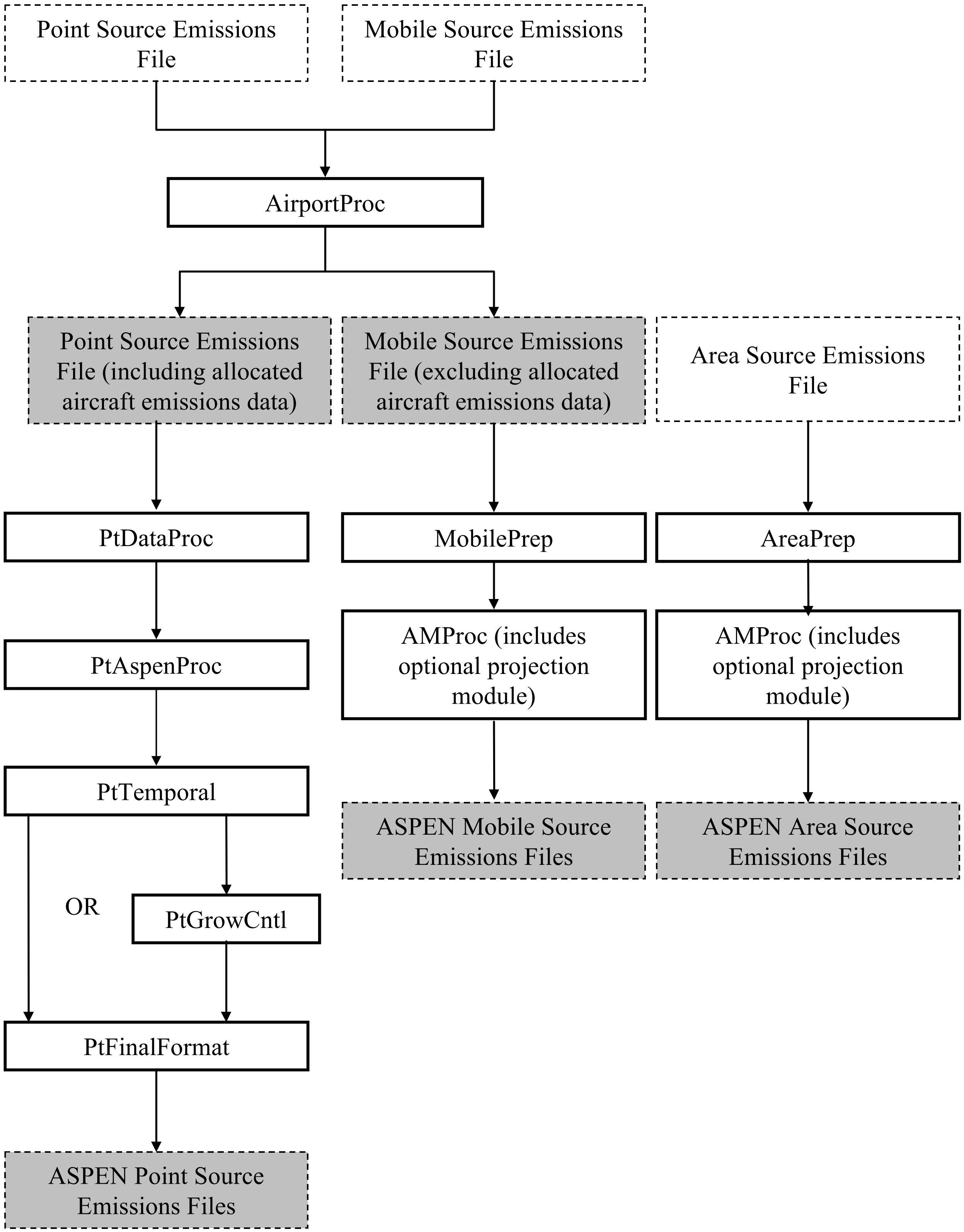

Figure 1-1. Overview of EMS-HAP Processing

In addition to the SAS® code for the different programs, EMS-HAP includes ancillary input files in either SAS® or ASCII text format. An ancillary file is any data file you input to the program other than your emission inventory. The SAS® ancillary files are those that you are not expected to change when running EMS-HAP. For example, one SAS® ancillary file contains the radius of each census tract. The text ancillary files are those that you may choose to change in order to tailor the emission processing to your specific needs. As an example, the HAP table file (ASCII text format) allows you to select the particular hazardous air pollutants (HAPs) to model. You can model all of the HAPs in your inventory or any subset of HAPs by modifying this file.

1.3 How do I use this guide?

This guide describes the programs that comprise EMS-HAP, and gives instructions on how to use them to create ASPEN emission input files for base year or projected year inventories of your choice. This manual is not specific to any one input inventory. For example, you are not limited to using the 1996 NTI to run EMS-HAP. You need only make sure your input inventory meets the requirements described within each program.

We present the programs in the order you may choose to use them. Chapter 2 describes the AirportProc program. Chapters 3 through 7 describe the point source processing programs. Chapters 8 through 10 describe the programs for area and mobile source processing. Each chapter describes the function of the program, how to run the program, all required ancillary input files and emission inventory data requirements, and how to evaluate the output to determine if the data were processed successfully. In this guide, all ancillary SAS® data files are named without their extension, since SAS® data file extension names vary with system and engine type. All programs are also named without their extension.

Appendix A presents the file formats of the ancillary input files. Appendix B contains sample batch files for running the EMS-HAP programs. Appendix C discusses preparation of the point source component of the 1996 NTI for input into EMS-HAP. Appendix D presents the methodologies used to prepare emission input files for the ASPEN model for a national air toxics assessment. Appendix D also discusses how we developed the key ancillary input files, such as the spatial allocation factor files, provided with EMS-HAP. The ancillary files provided with EMS-HAP are those we used to produce the 1996 ASPEN modeling inventory.

A separate user's guide is available for the ASPEN model.[1] Users familiar with ASPEN model input requirements will have a better understanding of EMS-HAP.

CHAPTER 2
Aircraft Emissions Processing
The Aircraft Emissions Processing Program (AirportProc)

AirportProc is the first program you run in EMS-HAP (see Figure 1-1). This program produces: (1) a county-level mobile source file, and (2) a point source file containing aircraft emissions. The mobile source file is an input to the mobile source processing programs (Chapters 9 and 10). The point source file is an input to the point source processing programs (Chapters 3 through 7).

2.1 What is the function of AirportProc?

The Aircraft Emissions Processing Program (AirportProc) provides you with a means to model aircraft emissions in ASPEN as point sources located at airports instead of spatially allocated mobile sources. We built this capability because airport location data was readily available, and we felt that modeling these emissions at airport locations as opposed to spatially allocating them to census tracts would result in better ambient concentration estimates from the ASPEN model.

AirportProc performs the functions listed below:

- Allocates county-level aircraft emissions to specific airports
- Prepares allocated emissions for the point source processing programs
- Appends unallocated emissions back to the mobile source inventory

Figure 2-1 shows a flowchart of AirportProc. The following sections describe the above bullets.

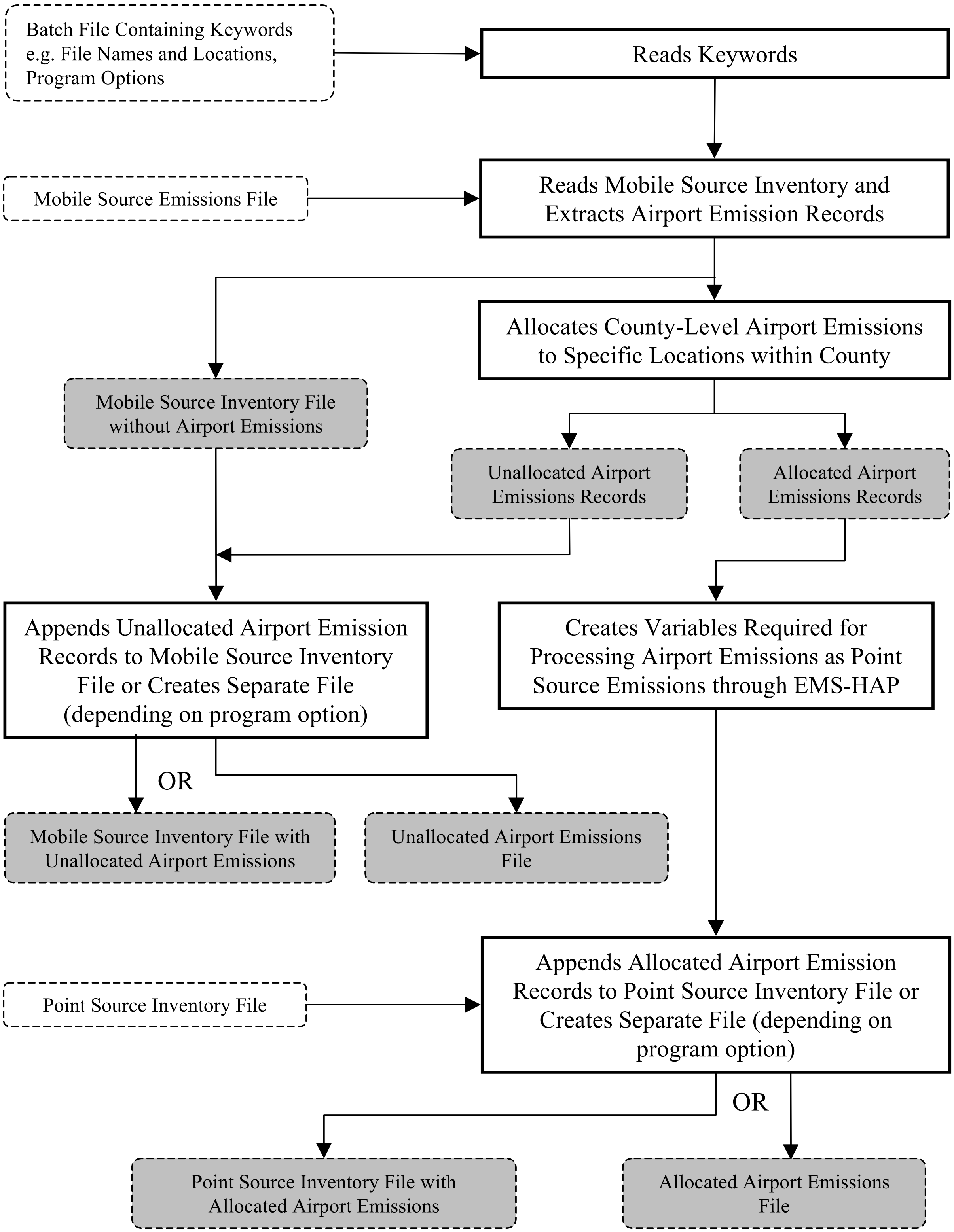

Figure 2-1. AirportProc Flowchart

2.1.1 Allocates county-level aircraft emissions to specific airports

AirportProc first extracts aircraft emissions records from the mobile source inventory. AirportProc currently extracts only those records that have the first six digits of the Area/Mobile Source (AMS) code equal to either 227500 (airports, commercial) or 227505 (general aviation). If your inventory's aircraft emissions have other AMS codes, you'll need to modify those codes so that their first six digits are either 227500 or 227505 before you run AirportProc. AirportProc then matches each aircraft emission record in the mobile source inventory to one or more specific airports that are in the same county. To do this, AirportProc uses an ancillary airport allocation SAS® file, apt_allc (see Section 2.2.3), containing data on airport locations and allocation factors. AirportProc matches aircraft emissions to airport locations only based on the county and not on the AMS code. Any different aircraft AMS codes within the same county will thus be allocated to exactly the same airports. If a county has both commercial and noncommercial airports, then emissions are only allocated to the commercial airports (even if the AMS code begins with 227505). This is because commercial airports are assumed to have general aviation as well as commercial activity. If multiple commercial airports are located in the county, then emissions are divided among the commercial airports based on the relative activity at the different airports in the county. If a county has multiple noncommercial airports, then emissions are divided equally among the noncommercial airports.

2.1.2 Prepares allocated emissions for the point source processing programs

AirportProc creates the variables required by EMS-HAP to process the aircraft emission records as point sources. Table 2-1 shows the list of variables AirportProc assigns along with the source of the data or the value assigned. AirportProc also creates the MACTCODE, SIC, ZIP_CODE, UTM_Z, CNTL_EFF and the stack parameter variables (described in Table 2-3) and sets their values to missing. The point source processing programs require these variables to be present in the input inventory SAS® data set.

The missing stack parameters for aircraft emissions will be defaulted by either SCC code, which, in this case is the aircraft emissions AMS code, or by global defaults when you run the first point source processing program, PtDataProc (Chapter 3). You choose which stack parameter default technique to use (see Section 3.1.2). EMS-HAP assigns stack parameters to aircraft emissions because the ASPEN model requires stack parameters for all point source emission records. Note that assigning stack parameters to aircraft emissions is not inconsistent with ASPEN's treatment of other mobile sources as pseudopoint sources (see ASPEN User's Guide[1]). Also, in PtAspenProc (Chapter 4), aircraft emissions will be assigned a vent type of non-stacked, which tells the ASPEN model not to perform plume rise calculations for these emissions.

After creating the necessary variables for allocated aircraft records, AirportProc then either appends the records to the rest of the point source inventory or creates a separate file containing the records. Having them in a separate file enables you to run aircraft point sources through the point source programs separately from the non-aircraft point sources. You select the option to use by specifying a value for keyword ADD2PT in the batch file (see Section 2.2.4, Table 2-4).

Table 2-1. Variables Assigned to Point Source Aircraft Emissions

Variable Name	Data Description (units or values are in parentheses)	Source of Data or Value Assigned
ACT_ID	code identifying a unique airport activity (same as unique airport site)	concatenation of 'AP,' FIPS variable, and number assigned consecutively to each airport within county
COOR_ID	code identifying a unique set of geographic coordinates for the airport	same as ACT_ID
EMIS	pollutant emissions value (tons/year)	mobile source inventory EMIS variable
EMRELPID	code identifying a unique combination of airport site and airport AMS	concatenation of ACT_ID and mobile source inventory AMS variable
EMRELPTY	physical configuration code of release point	'AP'
FIPS	5-digit FIPS code (state and county combined)	concatenation of mobile source STATE and COUNTY variables
POLLCODE	unique pollutant code	mobile source inventory CAS variable
SCC	EPA source category code identifying the process	mobile source inventory AMS variable
SITE_ID	code identifying a unique airport site	same as ACT_ID
SRC_TYPE	description of the emission source	'nonroad'
X	longitude (decimal degrees)	airport allocation file LON variable
XY_TYPE	type of coordinate system used (LAT/LON or UTM)	'LATLON'
Y	latitude (decimal degrees)	airport allocation file LAT variable

2.1.3 Appends unallocated emissions back to the mobile source inventory

If your inventory contains county-level aircraft emissions (i.e. AMS code equal to either 227500 or 227505) for a county that has no airports in the ancillary airport allocation file, you cannot model these emissions as point sources. AirportProc identifies these records and then either appends them back into the mobile source inventory, or puts them in a separate file. You select which option you want by specifying a value for keyword ADD2MB in the batch file (see Section 2.2.4, Table 2-4).

2.2 How do I run AirportProc?

2.2.1 Prepare your mobile source inventory for input into AirportProc

Your mobile source inventory must meet the following requirements:

- It must be in SAS® file format.

- To complete all mobile source programs in EMS-HAP, your data must contain, at a minimum, the variables listed in Table 2-2, with units and values as provided. AirportProc retains any additional variables present for all records except aircraft emissions, i.e., AMS codes beginning with 227500 or 227505.
- All data records should be uniquely identifiable by using the combination of the state FIPS code (STATE), county FIPS code (COUNTY), AMS code (AMS), and pollutant code (CAS).
- It shouldn't contain Alaska and Hawaii emission records because EMS-HAP ancillary files currently don't cover these areas.

Table 2-2. Required Variables in AirportProc Input Mobile Source Inventory SAS® File

Variable Name	Data Description (Required units or values are in parentheses)	Type*
AMS	AMS 10-digit category code	A10
CAS	unique pollutant code	A10
CAT_NAME	mobile source emissions category name	A50
COUNTY	county 3-digit FIPS code	A3
EMIS	emissions (tons/year)	N
POL_NAME	pollutant name	A50
STATE	state 2-digit FIPS code	A2
UNITS	emission units (tons/year)	A12

* Ax = character string of length x, N = numeric

2.2.2 Prepare your point source inventory for input into AirportProc

You need to prepare your point source inventory for input to AirportProc only if you choose to append the allocated aircraft emissions to it; see keyword ADD2PT in Table 2-4 of Section 2.2.4. If you don't choose to append the aircraft emissions to your point source inventory, you can skip to Section 2.2.3.

Your point source inventory must meet the following requirements:

- It must be in SAS® file format.
- To complete all point source programs, your data must contain the variables in Table 2-3 with units and values as provided. Additional variables can be present, and will be included in the output inventory of AirportProc.
- All data records must be uniquely identifiable by using the combination of the activity ID (ACT_ID), pollutant code (POLLCODE), and emission release point ID (EMRELPID).
- All stack parameters within a group of records identified by the FIPS code (FIPS), activity ID (ACT_ID), and emission release point ID (EMRELPID) must be the same.
- It shouldn't contain Alaska and Hawaii emission records because EMS-HAP ancillary files currently don't cover these areas.

Table 2-3. Variables Required in AirportProc Input Point Source Inventory SAS® File

Variable Name	Data Description (Required units or values are in parentheses)	Type*
ACT_ID	code identifying a unique activity within a process at a unique site	A25
CNTL_EFF[a]	baseline control efficiency, expressed as a percentage	N
COOR_ID	code identifying a unique set of geographic coordinates	A20
EMIS	pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within an activity	A50
EMRELPTY	physical configuration code of release point (01=fugitive; 02=vertical stack; 03=horizontal stack, 04=goose neck, 05=vertical with rain cap, 06=downward-facing vent)	A4
FIPS	5-digit FIPS code (state and county combined)	N
MACTCODE	process or site-level MACT code	A7
POLLCODE	unique pollutant code	A10
SCC	EPA source category code identifying the process	A10
SIC	Standard Industrial Classification (SIC) code for the site	A4
SITE_ID	code identifying a unique site	A20
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions) If you choose to define ASPEN source groups by this variable as explained in 7.1.1, or run PtGrowCntl (Chapter 6) then it must have the value of 'major' or 'area' for non-aircraft emissions.	A15
STACKDIA	diameter of stack (meters)	N
STACKHT	height of stack (meters)	N
STACKVEL	velocity of exhaust gas stream (meters per second)	N
STKTEMP	temperature of exhaust gas stream (Kelvin)	N
UTM_Z	universal transverse mercator (UTM) zone	N
X	longitude (decimal degrees or degrees, minutes, seconds with no separating characters) or UTM easting (meters or kilometers)	N
XY_TYPE	type of coordinate system used (LAT/LON or UTM)	A7
Y	latitude (decimal degrees or degrees, minutes, seconds with no separating characters) or UTM northing (meters or kilometers)	N
ZIP_CODE	zip code of site	A12

* Ax = character string of length x, N = numeric
[a] required only if you run the optional Growth and Control Program (Chapter 6)

2.2.3 Determine whether you need to modify the ancillary input files for AirportProc

An ancillary file is any data file you input to the program other than your emission inventory. AirportProc uses only one ancillary input file, apt_allc. This SAS® data file contains information on each airport contained within a county, including its latitude and longitude and an allocation factor. For commercial airports, the allocation factor is based on the relative activity of the airport within the county. For noncommercial airports, the allocation factor equals 1 divided by the number of noncommercial airports in the county. You don't need to modify this file unless you obtain additional information concerning airport locations or relative airport activity. Figure 1 of Appendix A shows the format for this file, and Section D.4 (Appendix D) discusses how we developed it.

2.2.4 Prepare your batch file

The batch file serves two purposes: (1) allows you to pass "keywords" such as file names and locations, program options, and run identifiers to the program, and (2) sets up the execute statement for the program. A sample batch file for AirportProc is shown in Figure 1 of Appendix B.

Specify your keywords

Table 2-4 describes the keywords required in the batch file for AirportProc. Use keywords to locate and name all input and output files. Use the keyword ADD2PT to select whether to append the allocated aircraft emissions records to the input point source file. Use the keyword ADD2MB to select whether to append the unallocated records to the output mobile source inventory file.

You must include all directory names, file names, and variable values even if they are related to a function that you do not select to perform. For example, if you set ADD2PT to 0, you still need to assign a value to the keyword POINT. The value provided in this circumstance does not need to represent an actual file; it is merely a place holder for the keyword.

Table 2-4. Keywords in the AirportProc Batch file

Keyword	Description of Value
	Inventory File Directories
POINT	Point source inventory SAS® file directory
MOBILE	Mobile source inventory SAS® file directory
	Input Inventory Files
INPOINT	Input point source inventory SAS® file name
INMOBIL	Input mobile source inventory SAS® file name
	Ancillary Files (Prefix of file name provided with EMS-HAP in parentheses)
REFDIR	Reference file directory
AIRALLC	Airport allocation SAS® file name (apt_allc)
	Program Options
ADD2PT	1=append the allocated aircraft emissions records to the input point source inventory file (filename will be the value of the keyword OUTPOINT) 0=create an output file containing only the allocated aircraft emissions (filename will be the value of the keyword OUTPOINT)
ADD2MB	1=append the unallocated aircraft emissions records to the output mobile source inventory file (filename will be the value of the keyword OUTMOBIL) 0=create an output file containing only the unallocated aircraft emissions (filename will be the value of the keyword OUTMOBIL)
	Output Inventory Files
OUTPOINT	Output point source inventory SAS® file name
OUTMOBIL	Output mobile source inventory SAS® file name

Prepare the execute statement

The last line in the batch file runs the AirportProc program. In the sample batch file provided in Figure 1 of Appendix B, you will see a line preceding the run line that creates a copy of the AirportProc code with a unique name. It is this version of the program that is then executed in the last line. If you do this, the log and list files created by this run can be identified by this unique name. If you don't do this and run the program under a general name, every run of AirportProc will create a log and list file that will replace any existing files of the same name.

You may find that you need to assign a special area on your hard disk to use as work space when running AirportProc. In the sample batch file, a work directory is defined on the last line following the execution of AirportProc. For example, the command 'sas AirportProc_032800.sas -work /data/work15/dyl/' assigns a work directory called "/data/work15/dyl". The directory you reference must be created prior to running the program.

2.2.5 Execute AirportProc

There are two ways to execute the batch file. One way is to type 'source' and then the batch file name. Alternatively, first set the permission on the file to 'execute.' You do this by using the UNIX CHMOD command and adding the execute permission to yourself, as the owner of the file, to anyone in your user group, and/or to anyone on the system. For example, 'chmod u+x AirportProc.bat' gives you permission to execute the batch file. Refer to your UNIX manual for setting other permissions. After you have set the file permission, you can execute the batch file by typing the file name on the command line, for example, 'AirportProc.bat'.

2.3 How do I know my run of AirportProc was successful?

2.3.1 Check your SAS® *log file*

Review the output log file to check for errors or other flags indicating incorrect processing. To do this, search the log file for occurrences of the strings "error", "warning", "not found", and "uninitialized". These can indicate problems with input files or other errors.

You can also look at the number of records in the input mobile and point source inventory files and compare it to the number of records in the output mobile and point source inventory files. You should be able to account for the number of records in each file according the manner in which you chose to execute AirportProc (i.e., values assigned to ADD2PT and ADD2MB).

2.3.2 Check your SAS® *list file*

The list file created when AirportProc is executed contains information to assist in quality assurance. The information in this file is listed below:

- First 100 allocated airport sites
- Pollutant-level and state-level emissions totals and record counts of allocated aircraft emissions
- Emissions total and record count of output point source inventory file
- County-level and AMS code-level emissions totals and record counts of unallocated aircraft emissions
- Emissions total and record count of output mobile source inventory file

2.3.3 Check other output files from AirportProc

You should check for the existence of both the output point and mobile source inventory files, named by keywords OUTPOINT and OUTMOBIL, respectively. These files will serve as the inputs to the next point (PtDataProc, Chapter 3) and mobile (MobilePrep, Chapter 9) source processing programs you run. No other files are created by AirportProc.

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CHAPTER 3
Point Source Processing
The Data Quality Assurance Program (PtDataProc)

PtDataProc is the first program used in EMS-HAP for the processing of a point source inventory, unless you ran the Aircraft Emissions Processing Program, AirportProc (see Figure 1-1) using a point source inventory input file. The output point source emission inventory from PtDataProc is used as the input to PtAspenProc.

3.1 What is the function of PtDataProc?

The Data Quality Assurance Program (PtDataProc) prepares the point source emission inventory for modeling by assuring that each record contains valid latitude and longitude coordinates and reasonable stack parameters. You control which of the three functions listed below are performed in any given execution of PtDataProc (Table 3-7 in Section 3.2.3 details how to do this).

- Quality assures point source location data
- Quality assures stack parameters- defaults them where needed and for all allocated aircraft emissions
- Removes inventory variables and records not necessary for further processing (inventory windowing)

Figure 3-1 shows a flowchart of PtDataProc. The following sections describe the above bullets.

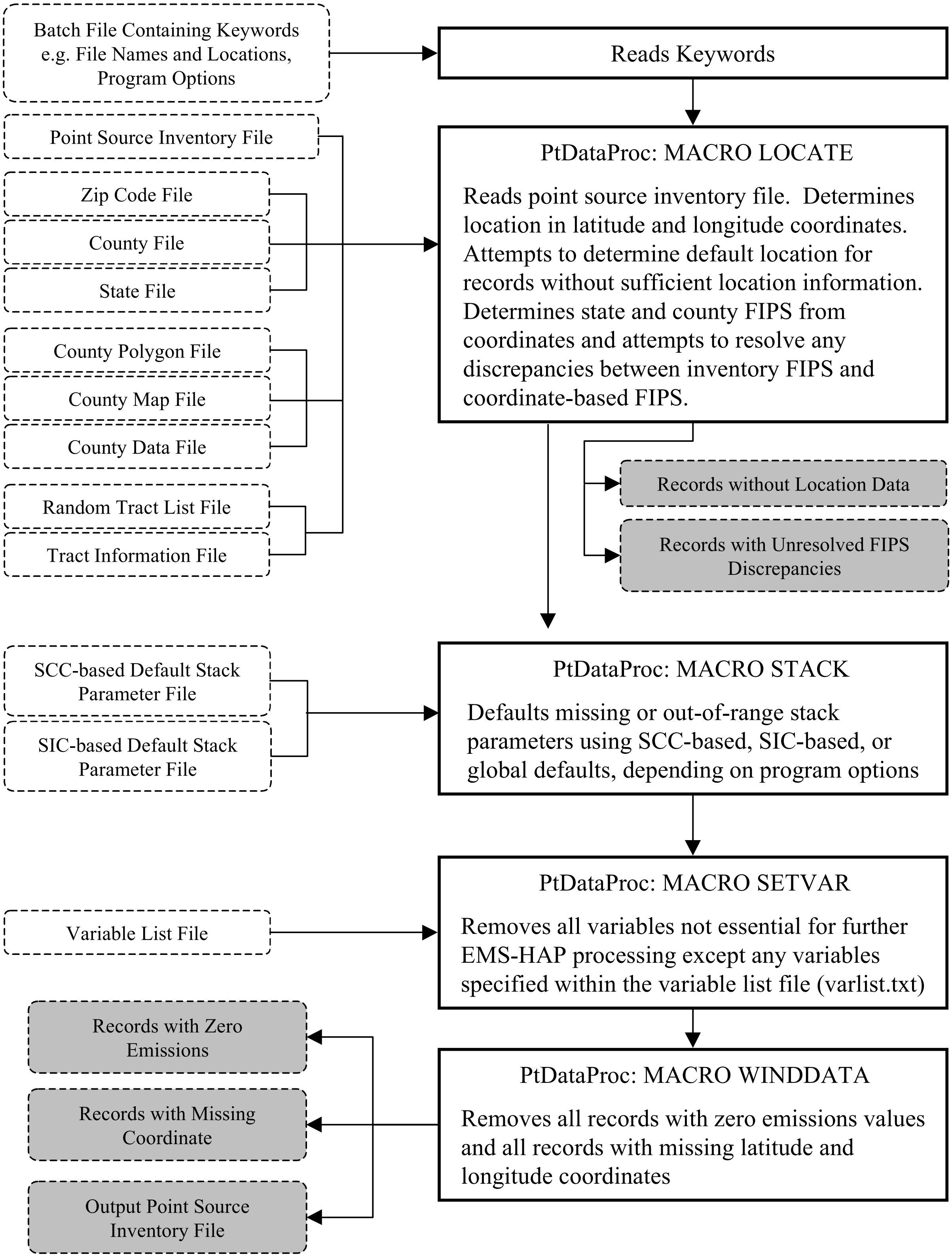

Figure 3-1. PtDataProc Flowchart

3.1.1 Quality assures point source location data

PtDataProc calculates latitude and longitude coordinates in decimal degrees. For sites without valid location information, PtDataProc assigns default locations if possible; sites are dropped from the emission inventory when PtDataProc is unable to assign a default location. PtDataProc considers location information invalid if it is missing, out of range, or if there is an inconsistency between the state and county FIPS code and the geographic coordinates.

PtDataProc invokes two SAS® programs (known as "include" programs) to carry out specific steps involved in this quality assurance function: 1) validFIP checks the validity of the FIPS code in the emission inventory; 2) latlon2fip computes FIPS codes based on the inventory geographic coordinates. You need to specify these names and the locations of these programs in your batch file (see keywords VALIDFIP and FINDFIPS in the "Program Files" section of Table 3-8).

The following sections detail how PtDataProc quality assures the point source inventory location data, and the diagnostics it produces.

Calculation of latitude and longitude coordinates

Some records in the point source inventory may have their geographical coordinates expressed in the latitude longitude coordinate system (XY_TYPE='LATLON') and other records may have the Universal Transverse Mercator (UTM) coordinate system (XY_TYPE='UTM'). PtDataProc calculates latitude and longitude in decimal degrees based on the value of the XY_TYPE variable and the values of the X, Y, and UTM_Z variables. The X and Y values for UTM coordinates can be expressed in meters or kilometers, and the values for latitude and longitude coordinates can be expressed in decimal degrees or in degrees-minutes-seconds format (excluding decimal point or any other separating characters).

PtDataProc performs limited quality assurance checks on the values of the location data (variables X, Y and UTM_Z). Depending on the evaluation of the location data, action is taken to handle the data in a specific way or to correct the data. To assist you in identifying how the data was evaluated, PtDataProc sets the value of the diagnostic flag variable LLPROB accordingly. Table 3-1 presents the location data evaluation, what action is taken, if any, and what value is assigned to the LLPROB variable. You can use the value of LLPROB to see if problems exist in your inventory. Section 3.1.3 explains how you can reduce the number of variables in your inventory through the windowing function, but still retain LLPROB, and any other variables that are not essential for EMS-HAP processing.

Table 3-1. Assignment of LLPROB Diagnostic Flag Variable

Location Data Evaluation	Correction Made to Location Data	Value Assigned to LLPROB variable
X or Y is missing or zero, or, XY_TYPE = 'UTM' and UTM_Z value is missing or zero	None; defaulting will be attempted	missing
LAT and LON, as calculated from X, Y and XY_TYPE variables are outside of an area including the contiguous U.S., Puerto Rico, and U.S. Virgin Islands.	None; defaulting will be attempted	bad_loc
UTM_Z is not missing or not zero; XY_TYPE is not equal to 'UTM' or 'LATLON'	Location data is to assumed represent UTM coordinates	UTM
XY_TYPE='UTM' or location data is assumed to represent UTM coordinates and X value is greater than Y value	X and Y values are exchanged	flipxy
XY_TYPE='UTM' or location data is assumed to represent UTM coordinates, and Y value is greater than 10,000 and, therefore, it must be measured in meters	X and Y values are used as they are and are not converted from kilometers to meters	meters
UTM_Z is missing or zero; XY_TYPE is not equal to 'UTM' or 'LATLON'	Location data is assumed to represent lat/lon coordinates	LATLON
XY_TYPE='LATLON' or location data is assumed to represent lat/lon coordinates, and X or Y value is less than zero	Change sign of X or Y value	negative
XY_TYPE='LATLON' or location data is assumed to represent lat/lon coordinates, and Y value is greater than the X value	X and Y values are exchanged	flipll
XY_TYPE='LATLON' or location data is assumed to represent lat/lon coordinates, and X and Y values are not in degrees, minutes, seconds notation	X and Y values are used as they are and are not converted from degrees, minutes, seconds notation to decimal degrees	decimal

Defaulting of missing or out-of-range coordinates

If the location data provided on a record is incomplete or out-of-range (LLPROB='missing' or LLPROB='bad_loc'), PtDataProc defaults the latitude and longitude based on the zip code or, if no zip code is provided, on the state and county FIPS code of the facility. PtDataProc considers the location out-of-range if the calculated latitude and longitude are outside of an area including the contiguous U.S., Puerto Rico, and U.S. Virgin Islands. The default location based on the zip code is the centroid latitude and longitude of the zip code area. If the record being defaulted to the zip code centroid doesn't have a valid FIPS, PtDataProc changes it to the FIPS represented by the zip code location. (Note that this will occur as long as the inventory state FIPS, if valid, is not inconsistent with the state FIPS determined by the zip code.)

The default location based on the state and county FIPS code is the centroid latitude and longitude of a census tract within the county. PtDataProc selects the census tract from a list (or array) of census tracts contained in the trctarry ancillary file. This file provides a random ordering of the census tracts within each county. For each unique location within a county that needs a default value, PtDataProc runs through the census tract list in the order of the tractarry file, assigning a tract centroid location from the list. For example, if five locations need to be defaulted in a particular county, the first location will be defaulted to the first tract centroid that's within the county from the list. The second location will be defaulted to the second tract centroid on the list for that county, and so on. If there are more coordinates that need defaulting than tracts in that county, PtDataProc will go back to the beginning of the census tract list for that county (following the same order) until all locations have been defaulted. The census tract defaulting methodology ensures that if there are multiple point source locations that need to be defaulted within the same county, they are assigned to as many different tract centroids within the county as possible.

PtDataProc records which basis was used to default a location by setting the value of the diagnostic flag variable LFLAG to either 'zipcode' or 'county'. When defaulting by zip code, if PtDataProc changes the inventory FIPS to the zip code FIPS, it also sets the value of the diagnostic flag variable FIPFLAG to 'assigned'. Note that this occurs only if PtDataProc determines that the inventory FIPS code is invalid. You can use the values of these diagnostic flag variables to check which point sources were defaulted, and the method PtDataProc used. Section 3.1.3 explains how you can reduce the number of variables in your inventory through the windowing function, but still retain LFLAG and FIPFLAG, and any other variables that are not essential for EMS-HAP processing.

As stated earlier, the default location based on the state and county FIPS code is the centroid of a census tract within the county. Census tracts with radius less than equal to 0.5 km are excluded from the list of census tracts contained in the trctarry ancillary file. That is, no locations are defaulted to tracts with radius less than or equal to 0.5 km. We chose 0.5 km to prevent the ASPEN model from calculating excessively high concentrations for these small census tracts (resulting from ASPEN's spatial averaging approach) which are not likely to be real values. Also note that if you run EMS-HAP multiple times using different inventories (e.g., if you remove certain facilities or subset different pollutants to run) the PtDataProc census tract defaulting technique may result in different census tract locations for the same facilities you defaulted in a previous run.

If the state or county FIPS is invalid, and PtDataProc can't determine a default location by the zip code, the record is written to both a text file (nolocate.txt) and a SAS® data set (nolocate) and is dropped from further processing (i.e., the record will not be modeled in ASPEN).

Resolution of discrepancies between coordinates and FIPS location data

For some sources, there may be a discrepancy in the location information due to errors in the inventory. For example, the latitude and longitude may indicate that the source is located in New York, but the FIPS indicates Michigan. PtDataProc addresses this situation by:

1. Calculating a latitude/longitude coordinate-based FIPS, referred to hereafter as the "alternate FIPS," for each unique set of geographic coordinates in the inventory.
2. Determining whether the alternate FIPS matches the inventory FIPS
3. Resolving the discrepancy when the alternate FIPS does not match the inventory FIPS

PtDataProc resolves discrepancies between coordinates and FIPS location data using three approaches:

1. *Distance Criterion*: PtDataProc computes the distance between the geographical coordinates and the centroid of the county based on the inventory FIPS. If this distance is less than 5.4 times the county radius, PtDataProc then presumes that the geographical coordinates can possibly be within the county and thus takes no action. We chose the value of 5.4 as a potential worst case. For Monroe County Florida (the county that comprises the Florida Keys) the distance between the farthest point in the county and its centroid is approximately 5.4 times the county radius. This large value will ensure that PtDataProc will not move coordinates that could potentially be within the county represented by the inventory FIPS.

2. *Zip Code Check*: If the distance criterion in step 1 is not met, then PtDataProc uses inventory zip code information if available, to resolve the discrepancy. If the FIPS based on the zip code (zip code FIPS) matches the alternate FIPS, then PtDataProc changes the inventory FIPS to the alternate FIPS. If the zip code FIPS matches the inventory FIPS, then PtDataProc changes the geographical coordinates to the centroid of the zip code area.

3. *FIPS validations*: If steps 1 and 2 do not resolve the problem, then PtDataProc conducts a series of additional checks. Depending on the validity of the inventory and alternate FIPS, PtDataProc will do one of the following: change the inventory FIPS, change the geographical coordinates, or drop the emissions record from further consideration. Table 3-2 contains the details.

Table 3-2. Resolutions in Discrepancy Between Alternate and Inventory FIPS

Resolution	Occurs when the Distance Criterion and Zip Code check do not Resolve the Discrepancy, AND when....
Default geographical coordinates to the county-level default, i.e., the centroid of a selected tract in the county represented by the inventory FIPS	The inventory contains a valid state/county FIPS.
Default inventory FIPS to the alternate FIPS	1. The county inventory FIPS is invalid and the alternate FIPS is in the same state as the inventory FIPS, or 2. The state inventory FIPS is invalid and the alternate FIPS is in the same state as represented by the postal code (1^{st} two digits of the ACT_ID), or 3. The state inventory FIPS is invalid and the record doesn't have a valid postal code (e.g., the 1^{st} two digits of the ACT_ID ="ES")
Drop emission record from further processing (this record will not be modeled in ASPEN)	1. The county inventory FIPS is invalid and the alternate FIPS is not in the same state as the inventory FIPS, or 2. The state inventory FIPS is invalid and the alternate FIPS is not in the same state as represented by the postal code (1^{st} two digits of the ACT_ID), or 3. Both the inventory FIPS and alternate FIPS are invalid

Records dropped from the inventory because the discrepancy could not be resolved are written to both a text file (nomodel.txt) and a SAS® data set (nomodel).

PtDataProc uses the same diagnostic flag variables for location discrepancies as are used when missing locations are defaulted. These variables are LFLAG and FIPFLAG. PtDataProc assigns their values based on the action taken to resolve the discrepancy. Table 3-3 presents all possible values assigned to these variables and their circumstances. Note that every combination of LFLAG and FIPFLAG is unique to a particular situation. For example, if LFLAG='county' and FIPFLAG='noch_ss' then the problem is a location discrepancy. PtDataProc resolved it by defaulting the geographic coordinates based on the state and county FIPS (i.e., using the census tract routine described above). The inventory FIPS, which represented the same state as the geographic coordinates, was not changed.

You can use these diagnostic flag variables to check the problems that may exist in your inventory, and how PtDataProc handled them. Section 3.1.3 explains how you can reduce the number of variables in your inventory through the windowing function, but still retain LFLAG and FIPFLAG, and any other variables that are not essential for EMS-HAP processing.

Table 3-3. Assignment of Diagnostic Flag Variables LFLAG and FIPFLAG

Location Data Evaluation	Values Assigned to Flag Variables
Geographic coordinates defaulted based on county (i.e., census tract routine) due to invalid coordinates (LLPROB has value of 'missing' or 'bad_loc')	LFLAG = 'county' AND FIPFLAG is not assigned a value
Geographic coordinates defaulted by zip code due to invalid coordinates (LLPROB has value of 'missing' or 'bad_loc') and the inventory FIPS and zip code FIPS agree	LFLAG = 'zipcode' AND FIPFLAG is not assigned a value
Geographic coordinates defaulted by zip code due to invalid coordinates (LLPROB has value of 'missing' or 'bad_loc') and inventory FIPS is reassigned to the zip code FIPS. Note: this happens when the inventory FIPS is invalid and either (1) the state inventory FIPS is the same as the state zip code FIPS or (2) the postal code from the address represents the same state as the state zip code FIPS.	LFLAG = 'zipcode' AND FIPFLAG = 'assigned'
Geographic coordinates defaulted based on county to resolve disagreement between inventory FIPS and alternate FIPS (LLPROB does not have value of 'missing' or 'bad_loc')	LFLAG = 'county' AND FIPFLAG = 'noch_ss', when inventory FIPS and alternate FIPS represent the same state; FIPFLAG = 'noch_ds', when inventory FIPS and alternate FIPS represent different states
Geographic coordinates defaulted by zip code to resolve disagreement between inventory FIPS and alternate FIPS (LLPROB variable does not have value of 'missing' or 'bad_loc')	LFLAG = 'zipcode' AND FIPFLAG = 'noch_ss', when inventory FIPS and alternate FIPS represent the same state; FIPFLAG ='noch_ds', when inventory FIPS and alternate FIPS represent different states
Inventory FIPS disagrees with alternate FIPS, but the distance criterion is met so no change is made to either FIPS or lat/lon. (This would likely occur when point source is near a state or county border.)	LFLAG is not assigned a value AND FIPFLAG = 'noch_ss', when inventory FIPS and alternate FIPS represent the same state; FIPFLAG = 'noch_ds', when inventory FIPS and alternate FIPS represent different states
Inventory FIPS disagrees with alternate FIPS, and is reassigned to the zip code FIPS	LFLAG is not assigned a value AND FIPFLAG = 'ZIP_ss', when inventory FIPS and alternate FIPS represent the same state; FIPFLAG = 'ZIP_ds', when inventory FIPS and alternate FIPS represent different states
Inventory FIPS disagrees with alternate FIPS, and is reassigned to the alternate FIPS	LFLAG is not assigned a value AND FIPFLAG = 'reloc_ss', when inventory FIPS and alternate FIPS represent the same state; FIPFLAG = 'reloc_ds', when inventory FIPS and alternate FIPS represent different states
Discrepancy between Inventory FIPS and alternate FIPS cannot be resolved	LFLAG is not assigned a value AND FIPFLAG = 'no_model'

3.1.2 Quality assures stack parameters- defaults them where needed and for all allocated aircraft emissions

PtDataProc checks each record for valid stack parameters and provides defaults to missing or erroneous data. PtDataProc determines if a non-missing stack parameter should be defaulted by comparing it to the minium and maximum range values you provide for each parameter. Because AirportProc (Chapter 2) sets the stack parameters for allocated aircraft emissions to missing, PtDataProc will default stack parameters for these emission records. PtDataProc defaults missing aircraft emission stack parameters the same way it defaults all other missing stack parameters as described below.

Stack parameter values that fall outside of the range or are missing can be defaulted in several ways. You can have PtDataProc assign default stack parameters using the 8-digit AIRS Source Classification Code (SCC)-based and/or 4-digit Standard Industrial Classification (SIC)-based defaults. You choose which defaulting technique PtDataProc uses and supply information on the valid parameter ranges and global defaults to be used through the key words you enter in the batch file (see Tables 3-7 and 3-8 in Section 3.2.3). If you choose either SCC-based or SIC-based defaults, PtDataProc uses ancillary SCC or SIC default files. If you choose both SCC-based and SIC-based defaults, and an inventory record can be matched to values in both the SCC and SIC default files, the program will use the SCC-based default over the SIC-based one.

Some stack parameters may not be addressed by either of these methods (e.g., if an inventory record has no SCC nor SIC) or, you may choose not to use these options. In these cases, PtDataProc uses the following "global" defaulting routine: (1) If the stack parameters are missing, PtDataProc will default them to the global stack parameters you choose, (2) If the stack parameters are outside of the valid range you provide, PtDataProc will use either the minimum or maximum range value as the default. The one exception to this global defaulting routine is for horizontal stacks or fugitives (EMRELPTY = '03' or '01'). If the stack parameters are missing or zero for these, PtDataProc uses the following defaults: stack height of 5 meters, stack diameter of 1 meter, stack temperature of 295 K and stack velocity of 0.5 meters/second.

Diagnostic flag variables, set for each stack parameter (HTFLAG, DIAFLAG, VELFLAG, and TEMPFLAG), explain why and how each stack parameter was assigned a default value; these are summarized in Table 3-4. Section 3.1.3 explains how you can reduce the number of variables in your inventory through the windowing function, but still retain these diagnostic variables, and any other variables that are not essential for EMS-HAP processing.

Table 3-4. Assignment of Stack Parameter Defaulting Diagnostic Flag Variables

Default Method	Evaluation of Invalid Stack Parameter	Default Value Assigned	Value Assigned to Diagnostic Flag Variables Htflag, Diaflag, Velflag, and Tempflag
SCC			
	Parameter is not missing, but is outside of valid parameter range	SCC based default	Concatenation of the value of DEFFLAG variable* included in SCC default file and 'out'
	Parameter is missing	SCC based default	Concatenation of the value of DEFFLAG variable* included in SCC default file and 'miss'
SIC			
	Parameter is not missing, but is outside of valid parameter range	SIC based default	Concatenation of the value of DEFFLAG variable* included in SIC default file and 'out'
	Parameter is missing	SIC based default	Concatenation of the value of DEFFLAG variable* included in SIC default file and 'miss'
Neither SCC nor SIC			
	Parameter is missing	Global default	'default'
	Parameter is not missing, but is less than the minimum range value	Minimum range value	'rangelow'
	Parameter is not missing, but is greater than the maximum range value	Maximum range value	'rangehi'

* the DEFFLAG variable indicates the method used to obtain the default value. It is described in more detail Figures 10 and 11 of Appendix A

3.1.3 Removes inventory variables and records not necessary for further processing (inventory windowing)

Because point source inventories can be very large, it is useful for further processing of the data through EMS-HAP to reduce the size of the inventory file as much as possible. The PtDataProc program allows you to do this in two ways: (1) by removing nonessential variables from your inventory and (2) by removing nonessential records from your inventory.

Removal of Nonessential Variables

You can choose to have PtDataProc remove all variables except for those required for further processing within EMS-HAP. To do this, set the value of the DOSETVAR keyword to 1 in your batch file (see Table 3-7 in Section 3.2.3). You also have the option of providing PtDataProc with a list of additional variables (e.g., LLPROB, LFLAG, FIPFLAG) to be retained. To do this, set the DOSETVAR and USELIST keywords in your batch file to 1, and provide a list of nonessential variables in an ancillary text file (see the varlist.txt file in Table 3-6).

Removal of Nonessential Records

You can choose to have PtDataProc remove all records that have no latitude/longitude data or that have zero emissions. To do this, set the value of the DOWINDOW keyword in your batch file to 1. Note that if you choose to have PtDataProc perform the location data quality assurance function, windowing the inventory to remove records without latitude and longitude data would not be necessary, because these records would have already been removed. You would still, however, need to perform the windowing function if you want to remove records with zero emissions.

3.2 How do I run PtDataProc?

3.2.1 Prepare your point source inventory for input into PtDataProc

Your point source inventory must meet the following requirements:

- It must be in SAS® file format.
- To complete all point source programs, your data must contain the variables in Table 3-5 with units and values as provided. Additional variables can be present, and will be included in the output SAS® file. However, you can choose to create an output file with only those variables needed in subsequent EMS-HAP processing programs by choosing the windowing function which was discussed in Section 3.1.3.
- All data records must be uniquely identifiable by using the combination of the activity ID (ACT_ID), pollutant code (POLLCODE), and emission release point ID (EMRELPID).
- All stack parameters within a group of records identified by the FIPS code (FIPS), activity ID (ACT_ID), and emission release point ID (EMRELPID) must be the same.
- It shouldn't contain Alaska and Hawaii emission records because EMS-HAP ancillary files currently don't cover these areas.

Your inventory will meet all requirements if it is the output of the AirportProc program. See Appendix C for a description of the preprocessing programs we developed to create a point source inventory for input into PtDataProc from the 1996 NTI modeling files.

Table 3-5. Variables Required for PtDataProc Input Point Source Inventory SAS® File
(Variables used by PtDataProc are in bold; Other variables listed are used by subsequent point source processing programs)

Variable Name	Data Description (Required units or values are in parentheses)	Type*
ACT_ID	code identifying a unique activity within a process at a unique site	A25
CNTL_EFF[a]	baseline control efficiency, expressed as a percentage	N
COOR_ID	code identifying a unique set of geographic coordinates	A20
EMIS	pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within an activity	A50
EMRELPTY	physical configuration code of release point (01=fugitive; 02=vertical stack; 03=horizontal stack, 04=goose neck, 05=vertical with rain cap, 06=downward-facing vent, AP=aircraft)	A4
FIPS	5-digit FIPS code (state and county combined)	A5
MACTCODE	process or site-level MACT code	A7
POLLCODE	unique pollutant code	A10
SCC[b]	EPA source category code identifying the process	A10
SIC[c]	Standard Industrial Classification (SIC) code for the site	A4
SITE_ID	code identifying a unique site	A20
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions) If you choose to define ASPEN source groups by this variable as explained in 7.1.1, or run PtGrowCntl (Chapter 6) then it must have the value of 'major' or 'area' for non-aircraft emissions.	A15
STACKDIA	diameter of stack (meters)	N
STACKHT	height of stack (meters)	N
STACKVEL	velocity of exhaust gas stream (meters per second)	N
STKTEMP	temperature of exhaust gas stream (Kelvin)	N
UTM_Z	universal transverse mercator (UTM) zone	N
X	longitude (decimal degrees or degrees, minutes, seconds with no separating characters) or UTM easting (meters or kilometers)	N
XY_TYPE	type of coordinate system used (LAT/LON or UTM)	A7
Y	latitude (decimal degrees or degrees, minutes, seconds with no separating characters) or UTM northing (meters or kilometers)	N
ZIP_CODE	zip code of site	A12

* Ax = character string of length x, N = numeric
[a] required only if you use the optional growth and control program (Chapter 6)
[b] used by PtDataProc only if you choose to use SCC-based defaults for missing/out-of-range stack parameters
[c] used by PtDataProc only if you choose to use SIC-based defaults for missing/out-of-range stack parameters

3.2.2 Determine whether you need to modify the ancillary input files for PtDataProc

An ancillary file is any data file you input to the program other than your emission inventory. Table 3-6 lists the ancillary input files for PtDataProc. Of the eleven different ancillary files required to run PtDataProc, there are only three files that you may need to modify. The other ancillary files contain standard reference data.

If you choose to have the program default the stack parameters by SCC or by SIC, you may want to modify the def_scc.txt or def_sic.txt files, respectively (file formats are provided in Appendix A, Figures 10 and 11). If you choose to have the program remove non-essential variables from your inventory, you may want to modify the varlist.txt file in order to retain additional non-essential variables of your choosing (see Appendix A, Figure 12 for file format).

Table 3-6. Required Ancillary Input Files for PtDataProc

Name of File Provided with EMS-HAP	Purpose	Need to Modify?	Format
zipcodes	Assigns default location coordinates by zip code	No	SAS®
cty_cntr	Determines validity of state and county FIPS	No	SAS®
st_cntr	Determines state FIPS from postal code	No	SAS®
counties	Determines state and county FIPS from geographic coordinates	No	SAS®
bound6	Determines state and county FIPS from geographic coordinates	No	SAS®
cntyctr2	Determines state and county FIPS from geographic coordinates	No	SAS®
trctarry	Assigns random census tract by county for purpose of assigning default location coordinates	No	SAS®
tractinf	Provides census tract centroid coordinates for default location coordinates	No	SAS®
def_scc.txt	Assigns default stack parameters by SCC if you choose this option	If you choose to default stack parameters by SCC	text
def_sic.txt	Assigns default stack parameters by SIC if you choose this option	If you choose to default stack parameters by SIC	text
varlist.txt	Provide list of non-essential variables to be retained in inventory if you choose this option	If you choose to retain additional variables on the inventory	text

3.2.3 Prepare your batch file

The batch file serves two purposes: (1) allows you to pass "keywords" such as file names and locations, program options, and run identifiers to the program, and (2) sets up the execute statement for the program. A sample batch file for PtDataProc is shown in Figure 2 of Appendix B.

Specify your keywords

Table 3-7 shows you how to specify keywords to select which functions you want PtDataProc to perform. For example, if you've already calculated your latitude and longitudes in decimal degrees and quality assured them, you may choose not to use this function. For this situation, set the keyword "DOLOCATE" to zero.

Table 3-7. Keywords for Selecting PtDataProc Functions

PtDataProc Function	Keyword (values provided cause function to be perfomed)
Quality assurance of location data	DOLOCATE = 1
Quality assurance of stack parameters and defaulting of aircraft emission stack parameters	DOSTACK=1
Use SCC based defaults; use global defaults or range defaults if parameters are still missing or out-of-range after SCC default process	SCCDEFLT = 1; SICDEFLT = 0
Use SIC based defaults; use global defaults or range defaults if parameters are still missing or out-of-range after SIC default process	SCCDEFLT = 0; SICDEFLT = 1
Use both SIC and SCC based defaults; use global defaults or range defaults if parameters are still missing or out-of-range (Note: when single record can be defaulted by both SIC and SCC-based defaults, PtDataProc will use the SCC default)	SCCDEFLT = 1; SICDEFLT = 1
Use only global defaults (range defaults if parameters are out of range)	SICDEFLT = 0; SCCDEFLT = 0
Window Inventory to reduce variable list	DOSETVAR = 1
Specify additional variables to retain on output inventory file	USELIST = 1
Don't retain any non-essential variables on output inventory file	USELIST = 0
Window Inventory to exclude zero emissions and unlocated records	DOWINDOW=1

Table 3-8 describes all of the keywords required in the batch file. PtDataProc is the only EMS-HAP program that uses "include" programs within the actual program. You specify the name of these programs in the batch file (in the "Program Files" section). *You must put the three ancillary files used by 'latlon2fip.inc' in the directory named by keyword MAP_DIR, and they must have the same names as the files we supplied to you (bound6, counties and cntyctr2).* Note the sections called "Valid Stack Parameter Ranges" and "Global Stack Parameters." You supply the values for stack parameter ranges used to determine if a stack parameter is valid. PtDataProc will use the upper or lower bounds of the range as a "range default" if parameters are not defaulted using SCC and/or SIC based defaults. You also supply values for global default stack parameters for missing stack parameters not defaulted by the other methods.

Table 3-8. Keywords in the PtDataProc Batch File

Keyword	Description of Value
	Input Inventory Files
IN_DATA	Input SAS® file directory
INSAS	Input inventory SAS® file name
	Program Files (Prefix of file name provided with EMS-HAP in parentheses)
INC_DIR	Include program directory
VALIDFIP	Include program file name to determine validity of county FIPS code (validFIP)
FINDFIPS	Include program file name to determine county FIPS based on latitude and longitude (latlon2fip)
	Ancillary Files (Prefix of file name provided with EMS-HAP in parentheses)
REFFILE	Ancillary SAS® file directory
REFTEXT	Ancillary text file directory
MAP_DIR	Ancillary mapping file directory. This directory must contain the SAS® files named bound6, counties and cntyctr2, which are used by the include program latlon2fip
ZIP	Zip code to FIPS and lat/lon cross-reference text file prefix (zipcodes)
CNTYCENT	County FIPS to county centroid location SAS® file prefix (cty_cntr)
STCENT	State FIPS to postal code cross-reference SAS® file prefix (st_cntr)
TRACTS	County FIPS to random list of tracts correspondence SAS® file prefix (trctarry)
TRCTINFO	Census tracts to state and county FIPS code, tract centroid, and tract radius correspondence SAS® file prefix (tractinf)
SCCDEFLT	SCC to default stack parameters correspondence text file prefix (def_scc)
SICDEFLT	SIC to default stack parameters correspondence text file prefix (def_sic)
VARLIST	Prefix of file containing list of additional variables to be retained in inventory output file (varlist)
	Program Options (see also Table 3-7)
DOLOCATE	1= quality assure location data; 0 = don't quality assure them
DOSTACK	1= quality assure stack parameters; 0 = don't quality assure them.
DOSCCDEF	1= assign default stack parameters by SCC; 0= don't assign them by SCC
DOSICDEF	1=assign default stack parameters by SIC; 0 =don't assign them by SIC

Table 3-8. Keywords in the PtDataProc Batch File (continued)

Keyword	Description of Value
DOSETVAR	1=retain only those non-essential variables from inventory specified by the user, based on the value of USELIST and VARLIST 0=retain all variables
USELIST	1= use ancillary file (keyword VARLIST) to provide additional non-essential variables to retain in inventory 0=don't retain any non-essential variables from the inventory
DOWINDOW	1=remove all records with zero emissions values or records without latitude and longitude values 0= don't remove records with zero emissions or without latitude and longitude values (note that values without latitude and longitude values will still be removed if you perform the data quality assurance of location data function)
EMISVAR	Emissions variable used
	Valid Stack Parameter Ranges
DLOWHT	Minimum range value for valid stack height (in meters)
DHIHT	Maximum range value for valid stack height (in meters)
DLOWDIA	Minimum range value for valid stack diameter (in meters)
DHIDIA	Maximum range value for valid stack diameter (in meters)
DLOWVEL	Minimum range value for valid stack velocity (in meters/second)
DHIVEL	Maximum range value for valid stack velocity (in meters/second)
DLOWTEMP	Minimum range value for valid stack temperature (in Kelvin)
DHITEMP	Maximum range value for valid stack temperature (in Kelvin)
	Global Default Stack Parameters
DFLTHT	Default stack height (in meters)
DFLTDIA	Default stack diameter (in meters)
DFLTVEL	Default stack exit gas velocity (in meters/second)
DFLTTEMP	Default stack exit gas temperature (in Kelvin)
	Additional Input Data
EMISVAR	Variable name containing the emissions data you want processed
	Output files
OUTDATA	Output SAS® file directory
OUTTEXT	Output directory for text file of records without latitude/longitude data
OUTSAS	Output inventory SAS® file name (contains all variables and records)
FINAL	Output inventory SAS® file name after windowing
NOLOCATE	Output data SAS® file name containing records without coordinates
ZEROEMIS	Output data SAS® file name containing records with zero emissions values

You must include all directory names, file names, and variable values even if they are related to a function that you do not select to perform. For example, if you set DOSTACK to 0, you still need to assign a value to the keywords for the SIC and SCC based default files and the global default stack parameters in your batch file. The values provided in this circumstance do not need to represent actual file names; they are merely place holder values for the keywords.

Prepare the execute statement

The last line in the batch file runs the PtDataProc program. In the sample batch file provided in Figure 2 of Appendix B, you will see a line preceding the run line that creates a copy of the PtDataProc code having a unique name. It is this version of the program that is then executed in the last line. If you do this, the log and list files created by this run can be identified by this unique name. If you don't do this and run the program under a general name, every run of PtDataProc will create a log and a list file that replace any existing files of the same name.

You may find that you need to define a special area on your hard disk to use as work space when running PtDataProc. In the sample batch file, a work directory is defined on the last line following the execution of PtDataProc. The directory you reference here must be created prior to running the program. For example, the statement:
'sas ptdataproc_061600.sas -work /data/work15/dyl/' assigns a work directory called "/data/work15/dyl".

3.2.4 Execute PtDataProc

There are two ways to execute the batch file. One way is to type 'source' and then the batch file name. Alternatively, first set the permission on the file to 'execute.' You do this by using the UNIX CHMOD command and adding the execute permission to yourself, as the owner of the file, to anyone in your user group, and/or to anyone on the system. For example, 'chmod u+x PtDataProc.bat' gives you permission to execute the batch file. Refer to your UNIX manual for setting other permissions. After you have set the file permission, you can execute the batch file by typing the file name on the command line, for example, 'PtDataProc.bat'.

3.3 How do I know my run of PtDataProc was successful?

3.3.1 Check your SAS® log file

Review the output log file to check for errors or other flags indicating incorrect processing. To do this, search the log file for occurrences of the strings "error", "warning", "not found", and "uninitialized". These can indicate problems with input files or other errors.

You can also look at the number of records in the input inventory file and compare it to the number of records in the output inventory file. The number of records shouldn't change unless PtDataProc removed records during the quality assurance of the location data or during the windowing of the inventory. If so, you can determine the number of records written to the PtDataProc output files containing the records which have been dropped from the inventory (files “nolocate” and “nomodel”) and the SAS® file containing the records with zero emissions (file named by keyword ZEROEMIS).

3.3.2 Check your SAS® *list file*

The list file contains the following information:

- First 100 sites requiring location defaulting due to missing or invalid location data
- First 100 sites dropped from the inventory because a default location could not be determined; emissions total from all records dropped from inventory
- First 100 sites dropped from the inventory because the disagreement between the location and FIPS of the facility could not be resolved; emissions total from all records dropped from inventory
- Pollutant-level and state-level emissions totals and record counts after all location defaulting is complete
- First 100 sites with out-of-range stack parameters; emissions total from all records with out-of-range stack parameters
- Pollutant-level and state-level emissions totals and record counts after defaulting of stack parameters

3.3.3 Check other output files from PtDataProc

You should check for the existence of the output inventory file named by keyword FINAL if you chose to window the inventory, or by keyword OUTSAS if you didn’t. While either of these two files can serve as the input to PtAspenProc, you will likely want to use the file you reduced through the window function (named by keyword FINAL) to minimize the disk space use.

PtDataProc also creates SAS® and ASCII formatted output files containing more information on how the location and stack parameters were defaulted or dropped from the inventory. Table 3-9 describes these files.

Table 3-9. Additional QA Files Created by PtDataProc

PtDataProc Function	QA output files	File Contents
Quality assurance of location data		
	dfltloc	all records where location was defaulted because of missing or invalid location data
	nolocate.txt and nolocate	all records dropped from inventory because a default location could not be determined
	nomodel.txt and nomodel	all records dropped from inventory because discrepancy between location and state and county FIPS could not be resolved
Quality assurance of stack parameters		
	stkcheck	all records where stack parameters are outside a normally anticipated range of values you supply in the "Valid Stack Parameter Ranges" section of Table 3-8
Window inventory to exclude nonzero emissions and unlocated sites		
	file name assigned through keyword ZEROEMIS	all records dropped from the inventory where emission values are zero
	file name assigned through keyword NOLOCATE	all records dropped from inventory because either latitude and/or longitude are missing (Note: if you chose to quality assure the location data, then this file should be empty)

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CHAPTER 4
Point Source Processing
The ASPEN-Specific Program (PtAspenProc)

PtAspenProc is executed after PtDataProc. The resulting point source emission inventory is then used as input to PtTemporal (see Figure 1-1).

4.1 What is the function of PtAspenProc?

The ASPEN-Specific Processing Program (PtAspenProc) prepares pollutant-specific information for the ASPEN model and determines ASPEN modeling parameters. PtAspenProc performs the functions listed below:

- Selects pollutants, groups and/or partitions pollutants, and determines their characteristics
- Assigns urban/rural dispersion parameters
- Assigns vent type and building parameters

Figure 4-1 shows a flowchart of PtAspenProc. The following sections describe the above bullets.

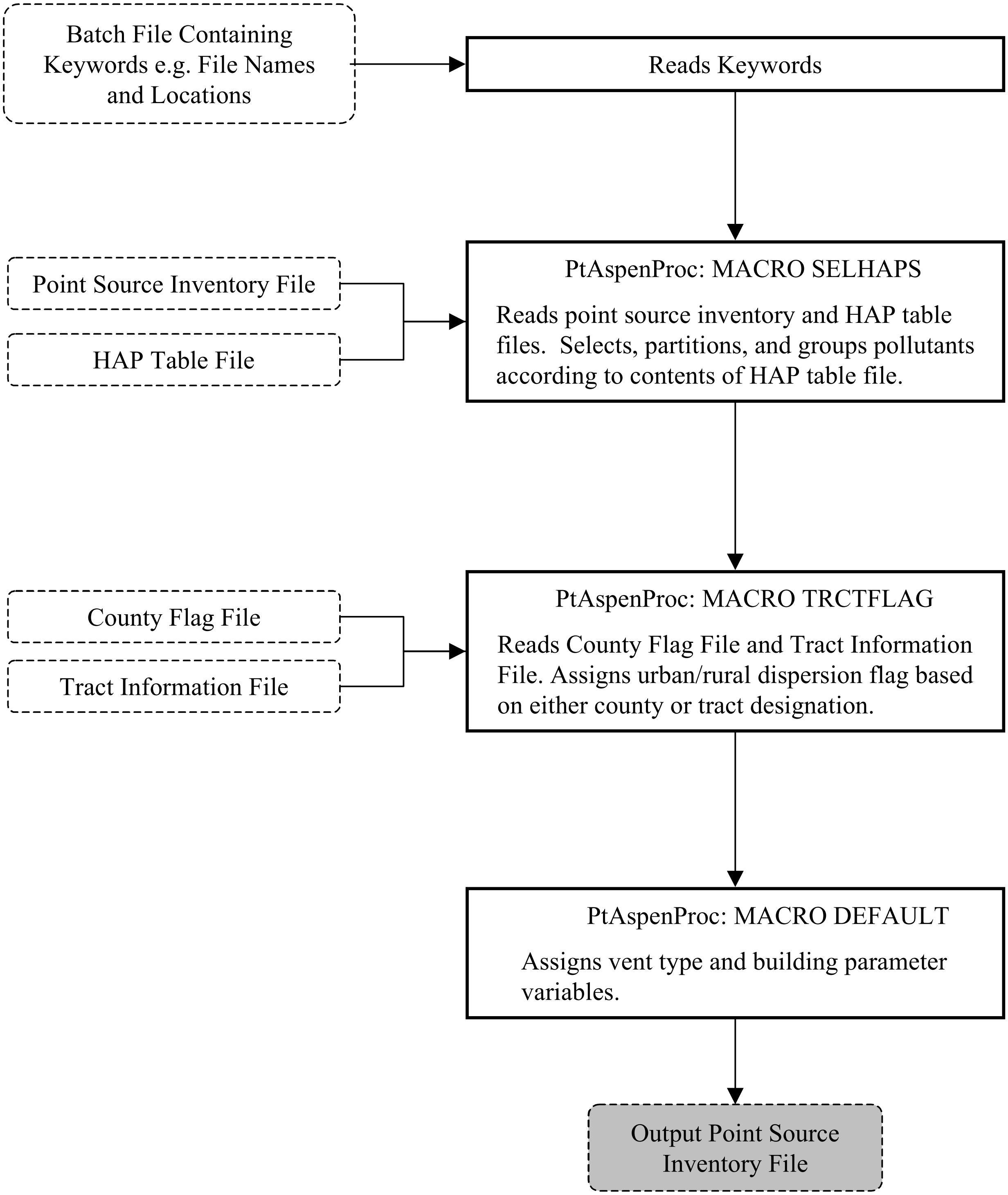

Figure 4-1. PtAspenProc Flowchart

4.1.1 Selects pollutants, groups and/or partitions pollutants, and determines their characteristics

PtAspenProc reads the point source inventory and selects, partitions, and groups pollutants to be modeled by ASPEN. It also assigns pollutant characteristics that tell ASPEN how to treat reactive decay and deposition. You control these processes through your entries in an ancillary file that we refer to as the "HAP table." PtAspenProc uses two HAP table files. One is used for the allocated aircraft emissions which you obtained by running AirportProc. The other is for all other (i.e., non-aircraft) point sources. PtAspenProc uses the source type variable (SRC_TYPE) to distinguish between aircraft point sources and all other point sources. All allocated aircraft emissions have SRC_TYPE = "nonroad". PtAspenProc's utilization of two different HAP tables gives you the flexibility to assign different pollutant characteristics (e.g., different particulate size classes for the particulate pollutants) to the pollutants from aircraft emissions.

PtAspenProc uses the HAP table to:

- Subset the inventory to include only those pollutants you've chosen to model
- Assign a reactivity class to each gaseous pollutant and a particulate size class to each particulate pollutant (through the variable REACT)
- Group multiple species into a single pollutant category
- Partition pollutants into multiple pollutant categories with different reactivity or particulate size classes (e.g., apportion lead chromate to lead compounds, fine particulate; lead compounds, coarse particulate; chromium compounds, fine particulate and chromium compounds, coarse particulate)
- Apply potency factors, molecular weight, or other adjustment factors (FACTOR variable) to the emissions of different species in a pollutant category
- Assign the resulting pollutant or pollutant category to be modeled in ASPEN a unique HAP code (variable NTI_HAP) used for inventory projections in PtGrowCntl, a unique pollutant group code (variable SAROAD) used for ASPEN modeling and a description of the group (variable SAROADDC)

Section 4.2.3 contains instructions on how to modify a HAP table to meet your needs. Appendix A, Tables 1-4 contain printouts of the HAP tables supplied with EMS-HAP. Appendix D, Sections D.5 and D.6 discuss the development of these HAP tables.

4.1.2 Assigns urban/rural dispersion parameters

The ASPEN model uses different dispersion coefficients and deposition rates for urban and rural sources. Thus, each emission source must be identified as being located in either an urban or a rural census tract. PtAspenProc supplies this information through the assignment of the urban/rural flag (UFLAG) where a value of 1 indicates an urban tract, and a value of 2 indicates a rural tract. In many cases, all of the tracts within a county are either all urban or all rural, and the assignment of the urban/rural flag is made by matching the state and county FIPS code to county data in an ancillary file called ctyflag which contains urban/rural flags for uniform (i.e., either all urban or all rural) counties. In cases where the tracts within a county are not uniformly urban or rural, PtAspenProc assigns the urban/rural flag by determining the specific tract in which the facility is located, and matching it to tract-level urban/rural data contained in an ancillary file called tractinf. The ancillary files supplied with EMS-HAP use the same urban/rural designations used in the EPA's Cumulative Exposure Project (CEP).[5] The CEP based the designation on residential population density data for 1990 (urban if greater than 750 people/km2), except for a few very small tracts. You can change these designations by changing ctyflag and tractinf. They are described briefly in Section 4.2.2 (Table 4-3), and their formats are provided in Figures 14 and 9, respectively of Appendix A.

4.1.3 Assigns vent type and building parameters

PtAspenProc assigns the vent type parameter and several building parameters required by the ASPEN model. The value of the vent type variable (IVENT) is assigned based on the stack type specified by the emission release point type variable (EMRELPTY) according to the scheme summarized in Table 4-1. An IVENT value of 0 (zero) represents a stacked vent and the ASPEN model performs plume rise calculations for these stacks. When the IVENT value is 1, representing a non-stacked vent, ASPEN does not perform plume rise calculations.

Table 4-1. Assignment of Vent Type Variable

Stack Type	Value of EMRELPTY	Assigned Value of IVENT
vertical, goose neck, vertical with rain cap, downward-facing vent	2,4,5,6	0
horizontal	3	1
fugitive	1	1
aircraft emissions	AP	1

The building parameters required by the ASPEN model are a building code (IBLDG), building width (BLDW), and building height (BLDH). For horizontal stacks, PtAspenProc sets the building code to "1" and both building dimension variables to 5 meters. For all other stacks, the building code is set to "0" and both dimension variables are set to 0 meters.

4.2 How do I run PtAspenProc?

4.2.1 Prepare your point source inventory for input into PtAspenProc

The point source inventory you use for input into PtAspenProc can come from a variety of sources, but you will likely use the output inventory created by PtDataProc (see Chapter 3). If your inventory has allocated aircraft emissions (from running AirportProc) you will have had to run PtDataProc in order to default the missing aircraft emission stack parameters. If your input to PtAspenProc is the result of processing through PtDataProc, the inventory will meet all requirements. This inventory will contain at least the variables listed in Table 4-2. It may contain additional variables such as the diagnostic flag variables (LFLAG, FIPFLAG, etc.)

created by PtDataProc depending on the options you chose for the windowing function in PtDataProc (see 3.1.3).

Table 4-2. Variables in the PtAspenProc Input Point Source Inventory SAS® File

Variables used by PtAspenProc are in bold;
other variables listed are used by previously run or subsequent point source processing programs

Variable Name	Data Description (Required units or values are in parentheses)	Type*
ACT_ID	code identifying a unique activity within a process at a unique site	A25
CNTL_EFF[a]	baseline control efficiency, expressed as a percentage	N
COOR_ID	code identifying a unique set of geographic coordinates	A20
EMIS	pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within an activity	A50
EMRELPTY	physical configuration code of release point (01=fugitive; 02=vertical stack; 03=horizontal stack, 04=goose neck, 05=vertical with rain cap, 06=downward-facing vent, AP=aircraft)	A4
FIPS	5-digit FIPS code (state and county combined)	A5
LAT	latitude (in decimal degrees)	N
LON	longitude (in negative decimal degrees)	N
MACTCODE	process or site-level MACT code	A7
POLLCODE	unique pollutant code	A10
SCC	EPA source category code identifying the process	A10
SIC	Standard Industrial Classification (SIC) code for the site	A4
SITE_ID	code identifying a unique site	A20
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions). If you choose to define ASPEN source groups by this variable as explained in 7.1.1, or run PtGrowCntl (Chapter 6) then it must have the value of 'major' or 'area' for non-aircraft emissions.	A15
STACKDIA	diameter of stack (meters)	N
STACKHT	height of stack (meters)	N
STACKVEL	velocity of exhaust gas stream (meters per second)	N
STKTEMP	temperature of exhaust gas stream (Kelvin)	N

* Ax = character string of length x, N = numeric
[a] required only by the optional Growth and Control Program (Chapter 6)

4.2.2 Determine whether you need to modify the ancillary input files for PtAspenProc

An ancillary file is any data file you input to the program other than your emission inventory. Table 4-3 lists the ancillary input files for PtAspenProc. The ones you'll likely need to modify are the HAP table files. Four different HAP table files are provided with EMS-HAP. These files were developed for use with different emission data sources (point and area, onroad mobile, and nonroad mobile) and for different pollutant types (directly emitted HAPs, and HAP precursors that lead to secondary HAP formation). In Appendix D, Section D.5 details how we developed the HAP table files for directly emitted HAPs, and Section D.6 details how we developed the HAP table for the precursors. All of these files contain the same type of information in the same format. You will probably want to modify these HAP table files in order to select and group the pollutants for your modeling needs. A description of the function and format of a HAP table file is presented in the next section. Complete listings of the individual HAP table files provided with EMS-HAP can be found in Appendix A (Tables 1-4).

Table 4-3. Required Ancillary Input Files for PtAspenProc

Name	Purpose	Need to Modify	Format
HAP table for non-aircraft point sources	Selects pollutants to be modeled, assigns reactivity and particulate size classes, groups pollutants, adjusts emissions for non-aircraft point source emission records	If you choose to change selection or characteristics of pollutants from those in files provided with EMS-HAP	Text
HAP table for aircraft sources	Selects pollutants to be modeled, assigns reactivity and particulate size classes, groups pollutants, adjusts emissions for allocated aircraft emission records	If you choose to change selection or characteristics of pollutants from those in files provided with EMS-HAP	Text
tractinf	Provides census tract centroid location and radius and urban/rural dispersion flag for assigning dispersion flag to a site at the tract-level	If you choose to update the tract-level urban/rural dispersion designations	SAS®
ctyflag	Assigns urban/rural dispersion flag based on county FIPS for counties with uniform census tracts	If you've updated the tract-level urban/rural dispersion designations	SAS®

4.2.3 Modify the HAP table input files

We've supplied you with four HAP Table files.

1) point_area HAP table (haptabl_point_area.txt)
2) onroad mobile HAP table (haptabl_onroad.txt)
3) nonroad mobile HAP table (haptabl_nonroad.txt)
4) precursor HAP table (haptabl_precursor.txt), which applies to precursors from point, area, onroad and nonroad sources.

Precursors are pollutants that cause HAPs to form secondarily in the atmosphere. They may or may not be HAPs themselves. More information about processing HAP precursors can be found in Appendix D, Section D.6.

PtAspenProc uses two HAP table files in a single run. One is for aircraft emission sources which were allocated to specific locations by the AirportProc program, and one is for non-aircraft point sources. Before you run PtAspenProc you'll need to select the appropriate HAP tables and modify them to fit your modeling needs and your inventory. If you are running the direct emissions of HAPs, then select the point_area HAP table for non-aircraft emissions and nonroad HAP table for aircraft emissions. Select the precursor HAP table for both non-aircraft point sources and aircraft point sources if you are processing precursors to HAPs; Figure 3 of Appendix B provides example batch files with these HAP table selections.

You may not need to modify any of the HAP table files provided with EMS-HAP. The most likely reason to modify one of these files would be to select different pollutants or to assign particulate size classes differently. In addition, you must change the file if it does not include all species contained in your inventory. Do this by adding records for these species to a HAP table file. Otherwise, EMS-HAP won't process these pollutants and it won't pass them to the ASPEN model.

The remainder of this section describes the HAP table file. It describes how EMS-HAP uses the information contained in the HAP table, and gives you the background you need to make decisions on modifying the HAP tables for use with your inventory.

Key Features of the HAP table

With the HAP table, you can select which pollutants to retain from your emission inventory. You can also group pollutants together (e.g., group lead oxide and lead chromate into lead compounds) or partition pollutants (e.g., partition lead chromate into lead compounds and chromium compounds). Depending on your inventory, you may need to modify the emission values to account for such things as reactivity differences between two pollutants in the same group or expressing the mass of metal-containing HAPs as the mass of the metal (which you may want to do if you are combining emissions from several different metal-containing HAPs).

PtAspenProc makes these adjustments to the emissions by applying a weighting factor also included in the HAP table file. Last, ASPEN modeling requires that every pollutant or pollutant group be assigned a unique code and a corresponding reactivity class for the SAROAD code. PtAspenProc assigns these based on the information in the HAP table file.

Table 4-4 shows the format of the HAP tables that PtAspenProc uses for HAP-specific processing. All variables except for POLLDESC and SAROADDC are required to have values for the pollutants you choose to model. However, values of those variables would be useful for interpreting information in the SAS® list file (see Section 4.3.2). PtAspenProc does not default any information not present in your HAP table. Table 4-5 gives sample entries which illustrate the key HAP-specific modeling features of EMS-HAP.

Table 4-4. Structure of the HAP Table

Variable name used in PtAspenProc	Description	Type*	Column	Length	Range
POLLDESC	Individual chemical name, prior to aggregation	C	1	45	
SAROADDC	Name of the aggregated SAROAD code	C	47	50	
POLLCODE	Code identifying individual chemical in inventory (typically a Chemical Abstracts System [CAS] No.)	C	100	10	
REACT	Reactivity or Particle Size Class	N	113	1	1-9
KEEP	Flag determining whether chemical will be modeled	C	121	1	Y or N
SAROAD	Code defining a single chemical or group of chemicals for modeling. Can be an historic SAROAD code, or arbitrarily assigned.	C	128	5	
FACTOR	Emission adjustment factor	N	135	7	
NTI_HAP	Code identifying HAP on the Clean Air Act HAP list. Used only in projection program PtGrowCntl (Chapter 6)	C	144	3	1-188

* Type C=character, N=numeric

Table 4-5. Sample Entries in a HAP Table

Inventory species name	HAP category name	NTI species code	React-ivity class	Keep ?	SAROAD code	Factor to adjust to emission value (TEF or other)	NTI HAP No.
Dioxins, total, w/o individ. isomers reported	Dioxins/Furans as TEQ, upper bound	610	1	Y	80245	1.000	903
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	Dioxins/Furans as TEQ, upper bound	40321764	1	Y	80245	0.500	903
2,3,7,8-Tetrachlorodibenzo-p-dioxin	Dioxins/Furans as TEQ, upper bound	1746016	1	Y	80245	1.000	903
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	Dioxins/Furans as TEQ, upper bound	19408743	1	Y	80245	0.100	903
1,2,3,4,6,7,8-Heptachlorodibenzo-p-/dioxin	Dioxins/Furans as TEQ, upper bound	35822469	1	Y	80245	0.010	903
Octachlorodibenzo-p-dioxin	Dioxins/Furans as TEQ, upper bound	3268879	1	Y	80245	0.001	903
Dioxins, total, w/o individ. isomers reported	Dioxins/Furans as TEQ, lower bound	610	1	Y	80245	0.000	903
2,3,7,8-Tetrachlorodibenzo-p-dioxin	Dioxins/Furans as TEQ, lower bound	1746016	1	Y	80412	1.000	903
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	Dioxins/Furans as TEQ, lower bound	40321764	1	Y	80412	0.500	903
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	Dioxins/Furans as TEQ, lower bound	19408743	1	Y	80412	0.100	903
1,2,3,4,6,7,8-Heptachlorodibenzo-p-/dioxin	Dioxins/Furans as TEQ, lower bound	35822469	1	Y	80412	0.010	903
Octachlorodibenzo-p-dioxin	Dioxins/Furans as TEQ, lower bound	3268879	1	Y	80412	0.001	903
Lead & Compounds	Lead compounds, fine particulate	195	2	Y	80193	0.740	122
Lead carbonate	Lead compounds, fine particulate	598630	2	Y	80193	0.574	122
Lead titanate	Lead compounds, fine particulate	12060003	2	Y	80193	0.506	122
Lead sulfate	Lead compounds, fine particulate	7446142	2	Y	80193	0.506	122
Lead oxide	Lead compounds, fine particulate	1309600	2	Y	80193	0.687	122
Lead nitrate	Lead compounds, fine particulate	10099748	2	Y	80193	0.463	122
Lead & Compounds	Lead compounds, coarse particulate	195	3	Y	80393	0.260	122
Lead carbonate	Lead compounds, coarse particulate	598630	3	Y	80393	0.202	122
Lead titanate	Lead compounds, coarse particulate	12060003	3	Y	80393	0.178	122
Lead sulfate	Lead compounds, coarse particulate	7446142	3	Y	80393	0.178	122
Lead oxide	Lead compounds, coarse particulate	1309600	3	Y	80393	0.241	122
Lead nitrate	Lead compounds, coarse particulate	10099748	3	Y	80393	0.163	122
Hydrogen Cyanide	Cyanide Compounds, gas	74908	1	N	80145	0.963	82

Selecting the pollutants you want to model

Set the KEEP variable to "Y" for each pollutant that you want to model, and "N" for each pollutant you don't want to model. EMS-HAP uses this variable to determine which records to keep for further processing. EMS-HAP will keep records for the pollutants in the HAP table with KEEP equal to "Y" and drop records for pollutants with KEEP equal to "N."

Assigning reactivity and particulate size classes to the pollutants

Make sure your HAP table has an assignment of the reactivity variable for every pollutant you want to model. If you have additional information on how HAPs partition between fine and coarse particulate size classes or between gas and particulate matter, you may want change how they are partitioned in the HAP tables provided. To do this, you need to also read about combining and partitioning inventory species into groups presented in the next section.

EMS-HAP uses the REACT variable to provide ASPEN information on the amount of decay or deposition to use for each pollutant. As emissions disperse downwind, most organic HAPs are gradually converted to other compounds. Particulate HAPs gradually settle and deposit as they disperse downwind from an emission source. The REACT variable in Table 4-4, specifies the reactivity class, or in the case of particulate HAPs, the particulate size class. EMS-HAP uses these classes to establish and provide decay rate information for the ASPEN input files, as discussed in Chapter 7, Section 7.1.2.

ASPEN uses up to seven reactivity classes to quantify degradation of gaseous organic pollutants, and two classes to distinguish between fine and coarse particulate pollutants. These classes are:

- non-reactive or very low reactivity (REACT=1)
- low reactivity (REACT=9)
- medium low reactivity (REACT=4)
- medium reactivity (REACT=5)
- medium high reactivity (REACT= 6)
- high reactivity (REACT=8)
- very high reactivity (REACT=7)

- fine: particles with aerodynamic diameter less than 2.5 Fm- (REACT=2)
- coarse: particles with aerodynamic diameter beween 2.5 and 10 Fm- (REACT=3)

This classification system and the associated decay coefficients were developed for the Cumulative Exposure Project (CEP).[6] The decay coefficients are located in the ancillary file called indecay.txt. This file is used with PtFinalFormat (Chapter 7, see 7.2.2) and AMProc (Chapter 10, see 10.2.2). Appendix A, Figure 26, contains sample file contents for indecay.txt.

Combining/partitioning inventory species into groups

To group or partition inventory species, follow the directions in Table 4-6 below. If you are partitioning HAPs, you must also adjust the FACTOR variable as discussed in the following section.

Table 4-6. Directions for Partitioning or Grouping of Inventory Species

If you want to	Then	For Example......
Partition a pollutant into more than one category.	Use multiple records (in the HAP table) with the same POLLCODE value and different SAROAD values. You need a separate record for each HAP category to which the pollutant is assigned. Also see Table 4-7 for information on how to adjust the FACTOR variable.	Table 4-5 shows "Lead & Compounds" partitioned to "Lead Compounds, coarse" and "Lead Compounds, fine" categories.
Group multiple inventory species to the same HAP category.	Use multiple records (in the HAP table) with the same SAROAD value, and different POLLCODE values.	Table 4-5 shows that both "Dioxins, total, w/o individ. isomers reported"and "1,2,3,7,8-Pentachlorodibenzo-p-dioxin" are assigned to the "Dioxins/Furans as TEQ, upper bound" HAP group.
Partition a pollutant into different particle size classes, while at the same time grouping it together with other pollutants in a HAP category.	Use two records for each pollutant. Both records have the same POLLCODE but different SAROAD codes. One record has a SAROAD representing the fine particulate group, and one record has a SAROAD representing the coarse particulate group.	Table 4-5 shows how to group six lead inventory entries into "Lead Compounds" and in turn divide them into fine (REACT =2) and coarse (REACT =3) particulates. Note that 12 records are needed in the HAP table, two for each of the 6 species.

Adjusting emissions

Use the FACTOR variable to make adjustments to emissions as shown in Table 4-7. If you are not adjusting emissions, you must set the FACTOR variable to 1. A missing FACTOR variable will drop emissions for that pollutant from your inventory.

Table 4-7. Using FACTOR Variable to Adjustment Emissions

Use FACTOR to........	For Example......
Apportion a pollutant's emissions into more than one category	If "Lead & Compounds" contained 26% coarse particulate and 74% fine particulate, the factors (hereafter referred to as "split factors") to apportion emissions into coarse and fine particulate classes would be 0.26 and 0.74, respectively
Adjust the emissions of a metal or cyanide compound to account for only the metal or cyanide portion of the compound	To quantify how much cyanide gas emissions come from Hydrogen Cyanide (CHN), use a factor (hereafter referred to as "metal reduction factor") equal to the ratio of the molecular weight (MW) of total cyanide moles in CHN to the molecular weight of CHN. The MW of cyanide moles is 26.0177, and the MW of CHN is 27.0256. The factor for CHN is therefore 26.0177/27.0256= 0.9627.
Adjust the emissions of a metal or cyanide compound to account for only the metal or cyanide portion of the compound *and* apportion the emissions into more than one category	Combine the coarse fine split factor and metal reduction factor by multiplying them together. For Lead Carbonate (CO3Pb), the metal reduction factor is the MW of lead (207.9) divided by the MW of CO3Pb (267.2092), which is 0.7754. Given a 26/74 coarse/fine split, the factor used in the HAP table for processing lead carbonate for the coarse lead category is 0.7754*0.26= 0.202, and the factor for the fine lead category is 0.7754*0.74 = 0.574
Adjust the emissions of a dioxin congener to 2,3,7,8-tetrachlorodibenzodioxin toxic equivalents (TEQs) using a toxics equivalency factor (TEF)	1,2,3,7,8-Pentachlorodibenzo-p-dioxin has a TEF of 0.5, thus use a factor of 0.5 to adjust this species to TEQ.
Apply two different TEFs for those dioxin/furans that can not be converted to TEQ to produce both upper and lower bound estimates for dioxin/furans	Assign a TEF of 1.0 to "Dioxins, total, w/o individ. isomers reported" to reflect an upper end estimate of TEQ. Assign it a TEF of 0.0 to reflect a lower bound estimate of TEQ

The emissions for a HAP category is the sum of the adjusted emission for each species in the category. The following hypothetical example illustrates how PtAspenProc groups and partitions inventory species. Refer to Table 4-5 for the factors used in this example. A given stack emits lead oxide, lead carbonate, and lead sulfate emissions. PtAspenProc calculates the emissions (E) of lead compounds fine particulate (SAROAD= 80193) from that stack as:

$$E_{\text{lead compounds, fine particulate}} = 0.687*E_{\text{Lead oxide}} + 0.574*E_{\text{Lead carbonate}} + 0.506*E_{\text{lead sulfate}}$$

The emissions of lead compounds coarse particulate (SAROAD=80393) are calculated as:

$$E_{\text{lead compounds, coarse particulate}} = 0.241*E_{\text{Lead oxide}} + 0.202*E_{\text{Lead carbonate}} + 0.178*E_{\text{lead sulfate}}$$

4.2.4 Prepare your batch file

The batch file serves two purposes: (1) allows you to pass "keywords" such as file names and locations, program options, and run identifiers to the program, and (2) sets up the execute statement for the program. A sample batch file for PtAspenProc is shown in Figure 3 of Appendix B.

Specify your keywords

Table 4-8 describes the keywords required in the batch file. Use keywords to locate and name all input and output files.

Table 4-8. Keywords in the PtAspenProc Batch File

Keyword	Description of Value
	Input Inventory Files
IN_DATA	Input SAS® file directory
INSAS	Input inventory SAS® file name
	Ancillary or Reference Files (Prefix of file name provided with EMS-HAP)
REFSAS	Reference SAS® file directory
REFTEXT	Reference text file directory
PTHAPS	HAP table file prefix; used for non-aircraft point source emissions (haptabl_point_area or haptabl_precursor)
MOBHAPS	HAP table file prefix; used for aircraft point source emissions (haptabl_nonroad or haptabl_precursor)
CTYFLAG	County FIPS to urban/rural flag correspondence SAS® file for counties with a uniform flag for all tracts within the county (ctyflag)
TRCTINF	Census tract information SAS® file containing data necessary to assign an urban/rural flag (tractinf)
	Additional Input Data
EMISVAR	Variable name containing the emission data values
	Output files
OUTDATA	Output SAS® file directory
OUTSAS	Output inventory SAS® file name

Prepare the execute statement

The last line in the batch file runs the PtAspenProc program. In the sample batch file provided in Appendix B, you will see a line preceeding the run line that creates a copy of the PtAspenProc code having a unique name. It is this version of the program that is then executed in the last line. If you do this, the log and list files created by this run can be identified by this unique name. If you don't do this and run the program under a general name, every run of PtAspenProc will create a log and a list file that will replace any existing files of the same name.

You may find that you need to assign a special area on your hard disk to use as work space when running PtAspenProc. In the sample batch file, a work directory is defined on the last line following the execution of PtAspenProc. For example, the command 'sas PtAspenProc_011300.sas -work /data/work15/dyl/' assigns a work directory called "/data/work15/dyl". The directory you reference must be created prior to running the program.

4.2.5 Execute PtAspenProc

There are two ways to execute the batch file. One way is to type 'source' and then the batch file name. Alternatively, first set the permission on the file to 'execute.' You do this by using the UNIX CHMOD command and adding the execute permission to yourself, as the owner of the file, to anyone in your user group, and/or to anyone on the system. For example, 'chmod u+x PtAspenProc.bat' gives you permission to execute the batch file. Refer to your UNIX manual for setting other permissions. After you have set the file permission, you can execute the batch file by typing the file name on the command line, for example, 'PtAspenProc.bat'.

4.3 How do I know my run of PtAspenProc was successful?

4.3.1 Check your SAS® *log file*

You need to review the output log file to check for errors or other flags indicating incorrect processing. This review should include searching the log files for occurrences of the strings "error", "warning", "not found", and "uninitialized". These can indicate problems with input files or other errors.

Depending on how you selected, partitioned, and grouped pollutants, the number of records in the output inventory file will be different from the number of records in the input inventory file. After the application of the HAP table files, the number of records in the output inventory file should not change when the urban/rural dispersion flag, vent type, and building parameters are added.

4.3.2 Check your SAS® *list file*

The list file contains the following information:

- List of records (if any) from the inventory with pollutant codes not included in the HAP tables
- List of pollutants codes retained for ASPEN modeling based on the HAP tables, including the SAROAD assignment and FACTOR variable
- List of pollutant codes not retained for ASPEN modeling based on the HAP tables, including any SAROAD assignment

- Comparison of pollutant code-level emission totals of aircraft and non-aircraft emissions retained for modeling, not retained for modeling, and in the input inventory files
- Pollutant code-level and SAROAD-level emission totals for emissions retained for ASPEN modeling after application of weighting factor
- SAROAD-level emission totals after selection of pollutants, application of weighting factor, and accumulation by SAROAD code
- SAROAD-level emission totals for output inventory from PtAspenProc

You should check to be sure that all pollutants of interest are included in your HAP tables by reviewing the first lists of records describe above. Any records with pollutant codes not found in the HAP tables are removed from the inventory. Based on these lists, you may need to revise your HAP table files and rerun PtAspenProc.

It is important to check the accuracy of the pollutant selection, the application of weighting factors, and the accumulation of emissions to the SAROAD code groups. The tables comparing the emission totals between the pollutants retained for modeling and those not retained to the input emission inventory is particularly useful for this purpose. It is also important to compare the pollutant-level emission totals before and after the application of the weighting factors.

4.3.3 Check other output files from PtAspenProc

You should check for the existence of the output inventory file named by keyword OUTSAS. This file will be the inventory input to PtTemporal.

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CHAPTER 5
Point Source Processing
The Temporal Allocation Program (PtTemporal)

PtTemporal is typically run after PtAspenProc (see Figure 1-1). You can input the resulting inventory from PtTemporal into the PtGrowCntl program to project your inventory to a future date, or the PtFinalFormat program to write out the emission input files for the ASPEN model.

5.1 What is the function of PtTemporal?

The PtTemporal program prepares the inventory for the ASPEN model by temporally allocating annual point source emissions. Temporal allocation is the process of estimating emissions at smaller temporal scales than the scales of the input emission inventory. The ASPEN model requires emissions for eight 3-hour periods within an annually-averaged day; this uniform allocation of annual emissions to days during the year results in each day of the year containing the same emissions. This program produces these eight emission estimates for the point source inventory. PtTemporal performs the following functions:

- Assigns an hourly temporal profile to each emission record
- Uses the hourly profiles to produce eight 3-hour emission rates

Figure 5-1 shows a flowchart of PtTemporal. The following sections describe the above bullets.

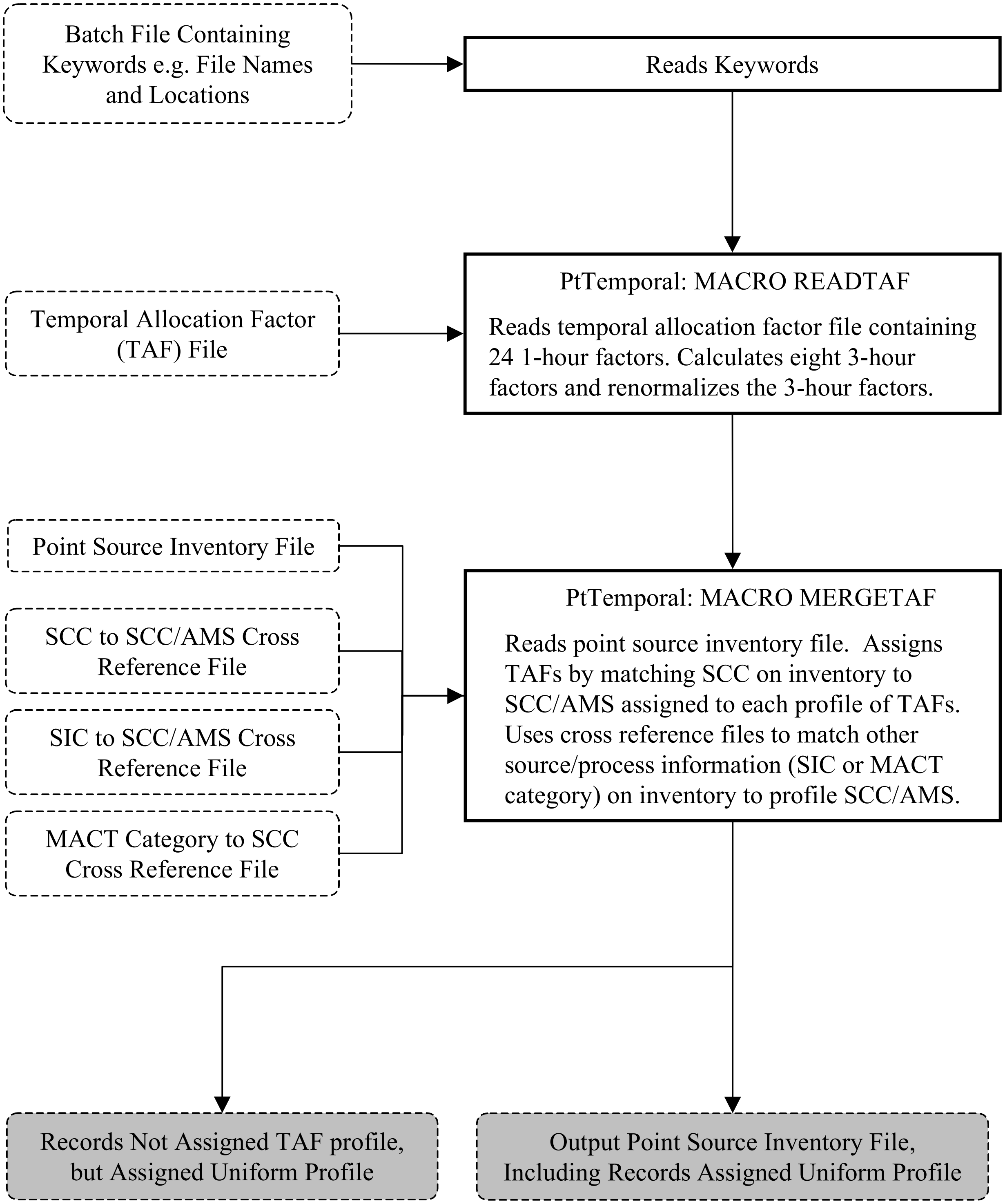

Figure 5-1. PtTemporal Flowchart

5.1.1 Assigns an hourly temporal profile to each emission record

EMS-HAP assigns temporal profiles from an ancillary temporal allocation factor (TAF) file. This file contains temporal profiles based on 8-digit AIRS Source Classification Codes (SCC) or 10-digit Area and Mobile System (AMS) codes. Each profile consists of 24 temporal allocation factors (TAFs) that can allocate annual emissions to each hour of an average day. Details on how we developed this file are presented in Appendix D, Section D.7. PtTemporal attempts to match each record in the emission inventory to a temporal profile in the TAF file based on either the SCC code, the Standard Industrial Classification (SIC) code, or the Maximum Achievable Control Technology (MACT) code. If the emission record contains an 8-digit SCC code, PtTemporal first attempts to match the record directly to a temporal profile. For those records without an SCC code or with a code for which no profile is provided, PtTemporal checks for other information that can be linked to an SCC or AMS code in the TAF file. By using several cross-reference files, PtTemporal attempts to link to temporal profiles using the following information on the inventory records in the order given: partial SCC code, SIC code, or MACT code. For records that still cannot be assigned a temporal profile, PtTemporal tries to match the first 6 digits of the SCC with the first 6 digits of the SCC codes in the TAF file. If none of this information links to a temporal profile, then the emissions are assigned uniform temporal allocation factors that evenly distribute the emissions over the eight 3-hour periods.

5.1.2 Uses the hourly profiles to produce eight 3-hour emission rates for each record

Because ASPEN requires emissions for eight 3-hour periods of an average day, PtTemporal uses the 24 hourly TAFs to produce emission rates for the 3-hour periods. Although the initial 24 hourly TAFs are assumed to be normalized to conserve mass, PtTemporal checks the normalization of the 3-hour TAFs for each profile. PtTemporal then applies the TAFs and, as required by ASPEN, converts the annual emission rate to grams/second.

The example shows the calculation for the 3-hour period from midnight to 3 am.

$$E_{0-3} = E_{ann} \times (HF_1 + HF_2 + HF_3) \times CF_1 \times CF_2 \times CF_3 \times CF_4 \times CF_5 \qquad \text{(eq. 5-1)}$$

where:

E_{0-3} = emission rate during the midnight to 3 a.m. time period for an average day (grams/second)

E_{ann} = annual emissions (tons/year)

HF_n = temporal allocation factor for hour "n" (fraction of daily emissions occurring in hour "n" - dimensionless)

CF_1 = conversion factor (1 year / 365 days)

CF_2 = conversion factor (1 day / 24 hours)

CF_3 = conversion factor (1 hour / 3600 seconds)

CF_4 = conversion factor (2000 lbs / 1 ton)

CF_5 = conversion factor (453.592 grams /1 lb)

5.2 How do I run PtTemporal?

5.2.1 Prepare your point source inventory for input into PtTemporal

The point source inventory you use for input into PtTemporal must be the output of PtAspenProc if you intend to create ASPEN-input files. If you don't intend to create ASPEN-input files, you could use the output from PtDataProc as the input into PtTemporal. The inventory produced by either PtDataProc or PtAspenProc will meet all requirements. The inventory produced by PtAspenProc will contain at least the variables listed in Table 5-1. It may contain additional variables such as the diagnostic flag variables (LFLAG, FIPFLAG, etc.) created by PtDataProc depending on the options you chose for the windowing function in PtDataProc (see 3.1.3).

Table 5-1. Variables in the PtTemporal Input Point Source Inventory SAS® File
Variables used by PtTemporal are in bold;
other variables listed are used by previously run or subsequent point source processing programs

Variable Name	Data Description (Required units or values are in parentheses)	Type*
ACT_ID	code identifying a unique activity within a process at a unique site	A25
BLDH	ASPEN building height (in meters) (5 for horizontal stacks, 0 for all other stacks); assigned in PtAspenProc (see Section 4.1.3)	N
BLDW	ASPEN building width (in meters) (5 for horizontal stacks, 0 for all other stacks); assigned in PtAspenProc (see Section 4.1.3)	N
CNTL_EFF[a]	baseline control efficiency, expressed as a percentage	N
COOR_ID	code identifying a unique set of geographic coordinates	A20
EMIS	pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within an activity	A50
EMRELPTY	physical configuration code of release point (01=fugitive; 02=vertical stack; 03=horizontal stack, 04=goose neck, 05=vertical with rain cap, 06=downward-facing vent, AP=aircraft)	A4
FIPS	5-digit FIPS code (state and county combined)	A5
IBLDG	ASPEN building code (1 for horizontal stacks, 0 for all other stacks) assigned in PtAspenProc (see Section 4.1.3)	A1
IVENT	ASPEN vent type (0 for stacked sources, 1 for non-stacked sources) assigned in PtAspenProc (see Section 4.1.3)	A1

Table 5-1. Variables in the PtTemporal Input Point Source Inventory SAS® File
(Continued)

Variable Name	Data Description (Required units or values are in parentheses)	Type*
LAT	latitude (in decimal degrees)	N
LON	longitude (in negative decimal degrees)	N
MACTCODE	process or site-level MACT code	A7
NTI_HAP	code identifying HAP on the Clean Air Act HAP list; assigned in PtAspenProc (see Section 4.1.1)	A3
POLLCODE	unique pollutant code	A10
REACT	pollutant reactivity class (1-9); assigned in PtAspenProc (see Section 4.1.1)	N
SAROAD	unique pollutant-group code; assigned in PtAspenProc (see Section 4.1.1)	A10
SAROADDC	descriptive name for the SAROAD; assigned in PtAspenProc (see Section 4.1.1)	A50
SCC	EPA source category code identifying the process	A10
SIC	Standard Industrial Classification (SIC) code for the site	A4
SITE_ID	code identifying a unique site	A20
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions) If you choose to define ASPEN source groups by this variable as explained in 7.1.1, or run PtGrowCntl (Chapter 6) then it must have the value of 'major' or 'area' for non aircraft emissions.	A15
STACKDIA	diameter of stack (meters)	N
STACKHT	height of stack (meters)	N
STACKVEL	velocity of exhaust gas stream (meters per second)	N
STKTEMP	temperature of exhaust gas stream (Kelvin)	N
UFLAG	urban/rural dispersion flag (1 for urban, 2 for rural); assigned in PtAspenProc (see Section 4.1.2)	N

*Ax = character string of length x, N = numeric
[a] required only if you run the optional Growth and Control Program (Chapter 6)

5.2.2 Determine whether you need to modify the ancillary input files for PtTemporal

An ancillary file is any data file you input to the program other than your emission inventory. Table 5-2 lists the ancillary input files required for PtTemporal and when you may need to modify them.

Table 5-2. Required Ancillary Input Files for PtTemporal

Name of File Provided with EMS-HAP	Purpose	Need to Modify?	Format
taff_hourly.txt	Provides temporal profiles containing 24 hourly temporal allocation factors (TAFs) by SCC and/or AMS codes	When additional source specific temporal factors become available	Text
scc2ams.txt	Provides cross reference between SCC on inventory to SCC and/or AMS in order to assign temporal profile	When inventory contains records with partial SCC codes, or SCC codes that are not in the cross-reference file or TAF file	Text
sic2ams.txt	Provides cross reference between SIC on inventory to SCC and/or AMS in order to assign temporal profile	When inventory contains records with the source category identified by SIC codes that are not in the cross-reference file	Text
mact2scc.txt	Provides cross reference between MACT code on inventory to SCC in order to assign temporal profile	When inventory contains records with the source category identified by MACT category codes that are not in the cross-reference file	Text

5.2.3 Modify the temporal allocation factor file (taff_hourly)

The primary ancillary input file for PtTemporal is the temporal allocation factor (TAF) file (taff_hourly). This is a common file used for point, area, and mobile source emission processing within EMS-HAP. This file provides 24 hourly allocation factors that are applied to emissions sources based on 8-digit SCC or 10-digit AMS codes. Local time zones are used. The TAFs should be normalized and, therefore, sum to 1 to conserve mass. Details on the development of this file are presented in Appendix D, Section D.7, and Figure 15 of Appendix A contains the file format. You can modify the allocation factors for existing profiles or add new profiles.

5.2.4 Modify the cross-reference files used to link inventory records to the temporal allocation factor file (scc2ams, sic2ams, and mact2scc)

PtTemporal uses three cross-reference files for cases where there the SCC is missing or the value contained on the emission inventory record can't be linked directly to the SCC and/or AMS on the TAF file. These cross-reference files provided with EMS-HAP were developed to accommodate the types of source category information included in the 1996 NTI. For instance, the 1996 NTI does not include SCC for every emission record or sometimes uses a shortened 1-digit, 3-digit or 6-digit SCC. Therefore, one cross-reference file (scc2ams.txt) links generic 1-digit, 3-digit, and 6-digit SCCs to the 8-digit SCC and 10-digit AMS codes used in the temporal profile file. Another file links SIC codes to SCC and AMS codes (sic2ams.txt), and is used in cases where no SCC is included on the emission record, but an SIC is included. A third file links MACT codes to SCC and AMS codes (mact2scc.txt), and is used for cases where no SCC code is present on the emission record, but a MACT code is available. The formats for these three files are provided in Figures 16, 17 and 18 of Appendix A. Details on how we developed these files are presented in Appendix D, Section D.9.

You would expect to modify any of these files depending on the source category information included in your emission inventory. You might consider modifying these files after executing PtTemporal if you find that a large number of records with some form of source category information cannot be matched to a temporal profile and, therefore, are being assigned a uniform profile. You can determine which records are being assigned a uniform profile by looking at the log and list files and a special SAS® file, named "notaf," created when you run PtTemporal (see Section 5.3.3 for more details).

5.2.5 Prepare your batch file

The batch file serves two purposes: (1) allows you to pass "keywords" such as file names and locations, program options, and run identifiers to the program, and (2) sets up the execute statement for the program. A sample batch file for PtTemporal is shown in Figure 4 of Appendix B.

Specify your keywords

Table 5-3 describes the keywords required in the batch file. Use keywords to locate and name all input and output files.

Table 5-3. Keywords in the PtTemporal Batch File

Keyword	Description of Value
	Input Inventory Files
IN_DATA	Input SAS® file directory
INSAS	Input inventory SAS® file name
	Ancillary Files (Prefix of file name provided with EMS-HAP in parentheses)
REFFILE	Ancillary text file directory
TAF	Temporal profile text file (taff_hourly)
SCCLINK	SCC to AMS cross-reference text file (scc2ams)
SICLINK	SIC to SCC or AMS code cross-reference text file (sic2ams)
MACTLINK	MACT category code to SCC or AMS code cross-reference text file (mact2scc)
	Additional Input Data
EMISVAR	Variable name containing the values to be temporally allocated
	Output files
OUTDATA	Output SAS® file directory
OUTSAS	Output inventory SAS® file name

Prepare the execute statement

The last line in the batch file runs the PtTemporal program. In the sample batch file provided in Appendix B, you will see a line preceding the run line that creates a copy of the PtTemporal code having a unique name. It is this version of the program that is then executed in the last line. If you do this, the log and list files created by this run can be identified by this unique name. If you don't do this and run the program under a general name, every run of PtTemporal will create a log and list file that will replace any existing files of the same name.

You may find that you need to assign a special area on your hard disk to use as work space when running PtTemporal. In the sample batch file, a work directory is defined on the last line following the execution of PtTemporal. For example, the command 'sas PtTemporal_062000.sas -work /data/work15/dyl/' assigns a work directory called "/data/work15/dyl". The directory you reference must be created prior to running the program.

5.2.6 Execute PtTemporal

There are two ways to execute the batch file. One way is to type 'source' and then the batch file name. Alternatively, first set the permission on the file to 'execute.' You do this by using the UNIX CHMOD command and adding the execute permission to yourself, as the owner of the file, to anyone in your user group, and/or to anyone on the system. For example, 'chmod u+x PtTemporal.bat' gives you permission to execute the batch file. Refer to your UNIX manual for setting other permissions. After you have set the file permission, you can execute the batch file by typing the file name on the command line, for example, 'PtTemporal.bat'.

5.3 How Do I Know My Run of PtTemporal Was Successful?

5.3.1 Check your SAS® log file

You should review the output log file to check for errors or other flags indicating incorrect processing. This review should include searching the log files for occurrences of the strings "error", "warning", "not found", and "uninitialized". These can indicate problems with input files or other errors.

You can look at the number of records in the input inventory file and compare it to the number of records in the output inventory file. The number of records should be the same in these two files.

5.3.2 Check your SAS® list file

The list file created when PtTemporal is executed contains information to assist in quality assurance. The information is this file is listed below:

- List of records from the temporal allocation factor (TAF) file where the sum of the allocation factors before normalization is less than 0.9 or greater than 1.1

- Annual emission totals of the temporally allocated emissions and the unmatched (uniformly allocated by default) emissions by SAROAD code

5.3.3 Check other output files from PtTemporal

You should check for the existence of the output inventory file named by keyword OUTSAS. This file will serve as the input to the next point source processing program you choose to run. PtTemporal also creates a SAS® output file named notaf. This file contains information on the emission records not assigned a specific temporal profile. For these records, emissions were uniformly allocated to each of the eight 3-hour time periods. You can reduce the number of records appearing in this file in several ways. You can modify the TAF file (taff_hourly) by adding SCC codes and corresponding temporal allocation factors. You can modify one of the cross-reference files in order to link an AMS or SCC code in the TAF file with the source or process information is contained on the emission records (i.e., SCC, SIC, or MACT). See Section 5.2.4 for a description of the cross-reference files (scc2ams.txt, sic2ams.txt, or mact2scc.txt).

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CHAPTER 6
Point Source Processing
The Growth and Control Program (PtGrowCntl)

PtGrowCntl is executed after PtTemporal (see Figure 1-1). The output inventory is then used as the input to PtFinalFormat.

Note that this program is expected to undergo developmental changes, and we will provide updated documentation when the revised version is released. PtGrowCntl's control methodology is currently tailored to emission standards identified by the MACT code in the inventory or to facility specific information you provide. We refer to these emission standards as Maximum Achievable Control Technology (MACT) standards although they also include standards under Section 129 of the Clean Air Act. The current growth methodology relies solely on SIC-specific growth factors.

6.1 What is the function of PtGrowCntl?

The Growth and Control Program (PtGrowCntl) computes future emissions as a result of emission reduction strategy scenarios (currently MACT standards only) and projected economic growth. You control which of the two functions listed below are performed in any given execution of PtGrowCntl (Table 6-4 in Section 6.2.6 details how to do this).

- Assigns and applies growth factors to project emissions due to growth

- Assigns and applies emission reduction information to emissions

Figure 6-1 shows a flowchart of PtGrowCntl. The following sections describe the above bullets.

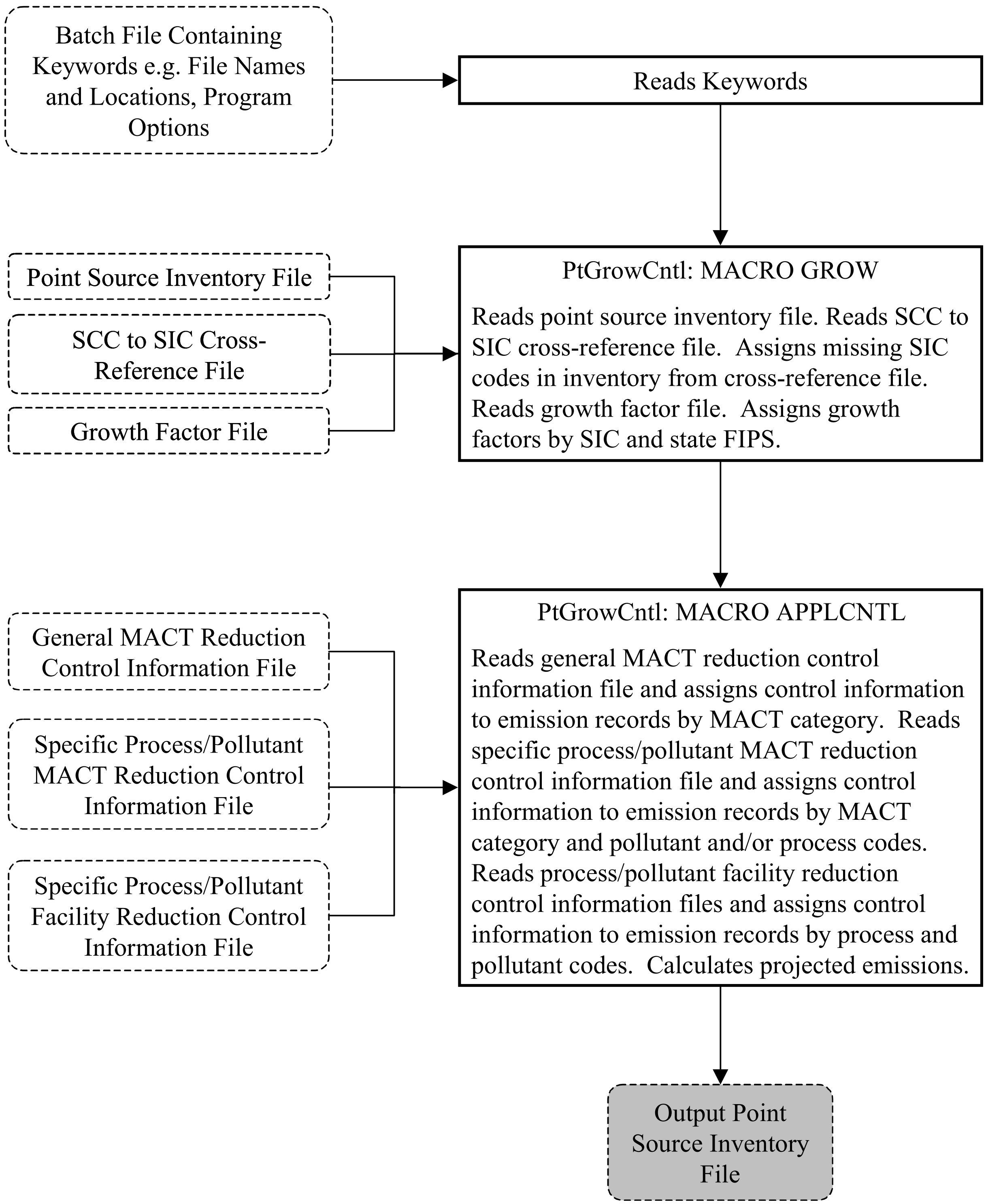

Figure 6-1. PtGrowCntl Flowchart

6.1.1 Assigns and applies growth factors to project emissions due to growth

PtGrowCntl assigns a growth factor to each emission record based on each record's state FIPS and the first two digits of the SIC code (PtGrowCntl does currently allow growth factors to be specified for one three-digit SIC code: '371'). You can choose to have PtGrowCntl assign SIC codes to those records in the inventory with missing values for SIC based on the inventory SCC codes (see keyword DOSCC in Table 6-4 in Section 6.2.6). PtGrowCntl uses an ancillary SCC to SIC cross-reference file (see Section 6.2.4) for this function.

PtGrowCntl uses growth factors, indexed by the state FIPS code and SIC, from an ancillary growth factor file (see Section 6.2.3). The growth factor file is specific to both the base year and future year. Each execution of PtGrowCntl results in an inventory file containing emissions projected to that one future year. PtGrowCntl computes grown 3-hour emission rates from the base year 3-hour emission rates for each record by multiplying the base year 3-hour emission rates by the assigned growth factor, as follows.

Grown emissions = (Base year baseline emissions) x (Growth factor)

The same growth factor is applied to all eight 3-hour emission rates. Note that any record will be assigned the default growth factor of one when there is no SIC code or when no match is found in the growth factor input file. In these cases, or, if you choose not to grow the emissions, the grown emissions will be unchanged from the base year emissions.

6.1.2 Assigns and applies emission reduction information to emissions

PtGrowCntl can assign emission reduction information several different ways; you choose the method by specifying keywords in the batch file (see Table 6-4 in Section 6.2.6). You supply the emission reduction information through ancillary files. You can supply information on a MACT-category level (e.g., for wood furniture manufacturing), and/or on a facility level (e.g., for the ABC company). The emission reduction information includes not only control efficiencies, but also information that tells PtGrowCntl whether and how to apply them to the inventory emission records.

In the next sections we discuss the emission reduction information, provide details on how PtGrowCtnl assigns it to the inventory records and present PtGrowCntl's computation of controlled emissions.

Emission Reduction Information

The emission reduction information you supply in the ancillary files consists of:

1. Two control efficiencies for the reduction strategy. One efficiency represents the emission reduction to be applied to existing sources; the other represents the emission reduction to be applied to new sources. PtGrowCntl gives you the flexibility to apply different efficiencies for new versus existing facilities because air pollution regulations often require a higher emission control efficiency for new facilities than for existing facilities. PtGrowCntl assumes that all new point sources are located at existing point sources. This would occur, for example, if an existing source rebuilt or constructed an additional operation to the extent that it (or part of it) would be considered a new source.

2. The percentage of emissions at existing sources that will come from new sources. PtGrowCntl uses this information to apportion the emissions into new source versus existing source emissions for each inventory record. A value of 100% would mean that in the future year, the entire MACT category (or specific facility) rebuilt to the extent that the efficiency for new sources would apply. A value of 50% would signify half of the emissions was due to new sources at the existing facilities and the other half was from the existing part.

3. An application control flag. PtGrowCntl uses this to determine whether or not to apply the control efficiencies. This enables you to keep the emission reduction information you've put in an ancillary file, but not use it for a particular run of EMS-HAP.

The MACT-category level emission reduction information also includes:

4. A source control flag. This determines to which source type (major[a] versus both area[b] and major) the control efficiencies would apply. For example, if a particular MACT standard affects only major sources, then you'd set the source control flag to "M" and the efficiencies would only be applied to inventory records with a source type of "major".

5. The compliance year for the standard. PtGrowCntl uses this information along with the projection year to determine whether or not the standard will affect the emissions. For example, if you are projecting to 2002, and the compliance year of the standard is 2003, then PtGrowCntl will not apply the reduction for that standard to the inventory.

6. The MACT bin. If the compliance year is not known, PtGrowCntl will use the MACT bin, which indicates the number of years between 1990 and planned the promulgation date of the MACT standard (2, 4, 7, or 10 years).

Assignment of Emission Reduction Information

PtGrowCntl provides you with three ways to assign reduction information to the point source inventory through the use of three ancillary files, MACT_gen.txt, MACT_spec.txt and SITE_spec.txt (also discussed in Section 6.2.5). You can choose any combination of the following assignment methods:

- <u>General MACT category information based on MACT code alone</u>. You can specify general MACT reduction information through the **MACT_gen.txt** ancillary file. General reduction information applies to an entire MACT category or MACT process (if the process has a unique MACT code), but not to a particular facility or pollutant emitted by the process. In addition, processes that don't have a unique MACT code, but are part of a MACT standard (e.g., equipment cleaning process in wood furniture manufacturing), can't be assigned emission reduction information through the MACT_gen file.

- <u>Specific MACT category information based on MACT code and HAP and/or SCC</u>. You can specify process and/or pollutant specific MACT reduction information through the **MACT_spec.txt** ancillary file. This file allows you to assign different reduction information for different processes within a MACT category or for different HAPs that a MACT standard will affect. For each MACT code, you can provide reduction information by the following criteria: (1) 6-digit or 8-digit SCC codes alone, (2) 6-digit or 8-digit SCC codes along with the NTI_HAP variable, or (3) the NTI_HAP variable alone. Note that you will need to use the specific information in conjunction with the general information. This is because the MACT_spec file does not contain the required compliance year or MACT bin information (but the MACT_gen file does). In addition, you will likely not have process or pollutant/specific control efficiencies for every MACT standard.

- <u>Facility-level Reduction information based on the facility's activity ID (ACT_ID_ variable and HAP</u>. You can specify process and pollutant specific facility-level reduction information through the **SITE_spec.txt** ancillary file. This allows you to assign different reduction information for different processes at a specific facility or for different HAPs emitted by those processes at that facility. You can provide reduction information by unique ACT_IDs or you can combine the ACT_IDs with NTI_HAPs.

If you choose to specify information by all of these methods, and an individual inventory record can be matched to the information in more than one ancillary file, the following hierarchy applies: the process and/or pollutant specific MACT reduction information will supercede information assigned by the MACT code alone. Reduction information assigned at the facility-level will supercede any of the MACT category-based reduction information.

Application of Emission Reduction Efficiencies

Based on the emission reduction information assigned to each inventory record, PtGrowCntl determines whether to apply the new and/or existing control efficiencies to the grown and temporally allocated emissions.

When MACT category-based emission reduction information is assigned to an inventory record (i.e., no facility-specific reduction information exists for that inventory record), PtGrowCntl applies a control efficiency to the emissions when the following criteria are met:

- The application control flag (MACT_APP) is equal to 1.

- The inventory source type variable (SRC_TYPE) is 'major' and the source control flag (MACT_SRC) is 'M' or the inventory source type variable has any value and the source control flag is 'B' (this value indicates that the reduction efficiency is applied to all source types).

- The projection year is greater than the compliance year or, if the compliance year is not provided, the projection year is greater than the MACT bin plus 1995.

If facility-based emission reduction information is assigned to an inventory record, PtGrowCntl applies this reduction information to the emissions when the application control flag (SITE_APP) is equal to 1.

PtGrowCntl computes projected emissions separately for the existing part and the new part of emission records in the inventory, and then sums the values to determine the final projected emissions. PtGrowCntl uses information on the percentage of grown emissions being emitted from new part of sources that you supplied in the ancillary files (variable MACTRATE or SITERATE, depending on whether MACT-based or facility-based information is being used, respectively). As discussed earlier in the section, this percentage allows PtGrowCntl to apportion the grown emissions to existing sources (e.g., 1-MACTRATE/100) to which the control efficiency for existing sources is applied and new sources (e.g., MACTRATE/100) to which the control efficiency for new sources is applied.

PtGrowCntl uses the baseline control efficiency (CNTL_EFF variable) included in the inventory to account for any existing controls reflected in the emission inventory rates. Note that values for the CNTL_EFF variable may or may not be missing in the inventory, but the inventory input file must contain this variable for PtGrowCntl to execute successfully. If CNTL_EFF is less than the control efficiency in the ancillary file (variables MACTEXIS and MACT_NEW or SITEEXIS and SITE_NEW), PtGrowCntl removes the baseline control prior to applying the strategy control efficiency to the grown emissions. If the baseline control efficiency is greater than the strategy control efficiency, we assume that the emission reduction in the ancillary file will not affect the facility. Therefore, PtGrowCntl doesn't apply that control efficiency.

Table 6-1 shows the calculations for existing and new source projected emissions.

Table 6-1. Summary of Equations used to Calculate Projected Emissions
Example calculations for MACT-based reductions;
substitute SITERATE, SITEEXIS, and SITE_NEW for facility-based reductions

Existing Sources

Strategy control efficiency > baseline control efficiency (Eq. 6-1)

$$\text{Projected Emissions}_E = \text{Grown Emissions} \times (1\text{-MACTRATE}/100) \times \frac{(1 - \text{MACTEXIS}/100)}{(1 - \text{CNTL\_EFF}/100)}$$

Baseline control efficiency > strategy control efficiency (Eq. 6-2)

$$\text{Projected Emissions}_E = \text{Grown Emissions} \times (1\text{-MACTRATE}/100)$$

New Sources

Strategy control efficiency > baseline control efficiency (Eq. 6-3)

$$\text{Projected Emissions}_N = \text{Grown Emissions} \times (\text{MACTRATE}/100) \times \frac{(1 - \text{MACT\_NEW}/100)}{(1 - \text{CNTL\_EFF}/100)}$$

Baseline control efficiency > strategy control efficiency (Eq. 6-4)

$$\text{Projected Emissions}_N = \text{Grown Emissions} \times (\text{MACTRATE}/100)$$

Where:

Projected Emissions_E = grown and controlled emissions from existing sources

Projected Emissions_N = grown and controlled emissions from new sources

Grown Emissions = (Base year baseline emissions) x (Growth factor) [see Section 6.1.1]

MACTRATE = MACT-based percentage of grown emissions attributed to new sources

(SITERATE = facility-based percentage)

MACTEXIS = MACT-based control efficiency for existing sources

(SITEEXIS = facility-based control efficiency for existing sources)

MACT_NEW = MACT-based control efficiency for new sources

(SITE_NEW is the facility-based control efficiency for new sources)

CNTL_EFF = inventory baseline control efficiency

If no reductions are applied to the temporally allocated grown emissions, then the final projected emissions are equal to the grown emissions.

6.2 How do I run PtGrowCntl?

6.2.1 Prepare your point source inventory for input into PtGrowCntl

The point source inventory you use for input into PtGrowCntl must be the output of PtTemporal (Chapter 5). Further, you must have run PtAspenProc (Chapter 4) prior to PtTemporal. This inventory will contain at least the variables listed in Table 6-2. It may contain additional variables such as the diagnostic flag variables (LFLAG, FIPFLAG, etc.) created by PtDataProc depending on the options you chose for the windowing function in PtDataProc (see Section 3.1.3).

Table 6-2. Variables in the PtGrowCntl Input Point Source Inventory SAS® File

Variables used by PtGrowCntl are in bold;
other variables listed are used by previously run or subsequent point source processing programs

Variable Name	Data Description (Required units or values are in parentheses)	Type *
ACT_ID	code identifying a unique activity within a process	A25
BLDH	ASPEN building height (in meters) (5 for horizontal stacks, 0 for all other stacks); assigned in PtAspenProc (see Section 4.1.3)	N
BLDW	ASPEN building width (in meters) (5 for horizontal stacks, 0 for all other stacks); assigned in PtAspenProc (see Section 4.1.3)	N
CNTL_EFF	baseline control efficiency, expressed as a percentage	N
COOR_ID	code identifying a unique set of geographic coordinates	A20
EMIS	pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within an activity	A50
EMRELPTY	physical configuration code of release point (01=fugitive; 02=vertical stack; 03=horizontal stack, 04=goose neck, 05=vertical with rain cap, 06=downward-facing vent, AP=aircraft)	A4
FIPS	5-digit FIPS code (state and county combined)	A5
IBLDG	ASPEN building code (1 for horizontal stacks, 0 for all other stacks) assigned in PtAspenProc (see Section 4.1.3)	A1
IVENT	ASPEN vent type (0 for stacked sources, 1 for non-stacked sources) assigned in PtAspenProc (see Section 4.1.3)	A1
LAT	latitude (in decimal degrees)	N
LON	longitude (in negative decimal degrees)	N
MACTCODE	process or site-level MACT code	A7

Table 6-2. Variables in the PtGrowCntl Input Point Source Inventory SAS® File (continued)

Variable Name	Data Description (Required units or values are in parentheses)	Type *
NTI_HAP	code identifying HAP on the Clean Air Act HAP list; assigned in PtAspenProc (see Section 4.1.1)	A3
POLLCODE	unique pollutant code	A10
REACT	pollutant reactivity class (1-9)	N
SAROAD	unique pollutant-group code; assigned in PtAspenProc (See section 4.1.1)	A10
SAROADDC	descriptive name for the SAROAD; assigned in PtAspenProc (see Section 4.1.1)	A50
SCC	EPA source category code identifying the process	A10
SCC_AMS	SCC or AMS code from the temporal allocation factor file identifying the temporal profile used; assigned in PtTemporal	A10
SIC	Standard Industrial Classification (SIC) code for the site	A4
SITE_ID	code identifying a unique site	A20
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions) If you choose to define ASPEN source groups by this variable as explained in 7.1.1, or run PtGrowCntl (Chapter 6) then it must have the value of 'major' or 'area' for non-aircraft emissions.	A15
STACKDIA	diameter of stack (meters)	N
STACKHT	height of stack (meters)	N
STACKVEL	velocity of exhaust gas stream (meters per second)	N
STKTEMP	temperature of exhaust gas stream (Kelvin)	N
TAFATE1-TAFATE8	temporal factors for the eight 3-hour periods of an average day; assigned in PtTemporal	N
TEMIS1-TEMIS8	temporally allocated emissions for the eight 3-hour periods of an average day (grams/sec); calculated in PtTemporal	N
UFLAG	urban/rural dispersion flag (1 for urban, 2 for rural); assigned in PtAspenProc (see Section 4.1.2)	N

*Ax = character string of length x, I = integer, N = numeric

6.2.2 Determine whether you need to modify the ancillary input files for PtGrowCntl

An ancillary file is any data file you input to the program other than your emission inventory. Table 6-3 lists the ancillary input files required for PtGrowCntl and when you may need to modify them.

Table 6-3. Required Ancillary Input Files for PtGrowCntl

Name of File Provided with EMS-HAP	Purpose	Need to Modify	Format
gfXX_YY (where XX specifies the projection year and YY specifies the base year)	Provides the assignment of year specific growth factors by state and SIC code.	When growth factors are needed for a different projection year or base year	SAS®
ptscc2sic	Provides cross reference between SCC codes and SIC codes for purpose of assigning growth factors by state and SIC code.	When additional or different SCC to SIC cross-references are needed to assign growth factors	Text
MACT_gen*	Provides emission reduction strategy information by MACT category	Develop by obtaining MACT-based reduction information	Text
MACT_spec*	Provides emission reduction strategy information by MACT category and SCC and/or HAP identification code	Develop by obtaining MACT-based reduction information	Text
SITE_spec*	Provides emission reduction information by the facility-specific activity identification code and HAP identification code	Develop if you have facility specific emission reduction information for a future year	Text

* These files are not currently being provided as part of EMS-HAP.

6.2.3 Modify the growth factor input file (gfXX_YY)

The growth factor file provides factors that are used to project the growth in emissions from the base year of the emission inventory to a future year that is of interest in your control strategy analysis. Each growth factor file consists of a series of records, with each record providing the growth factor to be used for a particular industrial category (SIC) within a particular state. Thus, each record includes a state FIPS code, an SIC code, and a growth factor that is applicable to that state/SIC combination. Note that only the first two digits of the SIC code are used along with the state FIPS to assign growth factors to the inventory records (PtGrowCntl does currently allow growth factors to be specified for the three-digit SIC code ‘371'). The format for this file is provided in Figure 19 of Appendix A.

Because you may want to use EMS-HAP to analyze a series of future years, you may have occasion to create a number of different growth factor files, with each separate version addressing a different projection year. Only one version of the growth factor file can be used in a particular run of EMS-HAP.

6.2.4 Modify the SCC to SIC cross-reference input file (ptscc2sic.txt)

PtGrowCntl uses the SCC to SIC cross-reference file for cases where there is no SIC contained on the emission inventory record. This file consists of unique 8-digit SCC codes and the corresponding 4-digit SIC code. Although many SCC codes can be assigned to the same SIC code, only one SIC code can be assigned to a given SCC code. Note that only the first two digits of the SIC code are used along with the state FIPS to assign growth factors to the inventory records (PtGrowCntl does currently allow growth factors to be specified for the three-digit SIC code ‘371'). The format for this file is provided in Figure 20 of Appendix A.

You would expect to modify this file depending on the SIC information included in your emission inventory. Note that any records without an SIC code will be assigned the default growth factor of one and, therefore, the grown emissions will be unchanged from the base year emissions.

6.2.5 Develop the emission reduction information files (MACT_gen.txt, MACT_spec.txt, and SITE_spec.txt)

These files are not currently being provided as part of EMS-HAP and, therefore, if you want to apply emission reductions to your inventory, you will need to develop these files. These files provide the reduction information needed to calculate the controlled emissions for the specified projection year. This information was presented in Section 6.1.2.

In the general MACT control file (MACT_gen.txt), you provide the list of MACT categories that will be addressed in your control strategy analysis. For each category, you provide the emission reduction information described in Section 6.1.2 by MACT code. The format for the general MACT control file is provided in Figure 21a of Appendix A.

If you have control efficiencies for specific HAPs or specific processes within a MACT category, use the specific MACT control file (MACT_spec.txt). In this file, you assign the reduction information by MACT code and by either a process code alone, a HAP identification code (NTI_HAP variable) alone, or by a process code and NTI_HAP together. The process code can be in the form of a 6-digit SCC code or 8-digit SCC code. The format for the specific MACT control file is provided in Figure 21b of Appendix A.

In cases where an emission inventory record is affected by more than one record in the specific MACT control file, the following order of precedence is followed in PtGrowCntl:

8-digit SCC ***and*** HAP code
6-digit SCC ***and*** HAP code
6-digit SCC ***alone***
8-digit SCC ***alone***
HAP code

For instance, a reduction information record that specifies an 8-digit SCC and NTI_HAP will supercede a record that specifies a 6-digit SCC and NTI_HAP, and so on.

If you have control efficiencies for specific HAPs or specific processes within a specific point source facility, you can use the specific facility control file (SITE_spec.txt). In this file, you can assign the reduction information by either the facility-specific activity identification code (ACT_ID variable) alone or by the ACT_ID and NTI_HAP variables together. The format for the specific facility control file is provided in Figure 22 of Appendix A.

In cases where an emission inventory record is affected by more than one record in the specific facility control file, the reduction information record that specifies the ACT_ID and NTI_HAP will supercede a record that specifies ACT_ID alone. In addition, the specific facility control information will supercede any of the MACT-based control information.

6.2.6 Prepare your batch file

The batch file serves two purposes: (1) allows you to pass "keywords" such as file names and locations, program options, and run identifiers to the program, and (2) sets up the execute statement for the program. A sample batch file for PtGrowCntl is shown in Figure 5 of Appendix B.

Specify your keywords

Table 6-4 shows you how to specify keywords to select which functions you want PtGrowCntl to perform. For example, if you want to factor in economic growth into your projection emissions, set the DOGROW keyword to 1.

Table 6-4. Keywords for Selecting PtGrowCntl Functions

PtGrowCntl Function	Keyword (values provided cause function to be performed)
Assign and apply growth factors	DOGROW = 1
Assign missing SICs by SCC to SIC cross-reference file	DOSCC = 1
Assign and apply reduction information	DOCNTL=1
Use general MACT reduction information only	GENCNTL = 1; PROCHEM = 0; SITECHEM = 0
Use process and/or pollutant specific MACT reduction information only - this combination should only be used if you are providing an input inventory file that was already run through PtGrowCntl using general MACT reduction information	GENCNTL = 0; PROCHEM = 1; SITECHEM = 0
Use facility-level reduction information only	GENCNTL = 0; PROCHEM = 0; SITECHEM = 1
Use general and process and/or pollutant specific MACT reduction information	GENCNTL = 1; PROCHEM = 1; SITECHEM = 0
Use general MACT and facility-level reduction information	GENCNTL = 1; PROCHEM = 0; SITECHEM = 1
Use process and/or pollutant specific MACT and process and facility-level reduction information - this combination should only be used if you are providing an input inventory file that was already run through PtGrowCntl using general MACT reduction information	GENCNTL = 0; PROCHEM = 1; SITECHEM = 1
Use all reduction information	GENCNTL = 1; PROCHEM = 1; SITECHEM = 1

Table 6-5 describes all of the keywords required in the batch file. You must include all directory names, file names, and variable values even if they are related to a function that you do not select to perform. For example, if you set DOGROW to 0, you still need to assign a value to the keyword GF and SCC2SIC. The values provided in this circumstance do not need to represent actual file names; they are merely a place holder for the keywords.

Table 6-5. Keywords in the PtGrowCntl Batch File

Keyword	Description of Value
	Input Inventory Files
IN_DATA	The input SAS® file directory
INSAS	Input inventory SAS® file name
	Ancillary Files (Prefix of file name provided with EMS-HAP in parentheses)
REFSAS	The reference SAS® file directory
REFTEXT	The reference text file directory
SCC2SIC	SCC to SIC cross-reference text file (ptscc2sic)
GF	Growth factors to SIC and state FIPS cross-reference SAS® file (gfXX_YY, where XX specifies the projection year and YY specifies the base year)
MACTGEN	General MACT-based emission reduction information text file prefix (MACT_gen)
MACTSPEC	Specific MACT-based emission reduction information text file prefix (MACT_spec)
SITESPEC	Specific facility-based emission reduction information text file prefix (SITE_spec)
	Program Options (See also Table 6-4)
DOGROW	1=project emissions as a result of economic growth; 0=don't grow emissions
DOSCC	1=use SCC to SIC cross-reference file to assign SIC where missing in inventory; 0=don't assign SIC where missing
DOCNTL	1=project emissions as a result of emission reduction strategies; 0=don't apply emission reduction strategies
GENCNTL	1=Use general MACT emission reduction information; 0= don't use general MACT information
PROCCHEM	1=Use process and/or pollutant specific MACT emission reduction information; 0=don't use process and/or pollutant specific MACT emission reduction information
SITECHEM	1=Use facility emission reduction information; 0=don't use facility emission reduction information
	Additional Input Data
GROWYR	Year to which emissions are to be grown
	Output files
OUTDATA	The output SAS® file directory
OUTSAS	Output inventory SAS® file name

Prepare the execute statement

The last line in the batch file runs the PtGrowCntl program. In the sample batch file provided in Figure 5 of Appendix B, you will see a line proceeding the run line that creates a copy of the PtGrowCntl code having a unique name. It is this version of the program that is then executed in the last line. If you do this, the log and list files created by this run can be identified by this unique name. If you don't do this and run the program under a general name, every run of PtGrowCntl will create a log and list file that will replace any existing files of the same name.

You may find that you need to define a special area on your hard disk to use as work space when

running PtGrowCntl. In the sample batch file, a work directory is defined on the last line following the execution of PtGrowCntl. The directory you reference here must be created prior to running the program.. For example, the statement:
'sas PtGrowCntl_062000.sas -work /data/work15/dyl/' assigns a work directory called "/data/work15/dyl".

6.2.7 Execute PtGrowCntl

There are two ways to execute the batch file. One way is to type 'source' and then the batch file name. Alternatively, first set the permission on the file to 'execute.' You do this by using the UNIX CHMOD command and adding the execute permission to yourself, as the owner of the file, to anyone in your user group, and/or to anyone on the system.. For example, 'chmod u+x PtGrowCntl.bat' gives you permission to execute the batch file. Refer to your UNIX manual for setting other permissions. After you have set the file permission, you can execute the batch file by typing the file name on the command line, for example, 'PtGrowCntl.bat'.

6.3 How Do I Know My Run of PtGrowCntl Was Successful?

6.3.1 Check your SAS® log file

Review the output log file to check for errors or other flags indicating incorrect processing. To do this, search the log file for occurrences of the strings "error", "warning", "not found", and "uninitialized". These can indicate problems with input files or other errors.

You can look at the number of records in the input inventory file and compare it to the number of records in the output inventory file. The number of records should be the same in these two files.

6.3.2 Check your SAS® list file

The list file created when PtGrowCntl is executed contains information to assist in quality assurance. The information is this file is listed below:

- Summary of inventory records assigned growth factors
- Summary of inventory records assigned general MACT reduction information
- Summary of inventory records assigned process and/or pollutant specific MACT reduction information
- Summary of inventory records assigned facility-level reduction information; if MACT-based reduction information is present, the summary includes MACT code, SCC, and MACT-based reduction information.

6.3.3 Check other output files from PtGrowCntl

You should check for the existence of the output inventory file named by keyword OUTSAS. This file will serve as the input to PtFinalFormat, the last point source processing program you run.

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CHAPTER 7
Point Source Processing
The ASPEN Final Format Program (PtFinalFormat)

PtFinalFormat is the final point source processing program you run (see Figure 1-1). You can run PtFinalFormat after PtTemporal, to create base year emission input files, or after PtGrowCntl, to create future year emission input files.

7.1 What is the function of PtFinalFormat?

The ASPEN Final Format Processing Program (PtFinalFormat) creates the emission input files for the ASPEN model. PtFinalFormat performs the functions listed below.

- Assigns ASPEN source groups used in the ASPEN model output
- Creates ASPEN input files, a column formatted text file and a SAS® file

You control whether to have PtFinalFormat write out the ASPEN input and column formatted text files in your execution of PtFinalFormat. Table 7-4 in Section 7.2.4 details how to do this.

Figure 7-1 shows a flowchart of PtFinalFormat. The following sections describe the above bullets.

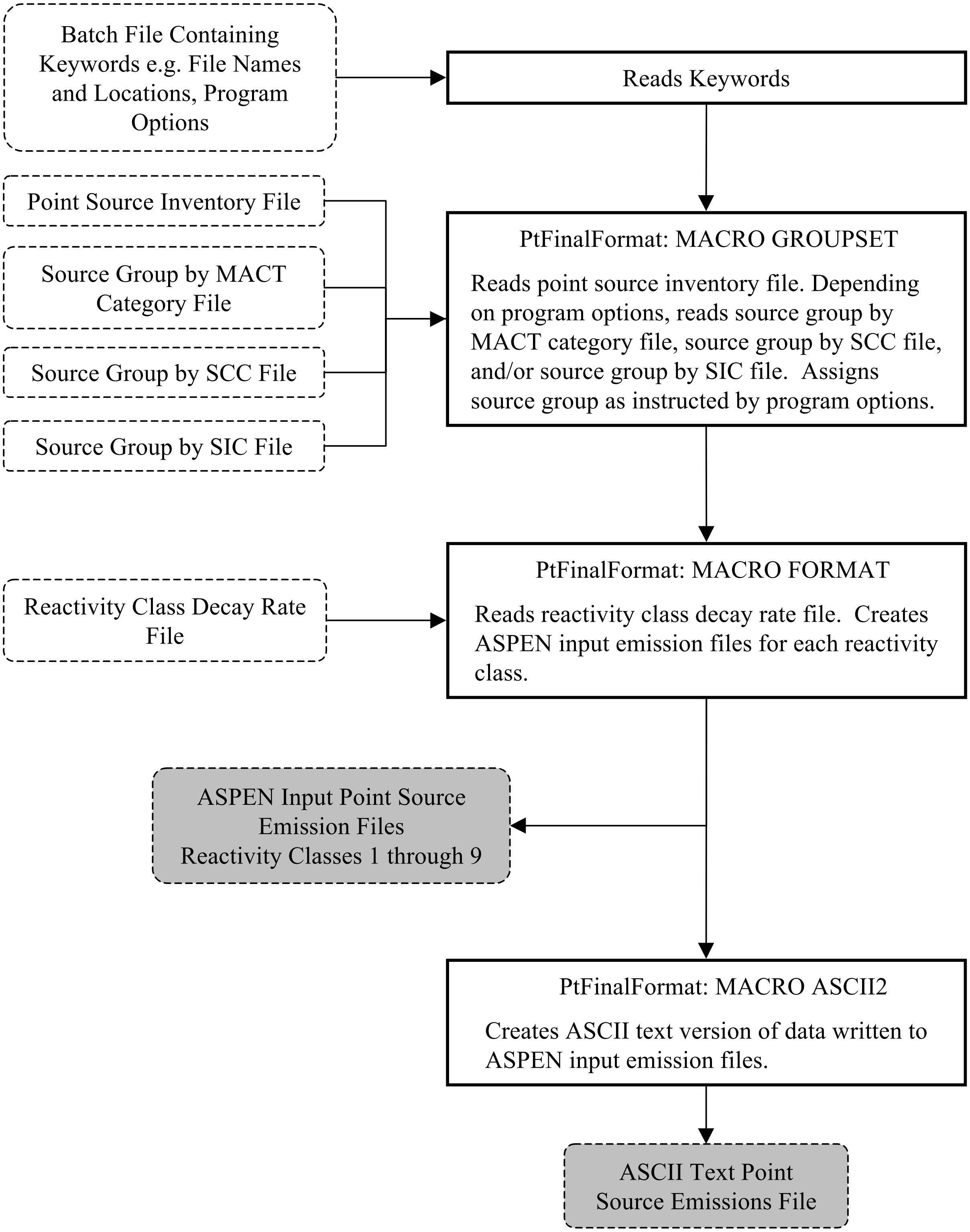

Figure 7-1. PtFinalFormat Flowchart

7.1.1 Assigns ASPEN source groups used in the ASPEN model output

The ASPEN model computes concentrations by source groups which can be used to analyze the relative impacts of different types of emissions sources. ASPEN can use up to 10 source groups. PtFinalFormat can assign ASPEN source groups several different ways. You choose the method based on the keywords you specify in your batch file (see Table 7-4 in Section 7.2.4). PtFinalFormat can use the source type variable (SRC_TYPE), the MACT category code variable (MACTCODE), the 6-digit SCC and/or the SIC. Table 7-1 shows how PtFinalFormat assigns the source group by SRC_TYPE.

Table 7-1. Assignment of ASPEN Source Groups

Value of SRC_TYPE Variable	Description	Source Group Assignment
major	major source of HAPs based on definition in Section 112 of Clean Air Act[a]	0
area	area source of HAPs based on definition in Section 112 of Clean Air Act[b]	1
nonroad	nonroad mobile source emissions (these are the allocated aircraft emissions)	3

[a] "...any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous pollutant or 25 tons per year or more of any combination of hazardous air pollutants..."
[b] "...any stationary source of hazardous air pollutants that is not a major source... shall not include motor vehicles or nonroad vehicles subject to regulation under title II.."

In point source processing, the only nonroad sources you would have in your point source inventory are allocated airport emissions obtained from running AirportProc (see Chapter 2).

If you choose to assign the source group by the MACT category, the 6-digit SCC and/or the SIC, PtFinalFormat uses the appropriate ancillary file (mact_grp, SCC_grp and/or SIC_grp) based on your assignment method. These files contain the group assignment value (which can be 0 through 9) by code. See Section 7.2.3 for instructions on how to modify these files if you choose to assign your groups this way. If you choose to assign the source group by more than one method, PtFinalFormat uses a set hierarchy. The MACT category assignment would replace a source type assignment. An SCC or SIC assignment would replace either a source type or MACT category assignment. The assignment of groups by both SCC and SIC have an associated ranking that control when the SIC assignment replaces the SCC assignment. If, for any record in your inventory, no source group assignment is made by the above methods, a default source group is assigned. You specify the value for this default in your batch file (Section 7.2.4, see keyword DFLTGRP in Table 7-5).

7.1.2 Creates ASPEN input files, a column formatted text file and a SAS® file

PtFinalFormat can create three different types output files:
1. The ASPEN input files
2. A column formatted ASCII text file
3. A SAS® output file.

You control whether or not to create the ASPEN input and column formatted text file in your execution of PtFinalFormat, based on the keywords you specify in your batch file (see Table 7-4 in Section 7.2.4). PtFinalFormat automatically creates the SAS® output file.

ASPEN Input Files

The ASPEN model requires emission data in the form of one ASCII text file for each of the possible nine reactivity class. PtFinalFormat creates all nine files in the appropriate format. Each text file consists of a header and body. The elements of the header are:

1. A run identifier: You supply this in the batch file (keyword RUNID in Table 7-5)
2. Wet and dry deposition codes: PtFinalFormat sets these to 0 for particulates and 1 for gaseous species. These values tell ASPEN whether to invoke the deposition algorithm for particulates (ASPEN does not perform deposition for gases).
3. Decay coefficients associated with the reactivity class: PtFinalFormat determines these from the ancillary file indecay.txt based on the value of the REACT variable (discussed in detail in Chapter 4, Section 4.2.3). This file contains a set of coefficients for each of the nine reactivity classes.

The file body contains source information such as latitude and longitude, source characteristics such as stack height, building width, and vent type, and the emissions for each of eight 3-hour periods for each pollutant (of the appropriate reactivity class) emitted from the stack.

PtFinalFormat names the nine ASPEN input files in the form "OUTCODE.rREACT.inp" where OUTCODE is the file identifier keyword you provide in the batch file, and REACT is the reactivity class (a number 1-9). An example file name is “Pt96.US.D121599.r1.inp” where OUTCODE is “Pt96.US.D121599" and REACT is “1".

Column Formatted ASCII File

PtFinalFormat can create a single column formatted ASCII text file containing data written to the ASPEN input emissions files. This file can provide easy access to the data for quality assurance purposes. You specify the prefix name of this file in your batch file (keyword ASCII in Table 7-5); the suffix is “txt”. Table 7-6 in Section 7.3.3 shows the format of this file.

SAS® Output File

PtFinalFormat automatically creates an output SAS® inventory file. This file contains the same data as in the input SAS® inventory file except that the source group variable (GROUP) has been added. You specify the name of this file in your batch file (keyword OUTSAS in Table 7-5).

7.2 How do I run PtFinalFormat?

7.2.1 Prepare your point source inventory for input into PtFinalFormat

The point source inventory you use for input into PtFinalFormat can be the output from either PtTemporal (see Chapter 5) or PtGrowControl (see Chapter 6). In either case, if you've followed the run stream of Figure 1-1, the inventory will meet all requirements. This file will contain at least the variables shown in Table 7-2. It may contain additional variables such as the diagnostic flag variables (LFLAG, FIPFLAG, etc.) created by PtDataProc depending on the options you chose for the windowing function in PtDataProc (see Section 3.1.3).

Table 7-2. Variables in the PtFinalFormat Input Point Source Inventory SAS® File

Variable Name	Data Description (Required units or values are in parentheses)	Type*
ACT_ID	code identifying a unique activity within a process at a unique site	A25
BASEMIS1-BASEMIS8[b]	temporally allocated baseline emissions for the eight 3-hour periods of an average day (grams/sec); assigned in PtGrowCntl	N
BIN[b]	number of years between 1990 and planned the promulgation date of the MACT standard (2,4,7, or 10 years); assigned in PtGrowCntl (see Section 6.1.2)	A2
BLDH	ASPEN building height (in meters) (5 for horizontal stacks, 0 for all other stacks); assigned in PtAspenProc (see Section 4.1.3)	N
BLDW	ASPEN building width (in meters) (5 for horizontal stacks, 0 for all other stacks); assigned in PtAspenProc (see Section 4.1.3)	N
CNTL_EFF[a]	baseline control efficiency, expressed as a percentage	N
COMPLYR[b]	compliance year of MACT standard; assigned in PtGrowCntl (see Section 6.1.2)	A4
COOR_ID	code identifying a unique set of geographic coordinates	A20
EMIS	baseline pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within an activity	A50
EMRELPTY	physical configuration code of release point (01=fugitive; 02=vertical stack; 03=horizontal stack, 04=goose neck, 05=vertical with rain cap, 06=downward-facing vent, AP=aircraft)	A4
FIPS	5-digit FIPS code (state and county combined)	A5

Table 7-2. Variables in the PtFinalFormat Input Point Source Inventory SAS® File
(continued)

Variable Name	Data Description (Required units or values are in parentheses)	Type*
GF[b]	Growth factor; assigned in PtGrowCntl (see Section 6.1.1)	N
IBLDG	ASPEN building code (1 for horizontal stacks, 0 for all other stacks) assigned in PtAspenProc (see Section 4.1.3)	A1
IVENT	ASPEN vent type (0 for stacked sources, 1 for non-stacked sources) assigned in PtAspenProc (see Section 4.1.3)	A1
LAT	latitude (in decimal degrees)	N
LON	longitude (in negative decimal degrees)	N
MACT_APP[b]	flag indicating whether or not the MACT-based controls should be applied (0 to not apply, 1 to apply control); assigned in PtGrowCntl (see Section 6.1.2)	A1
MACTCODE	process or site-level MACT code	A7
MACTEXIS[b]	MACT-based control information: Control efficiency for existing sources; assigned in PtGrowCntl (see Section 6.1.2)	N
MACT_NEW[b]	MACT-based control information: Control efficiency for new sources; assigned in PtGrowCntl (see Section 6.1.2)	N
MACTRATE[b]	MACT-based control information: Percentage of grown emissions attributed to new sources; assigned in PtGrowCntl (see Section 6.1.2)	N
MACT_SRC[b]	flag indicating to which source types the MACT-based controls should be applied (M for major sources only, B for all source types); assigned in PtGrowCntl (see Section 6.1.2)	A1
NTI_HAP	code identifying HAP on the Clean Air Act HAP list; assigned in PtAspenProc (see Section 4.1.1)	A3
POLLCODE	unique pollutant code	A10
REACT	pollutant reactivity class (1-9)	N
SAROAD	unique pollutant-group code; assigned in PtAspenProc (see Section 4.1.1)	A10
SAROADDC	descriptive name for the SAROAD; assigned in PtAspenProc (see Section 4.1.1)	A50
SCC	EPA source category code identifying the process	A10
SCC_AMS	SCC or AMS code from the temporal allocation factor file identifying the temporal profile used; assigned in PtTemporal	A10
SETSIC[b]	SIC assigned by cross-reference to SCC for use in assigning growth factors; assigned in PtGrowCntl (see Section 6.1.1)	A4

Table 7-2. Variables in the PtFinalFormat Input Point Source Inventory SAS® File
(continued)

Variable Name	Data Description (Required units or values are in parentheses)	Type*
SIC	Standard Industrial Classification (SIC) code for the site	A4
SITE_APP[b]	flag indicating whether or not the facility-based controls should be applied (0 to not apply, 1 to apply control); assigned in PtGrowCntl (see Section 6.1.2)	A1
SITEEXIS[b]	Facility-based control information: Control efficiency for existing sources; assigned in PtGrowCntl (See Section 6.1.2)	N
SITE_ID	code identifying a unique site	A20
SITE_NEW[b]	Facility-based control information: Control efficiency for new sources; assigned in PtGrowCntl (see Section 6.1.2)	N
SITERATE[b]	Facility-based control information: Percentage of grown emissions attributed to new sources; assigned in PtGrowCntl (see Section 6.1.2)	N
SITE_SRC[b]	flag indicating to which source types the facility-based controls should be applied (M for major sources only, B for all source types); assigned in PtGrowCntl (see Section 6.1.2)	A1
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions) If you choose to define ASPEN source groups by this variable as explained in 7.1.1, or run PtGrowCntl (Chapter 6) then it must have the value of 'major' or 'area' for non aircraft emissions.	A15
STACKDIA	diameter of stack (meters)	N
STACKHT	height of stack (meters)	N
STACKVEL	velocity of exhaust gas stream (meters per second)	N
STKTEMP	temperature of exhaust gas stream (Kelvin)	N
TAFATE1-TAFATE8	temporal factors for the eight 3-hour periods of an average day; assigned in PtTemporal	N
TEMIS1-TEMIS8	temporally allocated emissions for the eight 3-hour periods of an average day (grams/sec); calculated in PtTemporal, unless emissions projections were done in which case, values represent temporally allocated projected emissions calculated in PtGrowCntl	N
UFLAG	urban/rural dispersion flag (1 for urban, 2 for rural); assigned in PtAspenProc (see Section 4.1.2)	N

*Ax = character string of length x, I = integer, N = numeric
[a] required only if you run the optional Growth and Control Program (Chapter 6)
[b] variable present only if you run the optional Growth and Control Program (Chapter 6)

7.2.2 Determine whether you need to modify the ancillary input files for PtFinalFormat

An ancillary file is any data file you input to the program other than your emission inventory. Table 7-3 lists the ancillary input files required for PtFinalFormat and when you may need to modify them.

Table 7-3. Required Ancillary Input Files for PtFinalFormat

Name of File Provided with EMS-HAP	Purpose	Need to Modify?	Format
mact_grp.txt	Provides the assignment of ASPEN source groups by MACT code.	If you want to make different source group assignments by MACT code	Text
scc6_grp.txt	Provides the assignment of ASPEN source groups by 6-digit SCC and a rank code used to determine if the source group can be replaced by a SIC-based source group	If you want to make different source group assignments by SCC code	Text
sic_grp.txt	Provides the assignment of ASPEN source groups by SIC and a rank code used to determine if the source group can replace a SCC-based source group	If you want to make different source group assignments by SIC code	Text
indecay.txt	Provides decay coefficients for 6 stability classes for the eight 3-hour time periods for up to 9 reactivity classes	No	Text

7.2.3 Modify the ASPEN source group assignment files (mact_grp.txt, scc6_grp.txt, and sic_grp.txt)

The ASPEN model output presents data for each pollutant by census tract and by source group. The source group assignment you make in PtFinalFormat will determine how ASPEN will group the concentration estimates. You can control this assignment based on the source type using the SRC_TYPE variable (as was discussed in 7.1.1) and/or by using any one of the three ASPEN source group assignment files. The specific formats for these files are presented in Appendix A, Figures 23-25. The mact_grp.txt is a simple text file that has a MACT code followed by a source group code (number between 0 and 9, inclusive). To modify it, put the same group code next to each MACT code that you want in the same group. If you choose to use this file in combination with either of the other two files, it is important to remember that a MACT code-based assignment will automatically replace a source type-based assignment and will automatically be replaced by either an SCC-based or SIC-based assignment.

If you want to use both SCC-based assignments and SIC-based assignments, you can control whether or not the SIC-based assignment replaces the SCC-based assignment by setting the rank field in each file. These files contain the SCC or SIC code followed by the source group, followed by the rank. If an inventory record contains both SCC and SIC codes, the SCC assignment is made first. If an assignment can also be made by SIC, the SIC-based assignment will only replace the SCC-based assignment if the SIC rank is lower than the SCC rank (e.g. an SIC rank of 1 and a SCC rank of 3 will result in the SCC-based assignment to be replaced by the SIC-based assignment of the source group).

7.2.4 Prepare your batch file

The batch file serves two purposes: (1) allows you to pass "keywords" such as file names and locations, program options and run identifiers to the program, and (2) sets up the execute statement for the program. A sample batch file for PtFinalFormat is shown in Figure 6 of Appendix B.

Specify your keywords

Table 7-4 shows you how to specify keywords to select PtFinalFormat functions.

Table 7-4. Keywords for Selecting PtFinalFormat Functions

PtFinalFormat Function	Keyword (values provided cause function to be performed)
Assign ASPEN source groups	
by source type	DOSOURCE = 1
by MACT code	DOMACT = 1
by SCC	DOSCC = 1
by SIC	DOSIC = 1
Create ASPEN input files	DOWRITE = 1
Create single text-formatted file	DOASCII = 1

Table 7-5 describes all of the keywords required in the batch file. In addition to supplying all input and output file names and directories and program options, you must also supply additional input data (see "Additional Input Data" section in Table 7-5). You must supply a value for keyword ITYPE, which tells ASPEN whether your sources are point or pseudopoint sources. Always set ITYPE to 0 (which signifies point source).

Table 7-5. Keywords in the PtFinalFormat Batch File

Keyword	Description of Value
	Input Inventory Files
IN_DATA	Input SAS® file directory
INSAS	Input inventory SAS® file name
	Ancillary Files (Prefix of file name provided with EMS-HAP in parentheses)
REFFILES	Ancillary file directory
MACTGRP	MACT code to source group correspondence text file prefix (mact_grp)
SCCGRP	SCC code to source group correspondence text file prefix (scc6_grp)
SICGRP	SIC code to source group correspondence text file prefix (sic_grp)
DECAY	Reactivity class decay coefficients for 6 stability classes for eight 3-hour time periods (indecay)
	Program Options (see also Table 7-4)
DOSOURCE	1= assign source group by source type; 0=don't assign by source type
DOMACT	1=assign source group by MACT category code; 0=don't assign by MACT
DOSCC	1=assign source group by SCC code; 0=don't assign by SCC
DOSIC	1=assign source group by SIC code; 0=don't assign by SIC
DOWRITE	1=create ASPEN input emission files; 0=don't create ASPEN input files
DOASCII	1=create column-formatted ASCII text output file; 0=don't create column-formatted ASCII text output file
	Additional Input Data
DFLTGRP	Default source group (must be an integer between 0 and 9, inclusive)
OUTCODE	File identifier included in name of ASPEN input emission files (limit of 10 characters is recommended. Additional characters will be truncated from the file header, not the file name)
ITYPE	ASPEN Source type (0 for point sources)
RUNID	Run identifier included in ASPEN input emission file header (limit of 25 characters is recommended. Additional characters will be truncated)
	Output files
OUTDATA	Output SAS® file directory
OUTSAS	Output inventory SAS® file name
OUTFILES	Output ASPEN emission files directory
ASCIIFILE	Output ASCII text file directory
ASCII	Column-formatted ASCII text file name

You must include all directory names, file names and variable values even if they are related to a function that you do not select to perform. For example, if you set DOMACT to "0", you still need to assign a value to keyword MACTGRP in your batch file. The value provided in this circumstance does not need to represent an actual file name; it is merely a place holder value for the keyword.

Prepare the execute statement

The last line in the batch file runs the PtFinalFormat program. In the sample batch file provided in Appendix B, you will see a line preceding the run line that creates a copy of the PtFinalFormat code with a unique name. It is this version of the program that is then executed in the last line. If you do this, the log and list files created by this run can be identified by this unique name. If you don't do this and run the program under a general name, every run of PtFinalFormat will create a log and list file that will replace any existing files of the same name.

You may find that you need to assign a special area on your hard disk to use as work space when running PtFinalFormat. In the sample batch file, a work directory is defined on the last line following the execution of PtFinalFormat. For example, the command 'sas PtFinalFormat_062000.sas -work /data/work15/dyl/' assigns a work directory called "/data/work15/dyl". The directory you reference must be created prior to running the program.

7.2.5 Execute PtFinalFormat

There are two ways to execute the batch file. One way is to type 'source' and then the batch file name. Alternatively, first set the permission on the file to 'execute.' You do this by using the UNIX CHMOD command and adding the execute permission to yourself, as the owner of the file, to anyone in your user group, and/or to anyone on the system. For example, 'chmod u+x PtFinalFormat.bat' gives you permission to execute the batch file. Refer to your UNIX manual for setting other permissions. After you have set the file permission, you can execute the batch file by typing the file name on the command line, for example, 'PtFinalFormat.bat'.

7.3 How Do I Know My Run of PtFinalFormat Was Successful?

7.3.1 Check your SAS® log file

You need to review the output log file to check for errors or other flags indicating incorrect processing. This review should include searching the log files for occurrences of the strings "error", "warning", "not found", and "uninitialized". These can indicate problems with input files or other errors.

You can look at the number of records in the input inventory file and compare it to the number of records in the output SAS® inventory file. The number of records should be the same in these two files.

7.3.2 Check your SAS® list file

This program does not create a list file.

7.3.3 Check other output files from PtFinalFormat

PtFinalFormat can create several different output files. It automatically creates an output SAS® inventory file, named by keyword OUTSAS. This file contains the same data as in the input SAS® inventory file except that the source group variable has been added. If you set the DOWRITE keyword to “1", PtFinalFormat will create nine ASPEN input emissions files, one for each possible reactivity class. You should check that all nine files were created and that emission data are included only in those files representing reactivities classes for which you know your inventory has emission data. You may also want to check the header of the files for the decay rate information. If you set the DOASCII flag to “1", PtFinalFormat will create a single column formatted ASCII file which can be helpful in checking the quality of the ASPEN input emission data. Table 7-6 provides the variables in this file.

Table 7-6. FinalFormat Output ASCII File Variables

Variables and Data Description (Units or values are in parentheses)	**Type***
FIPS: 5-digit FIPS code; state and county combined	A5
PLANT_ID: ASPEN plant ID (first 10 characters of EMS-HAP ACT_ID)	A10
LON: point source longitude (negative decimal degrees)	10.5
LAT: point source latitude (decimal degrees)	8.5
ITYPE: ASPEN source type, 0 for point, 3 for pseudopoint (0)	A1
UFLAG: urban/rural dispersion flag (1 for urban, 2 for rural)	1.
STACKID: ASPEN Stack ID (derived from EMS-HAP EMRELPID)	A5
STACKHT: height of stack (meters)	6.1
STACKDIA: diameter of stack (meters)	6.2
STACKVEL: velocity of exhaust gas stream (meters per second)	6.1
STKTEMP: temperature of exhaust gas stream (Kelvin)	6.1
SAROAD: unique pollutant-group code	A5
GROUP: ASPEN source group (integer between 0 and 9, inclusive)	A1
TEMISA1: Emissions rate (grams/second) for the first 3-hour time period	E10.
TEMISA2: Emissions rate, time period 2	E10.
TEMISA3: Emissions rate, time period 3	E10.
TEMISA4: Emissions rate, time period 4	E10.
TEMISA5: Emissions rate, time period 5	E10.
TEMISA6: Emissions rate, time period 6	E10.
TEMISA7: Emissions rate, time period 7	E10.
TEMISA8: Emissions rate, time period 8	E10.
SITE_ID: Identifies a unique site	A20
ACT_ID: Identifies unique activity within a process	A25

* Ax = character string of length x, x.y = numeric format with y places right of decimal, Ex. = exponential

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CHAPTER 8
Area Source Processing
The Area Source AMProc Preparation Program (AreaPrep)

AreaPrep is the first program used in EMS-HAP for the processing of an area source inventory (see Figure 1-1). The output inventory from this program is fed into the Area and Mobile Source Processor (AMProc).

8.1 What is the Function of AreaPrep?

The Area Source AMProc Preparation Program (AreaPrep) is used to prepare an area source emission inventory for the Area and Mobile Source Processor (AMProc). AreaPrep performs the following functions:

- Assigns a spatial surrogate for each area source category for subsequent spatial allocation of county-level emissions to census tracts

- Assigns a code to each source category for matching to temporal profiles

- Creates inventory variables required by AMProc

Figure 8-1 shows a flowchart of AreaPrep. The following sections describe the above bullets.

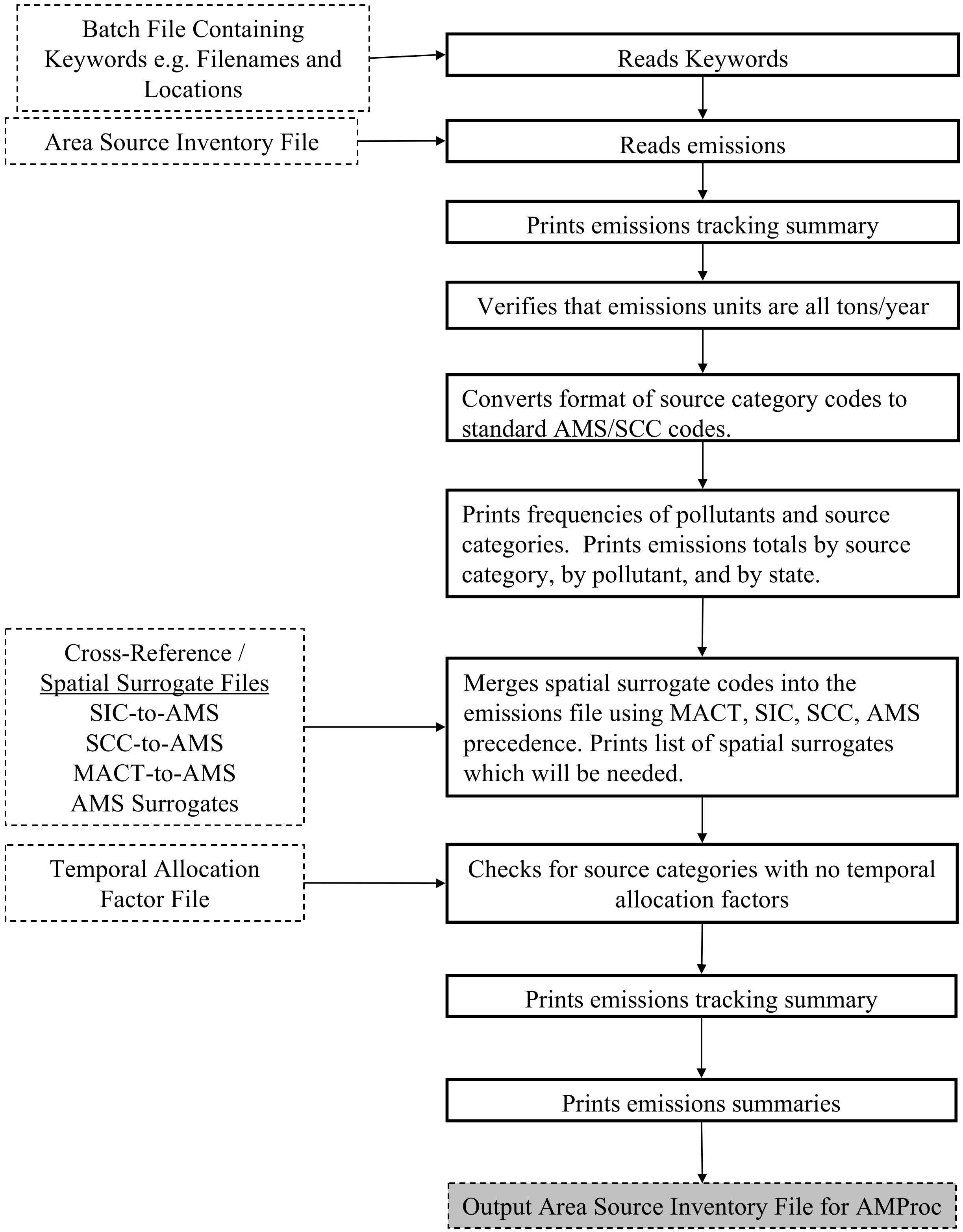

Figure 8-1. AreaPrep Flow Chart

8.1.1 Assigns a spatial surrogate for each area source category for subsequent spatial allocation of county-level emissions to census tracts

AreaPrep assigns spatial surrogates to be used for spatial allocation in AMProc. Emission processors use surrogates for spatial allocation of county-level emissions based on the premise that the geographic distribution of particular surrogates is similar to the geographic distributions of emissions from particular source categories.

Emission processors usually assign spatial surrogates to source categories extracted from the 10-digit AMS code. Because we designed EMS-HAP based on the 1996 NTI, it can assign spatial surrogates to area source categories using a variety of codes that may be in the area source inventory. These are: the MACT code, the SIC code, the SCC code or the AMS code. In addition, shortened AMS codes (4- or 7-digit) and SCC codes (3- or 6-digit) can be used for general categories of emissions; you may assign surrogates based on these. We designed EMS-HAP to use these other codes in addition to AMS for two reasons. First, in the 1996 NTI, the 10-digit AMS code is missing for some area source categories; in these cases the categories will have a non-missing MACT, SIC or SCC code. Second, these codes (MACT, SIC, SCC) tend to be more defined than the AMS code that is in the 1996 NTI, and are therefore more useful for assigning spatial surrogates. When a specific area source category contains multiple codes, AreaPrep uses the following hierarchy to select the spatial surrogate: MACT code, SIC code, SCC code, and AMS code. We determined that this hierarchy provided the best match of area source category to available spatial surrogate for the 1996 NTI, because of the level of detail provided in that inventory by the different classification codes. The MACT category code provides the most detail, followed by the SIC, SCC, and AMS codes. Note that even though AreaPrep was designed based on the 1996 NTI, it is sufficiently general to assign surrogates for any emission inventory. For example, AreaPrep will assign surrogates to your area source inventory based solely on AMS code, if the data for all of the other codes are missing.

AreaPrep makes surrogate assignments through the use of ancillary files (see Section 8.2.3 for directions on how you would modify these files). Each record provides the spatial surrogate that should be used for the applicable code. If AreaPrep can't assign a spatial surrogate to a source category (because either the source category has no codes or the codes it has are not contained in your ancillary files) then AreaPrep prints out a warning in your output SAS® list file and assigns this category to population (spatial surrogate code 20).

The actual implementation of the spatial surrogates to allocate county-level emissions to the census tracts (as required by ASPEN) is performed in AMProc (see Section 10.1.2 in Chapter 10). Table 8-1 gives a description of available spatial surrogates in the EMS-HAP ancillary files and their corresponding spatial surrogate code. Information on how we developed the spatial allocation factors for these surrogates is provided in Appendix D (D.10).

Table 8-1. Surrogates for Spatially Allocating Emissions from Counties to Census Tracts

Code	Surrogate	Definition	Origin of data
1	Residential land	USGS land use categories: Residential, plus one-third of mixed urban and built-up land plus one-third of other urban and built-up land	mid-70's to 80's
2	Commercial land	USGS land use categories: Commercial and services, plus one-half of industrial and commercial complexes, plus one-third of mixed urban and built-up land plus one-third of other urban and built-up land	mid-70's to 80's
3	Industrial land	USGS land use categories: industrial, plus one-half of industrial and commercial complexes, plus one-third of mixed urban and built-up land, plus one-third of other urban and built-up land	mid-70's to 80's
4	Utility land	USGS land use category: "transportation, communications, and utilities"	mid-70's to 80's
6	Sum of commercial land and industrial land	Sum of commercial land and industrial land, as defined above	mid-70's to 80's
7	Farm land	USGS land use category: "cropland and pasture"	mid-70's to 80's
8	Orchard land	USGS land use category: "orchards, groves, vineyards, nurseries, and ornamental horticultural areas"	mid-70's to 80's
9	Confined feeding	USGS land use category "confined feeding"	mid-70's to 80's
10	Farm land & confined feeding	USGS land use categories "cropland and pasture" plus "confined feeding"	mid-70's to 80's
12	Rangeland	USGS land use categories: "herbaceous rangeland" plus "scrub and brush" plus "mixed rangeland"	mid-70's to 80's
13	Forest land	USGS land use categories: "deciduous forest" plus "evergreen forest" plus "mixed forest land"	mid-70's to 80's
14	Rangeland & forest land	Sum of rangeland and forest land, as defined above	mid-70's to 80's
15	Water	US Census category: water area	1990
17	Mining & quarry land	USGS land use category: "strip mines, quarries, and gravel pits"	mid-70's to 80's
18	Inverse population density	Inverse (reciprocal) of: census tract population (20 -defined below) divided by census tract area. Tracts with zero population assigned spatial factors of zero.	1990
19	Inverse population density	Inverse (reciprocal) of: census tract population (20 -defined below) divided by census tract land area. Tracts with zero population assigned tract population of one.	1990
20	Population	U.S. Census category: 1990 residential population	1990
21	Railway miles	Total railway miles, as reported in TIGER/Line	1993
22	Roadway miles	Total miles of all roadway types in each census tract, as reported in TIGER/Line	1993
24	50% Population & 50% roadway miles	Surrogate based equally on population and on roadway miles	1990-93
25	25% Population & 75% roadway miles	Surrogate based on population and roadway miles, weighted by 25% and 75% respectively	1990-93
26	Tract area	The area of census tracts (includes land and water)	1990
27	Urban – inverse population density (18) Rural – farmland	inverse population density (18) for urban counties; farmland for rural counties	1990, mid-70's to 80's
28	Urban – population Rural – tract area	Population (20) for urban counties, tract area (26) for rural counties	1990
29	Sum of farmland and orchard land	Sum of farmland and orchard land, as defined above	mid-70's to 80's

8.1.2 Assigns a code to each source category for matching to temporal profiles

As with spatial surrogate assignments, EMS-HAP uses the various codes (MACT, SIC, SCC and AMS) that may be present in the inventory to match inventory records with temporal profiles. To do this, AreaPrep assigns an additional code to each inventory record. We refer to this code in this documentation as the AMS_SCC code (although AMProc names it the AMS code) because it can be either a 10-digit AMS code or an 8-digit SCC code. The next area source processing program you run, the Area and Mobile Source Processor (AMProc) uses this code to match each record to an appropriate temporal profile. AreaPrep assigns this code the same way it assigns a spatial surrogate (i.e., using either the existing MACT code, SIC, SCC or AMS in the inventory along with the ancillary files discussed in Section 8.2.3.) The AMS_SCC can overwrite the AMS code in the inventory. This will happen if the inventory record has values for both the AMS and another code (MACT, SIC or SCC) due to the fact that the inventory AMS is at the bottom of the hierarchy for this assignment. If a record has only a value for the inventory AMS, and no other code, then the assigned AMS_SCC will equal the inventory AMS. If a particular source category has no codes, or the codes it has are not contained in your ancillary files, then AreaPrep assigns the code a value of 7777777. The Area and Mobile Source Processor (AMProc) will eventually assign these source categories a uniform temporal profile.

AreaPrep also reads in the temporal allocation factor (TAF) ancillary input file, and gives you diagnostic information (See 8.3.2) regarding how the profiles in the TAF file match to the assigned AMS_SCC codes. The TAF file used here is the same as the one used for point source temporal allocation and is discussed in detail in Chapter 5. If there are source categories with no temporal allocation factor assignments, AreaPrep provides a warning that these categories will be assigned a uniform temporal profile.

8.1.3 Creates inventory variables required by AMProc

AreaPrep creates the 5-character STCOUNTY variable by concatenating the 2-digit STATE and the 3-digit COUNTY variables. It also creates the POLLCODE variable and sets its value equal to the CAS variable. The area source inventory you input to AMProc (see Table 10-1) requires these variables.

8.2 How do I run AreaPrep?

8.2.1 Prepare your area source inventory for input into AreaPrep

Your area source inventory must meet the following requirements:

- It must be in SAS® file format.
- It must contain, at a minimum, the variables listed in Table 8-2, with units and values as provided. Additional variables will not be present in the output inventory file.
- All data records should be uniquely identifiable by using the combination of the state

ID (STATE), county ID (COUNTY), source category name (CAT_NAME), and pollutant code (CAS).

- C It shouldn't contain Alaska and Hawaii emission records because EMS-HAP ancillary files currently don't cover these areas.

Table 8-2. Variables Required in the AreaPrep Input Area Source Inventory SAS® File

Variable Name	Data Description	Type*
AMS	AMS code	A10
CAS	unique pollutant code	A10
CAT_NAME	area source emissions category name	A90
COUNTY	county 3-digit FIPS code	A3
EMIS	emissions (tons/year)	N
MACT	MACT code	A4
POL_NAME	pollutant name	A50
SCC	EPA source category code (SCC) identifying the process	A8
SIC	Standard Industrial Classification (SIC) code	A4
STATE	state 2-digit FIPS code	A2
UNITS	emission units (tons/year)	A6

*Ax = character string of length x, N = numeric

8.2.2 Determine whether you need to modify the ancillary input files for AreaPrep

An ancillary file is any data file you input to the program other than your emission inventory. Table 8-3 lists the ancillary input files for AreaPrep. You may need to modify all of these files to tailor them to your emission inventory (for example, if your inventory has a value for SIC not contained in the sic2ams.txt file, or if you choose to use different spatial surrogate assignments from those we provided) since they were developed based on the 1996 NTI. How to do this is explained in the next section.

Table 8-3. Ancillary Input Files for AreaPrep

File Name Provided with EMS-HAP	Purpose	Need to Modify?	Format
surrxref.txt	Assigns each AMS code in the emission inventory to a particular spatial surrogate category	If you choose to change the spatial surrogate assignments or have AMS codes in your inventory not included in this file	text
mact2ams.txt	Assigns spatial surrogates and AMS_SCC codes for temporal allocation by MACT code	If you choose to change the spatial surrogate or AMS_SCC assignments or have MACT codes in your inventory not included in this file	text
scc2ams.txt	Assigns spatial surrogates and AMS_SCC codes for temporal allocation by SCC code	If you choose to change the spatial surrogate or AMS_SCC assignments or have SCC codes in your inventory not included in this file	text
sic2ams.txt	Assigns spatial surrogates and AMS_SCC codes for temporal allocation by SIC code	If you choose to change the spatial surrogate or AMS_SCC assignments or have SIC codes in your inventory not included in this file	text
taff_hourly.txt	Provides temporal profiles containing 24 hourly temporal allocation factors (TAFs) by AMS and/or SCC (i.e., AMS_SCC) codes. These will be applied in AMProc (Chapter 10)	If you choose to add or change the temporal allocation factors for a particular source category	text

8.2.3 Modify the files that assign codes and spatial surrogates based on MACT, SIC, SCC, and AMS codes

Figures 16, 17, 27, and 28 in Appendix A give the structure and sample file contents of the following respective spatial surrogate and AMS_SCC assignment files: scc2ams.txt, sic2ams.txt, surrxref.txt, and mact2ams.txt. You can edit these text files to change the spatial surrogate assignment or AMS_SCC assignment for a particular area source category or add a record for a source category that is in your inventory, but not represented in these files. Table 8-1 gives a description of available spatial surrogates and their corresponding spatial surrogate code. Information on how we developed the spatial allocation factors for these surrogates is provided in Appendix D (D.10).

When you add or change an AMS_SCC code assignment in mact2ams.txt, sic2ams.txt or scc2ams.txt files, you should look at the codes (and a description of the codes) in the temporal allocation factor (TAF) file (see Appendix A, Figure 15). You want to make sure the codes you change or add to the assignment files are present in the TAF file. Otherwise the AMS_SCC you add will not match to a temporal profile.

You don't need to change or add spatial surrogate and AMS_SCC assignments in all three ancillary assignment files if a source category in your inventory is only represented by one of the files. For example, if you have a source category in your inventory called "Consumer Products Usage" and it is represented only by AMS code 2460000000 (i.e., all other codes are blank), you only need to change the surrxref.txt file. Also, as discussed in Section 8.1.3, AreaPrep uses the MACT code file first, followed by the SIC, SCC and AMS. So, if your category has all four codes, make sure you modify the mact2ams.txt file first.

8.2.4 Prepare your batch file

The batch file serves two purposes: (1) allows you to pass "keywords" such as file names and locations, program options, and run identifiers to the program, and (2) sets up the execute statement for the program. A sample batch file for AreaPrep is shown in Figure 7 of Appendix B.

Specify your keywords

Table 8-4 lists the keywords required in the batch file. Use keywords to provide a run identifier and to locate and name all input and output files.

Table 8-4. Keywords in the AreaPrep Batch File

Keyword	Description (prefix of file name provided with EMS-HAP in parentheses)
RUNID	Run identification for titles
INPFILES	Input emission file directory
AREADATA	Input inventory SAS® file name
OUTFILES	Output files directory
OUTDATA	Output inventory SAS® file name
REFFILES	Ancillary files directory
SIC2AMS	Spatial surrogate assignments and codes for matching to temporal profiles by SIC text file prefix (sic2ams)
SCC2AMS	Spatial surrogate assignments and codes for matching to temporal profiles by SCC text file prefix (scc2ams)
MACT2AMS	Spatial surrogate assignments and codes for matching to temporal profiles by MACT text file prefix (mact2ams)
SURRXREF	Spatial surrogate assignments by AMS text file prefix (surrxref)
TAFFILE	Temporal profile text file prefix (taff_hourly)

Prepare the execute statement

The last line in the batch file runs the AreaPrep program. In the sample batch file provided in Appendix B, you will see a line preceding the run line that creates a copy of the AreaPrep code having a unique name. It is this version of the program that is then executed in the last line. If you do this, the log and list files created by this run can be identified by this unique name. If you don't do this and run the program under a general name, every run of AreaPrep will create a log and list file that will replace any existing files of the same name.

You may find that you need to assign a special area on your hard disk to use as work space when running AreaPrep. In the sample batch file, a work directory is defined on the last line following the execution of AreaPrep. For example, the command 'sas AreaPrep_060900.sas -work /data/home/mls/' assigns a work directory called "/data/home/mls". The directory you reference must be created prior to running the program.

8.2.5 Execute AreaPrep

There are two ways to execute the batch file. One way is to type 'source' and then the batch file name. Alternatively, first set the permission on the file to 'execute.' You do this by using the UNIX CHMOD command and adding the execute permission to yourself, as the owner of the file, to anyone in your user group, and/or to anyone on the system. For example, 'chmod u+x AreaPrep.bat' gives you permission to execute the batch file. Refer to your UNIX manual for setting other permissions. After you have set the file permission, you can execute the batch file by typing the file name on the command line, for example, 'AreaPrep.bat'.

8.3 How Do I Know My Run of AreaPrep Was Successful?

8.3.1 Check your SAS® log file

You need to review the output log file to check for errors or other flags indicating incorrect processing. This review should include searching the log files for occurrences of the strings "error", "warning", "not found", and "uninitialized". These can indicate problems with input files or other errors.

8.3.2 Check your SAS® list file

The list file contains the following information:

- Emissions totals and record counts, by pollutant, for the input emission inventory
- List of source category names
- Frequencies of lengths of codes
- The numbers of present and missing AMS, SCC, SIC, and MACT source category codes and names
- Frequencies of AMS, SCC, SIC, and MACT source category codes and names
- SCC Codes in emissions file not in SCC link file

- Warning message if a problem was encountered when matching source category codes
- Warning message if there were source categories with no spatial surrogate assignments
- List of the spatial surrogates which will be used in AMProc
- Warning message if there were source categories with no temporal allocation factor assignments, with a note that these categories will be assigned a uniform temporal profile in AMProc
- Summaries of Emissions With Missing SCC's
- All AMS, SCC, SIC, and MACT code combinations, with assigned AMS_SCC codes and spatial surrogates. Five tables: sorted by category name, AMS, SIC, SCC, and MACT codes
- Contents of the data set written out for subsequent input to AMProc, and the first six records in the file
- Output area source emissions totals for each pollutant
- Output file source category frequencies
- State-level emissions totals and record counts

One of the most important summaries in the list file is the one entitled "All Code Combinations, With Matched AMS_SCC Code and Spatial Surrogates." This summary shows the spatial surrogates and AMS_SCC code assignments. If you want to modify these assignments, you will need to change the mact2ams.txt, scc2ams.txt, sic2ams.txt, and surrxref.txt files as discussed above and rerun AreaPrep.

8.3.3 Check other output files from AreaPrep

You should check for the existence of the output inventory file named by keyword OUTDATA. This file (or this file divided up into smaller files, depending on how large it is and how much memory your computer has) will serve as the input to the Area and Mobile Source Processor (AMProc).

CHAPTER 9
Mobile Source Processing
The Mobile Source AMProc Preparation Program (MobilePrep)

The Mobile Source AMProc Preparation Program (MobilePrep) is run after the airport processing program, AirportProc (see Figure 1-1). The output from MobilePrep is fed into the Area and Mobile Source Processor (AMProc).

9.1 What is the function of MobilePrep?

The Mobile Source AMProc Preparation Program (MobilePrep) is used to prepare mobile source emissions for input to the Area and Mobile Source Processor (AMProc). MobilePrep performs the following functions:

- Splits the mobile source inventory into onroad and nonroad inventories
- Creates inventory variables required by AMProc

Unlike AreaPrep (discussed in Chapter 8), MobilePrep does not assign spatial surrogates or AMS_SCC codes. AMProc performs these functions for mobile sources. This is because, in the 1996 NTI, the mobile source emission inventory contains only one coding system, the AMS code. Thus, temporal allocation factors and spatial surrogates are selected using this code alone.

Figure 9-1 shows a flowchart of MobilePrep. The following sections describe the above bullets.

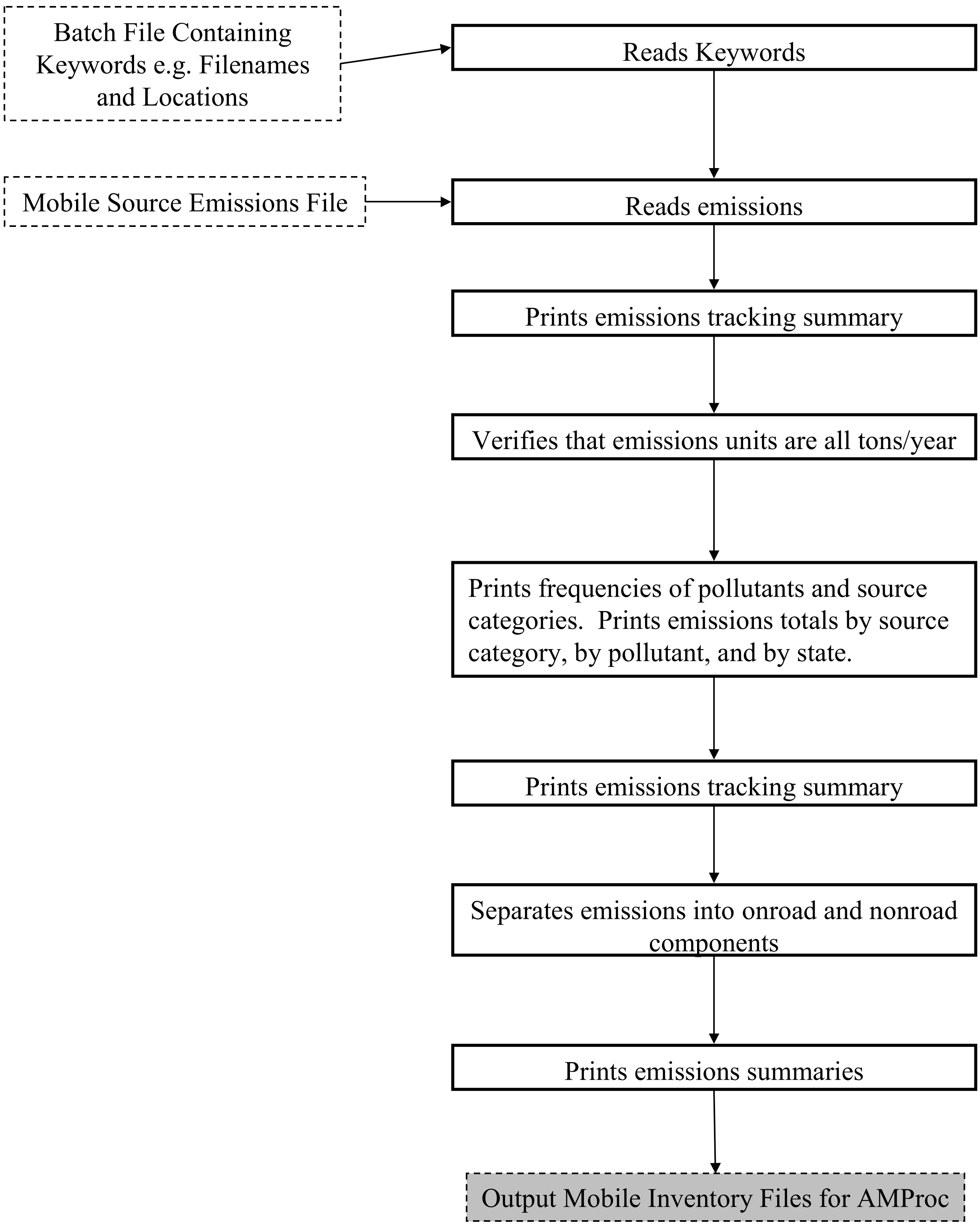

Figure 9-1. MobilePrep Flow Chart

9.1.1 Splits the mobile source inventory into onroad and nonroad inventories

MobilePrep splits the mobile source inventory into onroad and nonroad inventories based on the inventory AMS code. If the first 3 characters of the AMS code are 220 or 223, then the emission records are written into the onroad file (last two characters of the file name are "on"); records having all other AMS codes are written to the nonroad emissions file (last two characters are "of").

MobilePrep creates separate onroad and nonroad emission inventories to allow these inventories to be processed separately in AMProc. You will likely want to process these inventories separately through AMProc because it is the only way to assign different pollutant characteristics such as coarse/fine particulate matter splits for onroad and nonroad sources. Many metals, for example, have different coarse/fine particulate matter splits for onroad and nonroad sources. To use different splits, you need to specify a different HAP table when you run AMProc. You do this by running AMProc twice, each time using a different HAP table. The HAP table is one of the ancillary files for AMProc, and is discussed in greater detail in Chapters 4 (Section 4.2.3), 10 (Section 10.1.1) and Appendix D (Sections D.5 and D.6).

9.1.2 Creates inventory variables required by AMProc

MobilePrep creates the 5-character STCOUNTY variable by concatenating the 2-digit State ID and the 3-digit County ID. It also creates the POLLCODE variable and sets its value equal to the CAS variable. These variables are required in the inventory you input to AMProc (see Table 10-2).

9.2 How do I run MobilePrep?

9.2.1 Prepare your mobile source inventory for input into MobilePrep

Your mobile source inventory must meet the following requirements:

- It must be in SAS® file format.
- It must contain, at a minimum, the variables listed in Table 9-1, with units and values as provided. (Additional variables can be present, but will not be present in the output inventory file.)
- All data records should be uniquely identifiable by using the combination of the state ID (ST_FIPS), county ID (CTY_FIPS), AMS source category code (AMS), and pollutant code (CAS).
- It shouldn't contain Alaska and Hawaii emission records because EMS-HAP ancillary files currently don't cover these areas.

Table 9-1. Variables Required in the MobilePrep Input Mobile Source Inventory SAS® File

Variable Name	Data Description	Type*
AMS	AMS 10-digit category code	A10
CAS	unique pollutant code number	A10
CAT_NAME	mobile source emissions category name	A50
COUNTY	county 3-digit FIPS code	A3
EMIS	emissions (tons/year)	N
POL_NAME	pollutant name	A50
STATE	state 2-digit FIPS	A2
UNITS	emission units (tons/year)	A12

*Ax = character string of length x, N = numeric

9.2.2 Determine whether you need to modify the ancillary input files for MobilePrep

An ancillary file is any data file you input to the program other than your emission inventory. There are no ancillary input files for MobilePrep.

9.2.3 Prepare your batch file

The batch file serves two purposes: (1) allows you to pass "keywords" such as file names and locations, program options, and run identifiers to the program, and (2) sets up the execute statement for the program. A sample batch file for MobilePrep is shown in Figure 8 of Appendix B.

Specify your keywords

Table 9-2 lists the keywords required in the batch file. Use keywords to provide a run identifier and to locate and name all input and output files.

Table 9-2. Keywords in the MobilePrep Batch File

Keyword	Description
TITLE	Run identification for titles
INPFILES	Input emission file directory
INEMIS	Input emissions file name prefix
OUTFILES	Output files directory
OUTEMIS	Output file name prefix (must be no more than 6 characters if you're using SAS® version 6)
WORKDIR	Temporary directory for large work file

Prepare the execute statement

The last line in the batch file runs the MobilePrep program. In the sample batch file provided in Appendix B, you will see a line preceding the run line that creates a copy of the MobilePrep code having a unique name. It is this version of the program that is then executed in the last line. If you do this, the log and list files created by this run can be identified by this unique name. If you don't do this and run the program under a general name, every run of MobilePrep will create a log and list file that will replace any existing files of the same name.

You may find that you need to define a special area on your hard disk to use as work space when running MobilePrep. A directory for work space is defined in the batch file by the keyword WORKDIR. The directory you specify in your batch file must be created prior to running the program.

9.2.4 Execute MobilePrep

There are two ways to execute the batch file. One way is to type 'source' and then the batch file name. Alternatively, first set the permission on the file to 'execute.' You do this by using the UNIX CHMOD command and adding the execute permission to yourself, as the owner of the file, to anyone in your user group, and/or to anyone on the system. For example, 'chmod u+x MobilePrep.bat' gives you permission to execute the batch file. Refer to your UNIX manual for setting other permissions. After you have set the file permission, you can execute the batch file by typing the file name on the command line, for example, 'MobilePrep.bat'.

9.3 How do I know my run of MobilePrep was successful?

9.3.1 Check your SAS® log file

You need to review the output log file for MobilePrep to check for errors or other flags indicating incorrect processing. This review should include searching the log files for occurrences of the strings "error", "warning", "not found", and "uninitialized". These can indicate problems with input files or other errors.

9.3.2 Check your SAS® list file

The list file contains the following information:

- The options that you specified
- Contents of input emissions file
- Emissions totals and record counts, by pollutant, for the input emission inventory
- List of source category names
- List of states in the inventory
- Table of emission units (there should be only tons/year listed)

- Emissions totals for each source category and pollutant for all mobile sources
- Contents of the onroad and nonroad data sets written out for subsequent input to AMProc
- Output emissions totals for each pollutant for all mobile, onroad, and nonroad sources

You should review the list file to verify that the emissions, pollutants, and source categories are correct. You should also make sure the emission units are “tons/year.”

9.3.3 Check other output files from MobilePrep

You should check for the existence of the onroad, nonroad and combined nonroad and onroad output inventory files. MobilePrep names the combined file what you entered as your name for the keyword “OUTFILE.” It names the onroad and nonroad files with the name you used for keyword “OUTFILE” concatenated with an “on,” for onroad and an “of” for nonroad. These files (or these files divided up into smaller files, depending on how large they are and how much memory your computer has) will serve as the input to the Area and Mobile Source Processor.

CHAPTER 10
Area and Mobile Source Processing
The Area and Mobile Source Processor (AMProc)

AMProc is the final program you run for processing area or mobile sources (see Figure 1-1). You must run AMProc separately for area sources and mobile sources. You will likely need to run AMProc separately for nonroad mobile sources and onroad mobile sources, as discussed in Section 9.1.1. AMProc uses the output of AreaPrep for area sources. It uses the output of MobilePrep for nonroad or onroad mobile sources. If you are running onroad and nonroad together, AMProc uses the combined onroad and nonroad inventory output from MobilePrep.

10.1 What is the Function of AMProc?

The Area and Mobile Sources Processor (AMProc) is the core of EMS-HAP's processing of area and mobile source emissions. It performs the functions listed below.

- Selects pollutants, groups and/or partitions pollutants, and assigns their characteristics

- Spatially allocates county-level emissions

- Temporally allocates emissions

- Determines ASPEN-specific modeling parameters

- Projects emissions to a future year

- Assigns ASPEN source groups

- Creates ASPEN input files, column formatted text and SAS® files

You control whether or not to have AMProc project emissions to a future year in your execution of the program; Section 10.1.6 details how to do this.

Figure 10-1 gives an overview of the Area and Mobile Sources Processor. The following sections describe the above bullets.

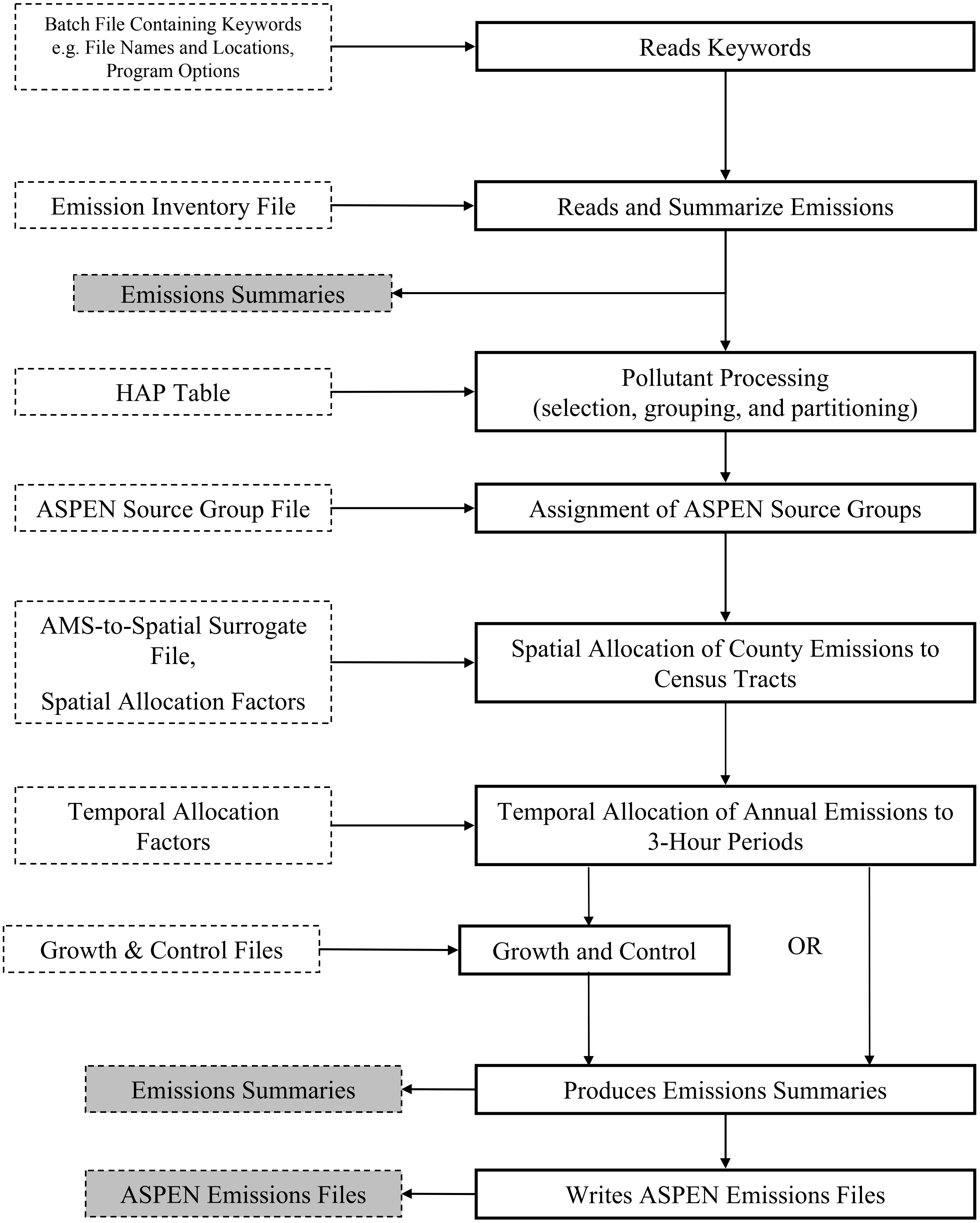

Figure 10-1. Overview of Area and Mobile Source Emissions Processing (AMProc)

10.1.1 Selects pollutants, groups and/or partitions pollutants, and assigns their characteristics

One of the first functions the Area and Mobile Source Processor performs is the selection, partitioning and grouping of pollutants to be modeled by ASPEN and the assignment of their characteristics. This same function is performed for point source processing with the PtAspenProc program (see Chapter 4). As with point source processing, you control these processes through your entries in an ancillary input file we refer to as the "HAP table" file. Unlike point sources, AMProc uses only one HAP table. Thus, if you want to specify a different HAP table for onroad sources than nonroad sources you will need to run AMProc twice, once with the onroad HAP table and once with the nonroad HAP table.

AMProc uses the HAP table to:

- Subset the inventory to include only those pollutants you've chosen to model
- Assign a reactivity class to each gaseous pollutant and a particulate size class to each particulate pollutant (through the variable REACT)
- Group multiple species into a single pollutant category
- Partition pollutants into multiple pollutant categories with different reactivity or particulate size classes (e.g., apportion lead chromate to lead compounds, fine particulate; lead compounds, coarse particulate; chromium compounds, fine particulate and chromium compounds, coarse particulate)
- Apply potency factors, molecular weight, or other adjustment factors (FACTOR variable) to the emissions of different species in a pollutant category
- Assign the resulting pollutant or pollutant category to be modeled in ASPEN a unique HAP code (variable NTI_HAP) used for inventory projections (if you choose this function), a unique pollutant group code (variable SAROAD) used for ASPEN modeling and a description of the group (variable SAROADDC)

Because this function is the same for point sources as it is for area and mobile sources, we refer you back to Chapter 4 for details about the HAP table. Section 4.2.3 contains instructions on how to modify it to meet your needs. Appendix A (Tables 1-4) contains printouts of all HAP tables supplied with EMS-HAP. Appendix D (D.5-D.6) describes how we developed these HAP tables.

10.1.2 Spatially allocates county-level emissions

Emission inventories generally provide area and mobile source emissions at the county level. EMS-HAP spatially allocates county-level emissions to the census tracts within each county. AMProc uses "spatial allocation factors" to apportion county-level emissions to census tracts. These spatial allocation factors are derived from data on the geographic distribution of various "spatial surrogates" that are believed to have geographic variations similar to those of emissions from various source categories.

Figure 10-2 presents a flow chart of the spatial allocation process in EMS-HAP for area and mobile sources. The first step is to assign the appropriate spatial surrogate to each source category. For area sources, this is done in AreaPrep; the process is explained in detail in Section 8.1.1. For mobile sources, AMProc assigns the spatial surrogates using the AMS code and the AMS-based surrogate assignment ancillary file, surrxref.txt (see Section 10.2.5).

The next step is to apply spatial allocation factors (SAFs) to the county-level emissions in the inventory to compute tract-level emissions. AMProc obtains the SAFs from ancillary SAF files. Each set of SAFs (the set consists of one SAF per tract) comes from an ancillary SAF file corresponding to a particular spatial surrogate. For example, SAF20 corresponds to population, since the surrogate code for population is "20." AMProc uses the spatial surrogate assignments discussed above to link each county-level emission record to the appropriate SAF file. AMProc then applies the factors to the county-level emissions. This results in tract-level emission estimates, for that county, for each area or mobile source category. AMProc uses the following equation to compute tract level emissions for each source category, j, in a county:

$$E_{\text{tract, county, j}} = E_{\text{county, j}} * S_{\text{county, tract, j}} \qquad \text{(eq. 10-1)}$$

where

$E_{\text{tract, county, j}}$ = census tract emissions from source category j in a county

$E_{\text{county, j}}$ = emissions from category j in the county that contains the census tract

$S_{\text{county, tract, j}}$ = the spatial allocation factor for the tract in the county that corresponds to the spatial surrogate assigned to source category j. (The spatial allocation factors for all of the tracts in a given county will sum to 1.0 for any given spatial surrogate.)

A discussion of the development of the ancillary SAF files supplied with EMS-HAP is provided in Appendix D (Section D.10).

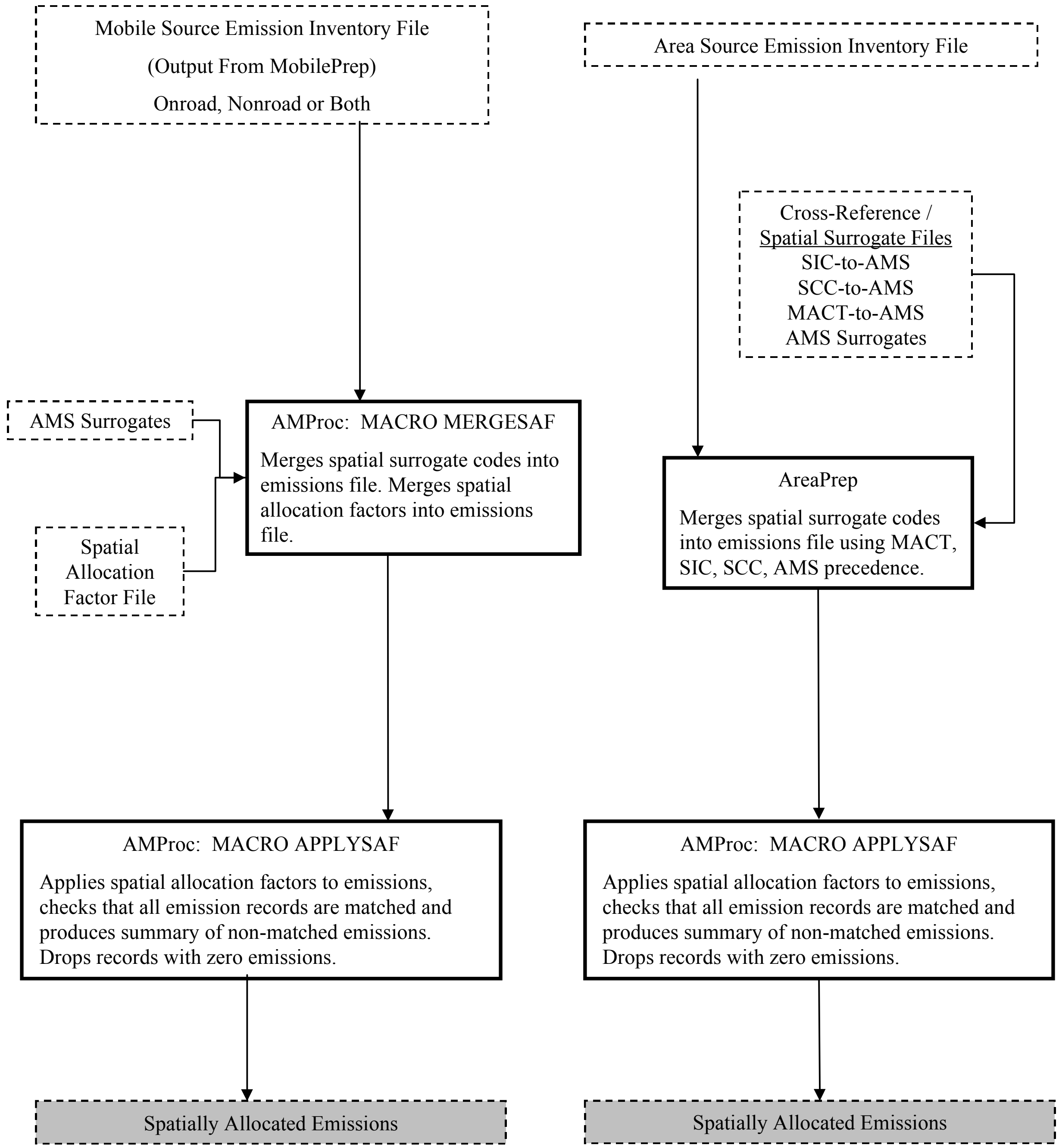

Figure 10-2. Area and Mobile Source Spatial Emissions Processing Flow Chart

10.1.3 Temporally allocates emissions

Temporal allocation of emissions is the process of estimating emissions at a finer temporal resolution than that of the emission inventory. The ASPEN model requires emission rates for eight 3-hour periods within an average day of the year (i.e., no seasonal, monthly or day-of-week variations in emissions are accounted for). AMProc produces these eight estimates for area and mobile source categories using temporal profiles for each source category. These temporal profiles are in an ancillary file we refer to as the temporal allocation factor (TAF) file.

Note that temporal allocation of point sources is done in PtTemporal (see Chapter 5). The temporal allocation methodology in AMProc is the same as PtTemporal except for the hierarchy of codes used to assign the TAFs to sources. AMProc uses the AMS code to assign TAFs. For area sources, this code was assigned in AreaPrep (see Section 8.1.2) based on the following hierarchy: MACT code, SIC code, SCC code and inventory AMS code. For point sources, PtTemporal assigns TAFs using a different hierarchy: the SCC, SIC and the MACTCODE.

AMProc produces a list any categories that do not match to temporal profiles in the ancillary TAF file. As in PtTemporal, these categories are assigned a uniform profile.

Figure 10-3 shows a flow chart of the temporal allocation process in EMS-HAP for area and mobile sources.

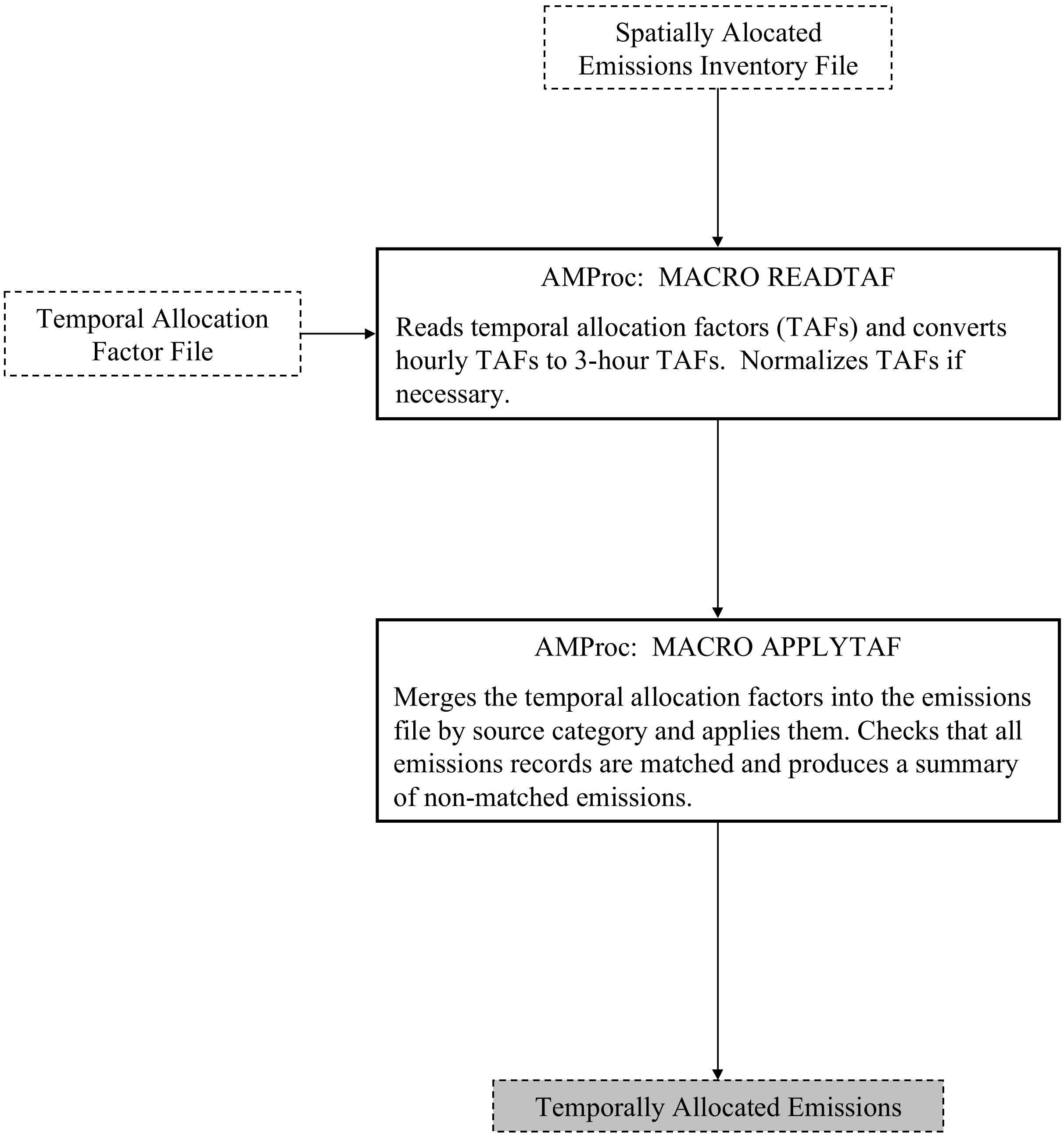

Figure 10-3. Area and Mobile Source Temporal Allocation Flow Chart

10.1.4 Determines ASPEN-specific modeling parameters

Urban/Rural Dispersion Parameters

The ASPEN model uses different dispersion parameters and deposition rates for urban and rural sources; therefore, each tract must be identified as being either urban or rural. AMProc supplies this information through the assignment of the urban/rural flag where a value of 1 indicates an urban tract, and a value of 2 indicates a rural tract.

AMProc reads the urban/rural flags at the tract level from the spatial allocation factor (SAF) files. These files are ancillary input files to the program (see 10.2.2, Table 10-3) and also serve to provide the spatial allocation factors for allocating county-level emissions to the census tracts, as was discussed in Section 10.1.2. The SAF files supplied with EMS-HAP use the same urban/rural designations used in the EPA's Cumulative Exposure Project (CEP).[6] The CEP based the designation on residential population density data from 1990 (urban if greater than 750 people/km2), except for a few very small tracts. Each SAF file contains the same urban/rural flag designations. To change these designations you need to change them in all SAF files. The format of the SAF files is provided in Figure 29 of Appendix A.

Vent Type Parameter IVENT

An IVENT value of 0 (zero) represents a stacked vent. The ASPEN model performs plume rise calculations for these stacks. An IVENT value of 1 represents a non-stacked vent. The ASPEN does not perform plume rise calculations for this case. IVENT is set to 1 for all area and mobile sources because stacks are not being processed.

10.1.5 Assigns ASPEN source groups used in the ASPEN model output

The ASPEN model computes concentrations for up to 10 source groups which can be used to analyze the relative impacts of different types of emission sources. AMProc assigns groups using an ancillary source group assignment file, am_grp.txt (see Section 10.2.4). This file links the source category name variable (CAT_NAME) and the county-level urban/rural designation to a group number (between zero and nine, inclusive.) Use of the county-level urban/rural designation allows you to distinguish between sources located in urban counties from sources located in rural counties. Note that the county-level urban/rural designation is different from the tract-level urban/rural dispersion parameter described in 10.1.4. The county-level urban/rural designations come from the ancillary file popflag96.txt.

10.1.6 Projects emissions to a future year

AMProc can project the area and mobile source emissions inventories to a future year, reflecting the impacts of growth and emission reduction scenarios. We expect you will use this primarily for area sources, since mobile source projections usually involve running a mobile source emissions model rather than multiplying base year emissions by a series of factors (which is basically what this program does.) Nonetheless, if you develop a set of growth and emission reduction factors to use, this program can be used for mobile sources.

You can choose to project your emissions along with the other functions in AMProc, or you can supply an inventory that is already temporally and spatially allocated and project emissions for that inventory. Emission reduction information can be assigned to the emission records either by the source category, reflecting a user-defined reduction scenario, or by the MACT code, reflecting the reductions to be achieved by Maximum Achievable Control Technology (MACT) standards and standards under Section 129 of the Clean Air Act.

The "Program Options" section of Table 10-4 shows how to set the keywords in your batch file to select your options for projecting emissions.

The projection methodology for area and mobile sources in AMProc is very similar to that for point sources in PtGrowCntl. The major difference is that AMProc allows you to provide user-defined emission reduction scenarios (which could include MACT and other strategies you choose). PtGrowCntl currently only allows you to provide category-based reductions based on the MACT code variable or facility-specific emission reduction information.

Figure 10-4 shows a flowchart for the area and mobile sources growth and control processing. Note that this module of AMProc is expected to undergo developmental changes. We will provide updated documentation when the revised version is released.

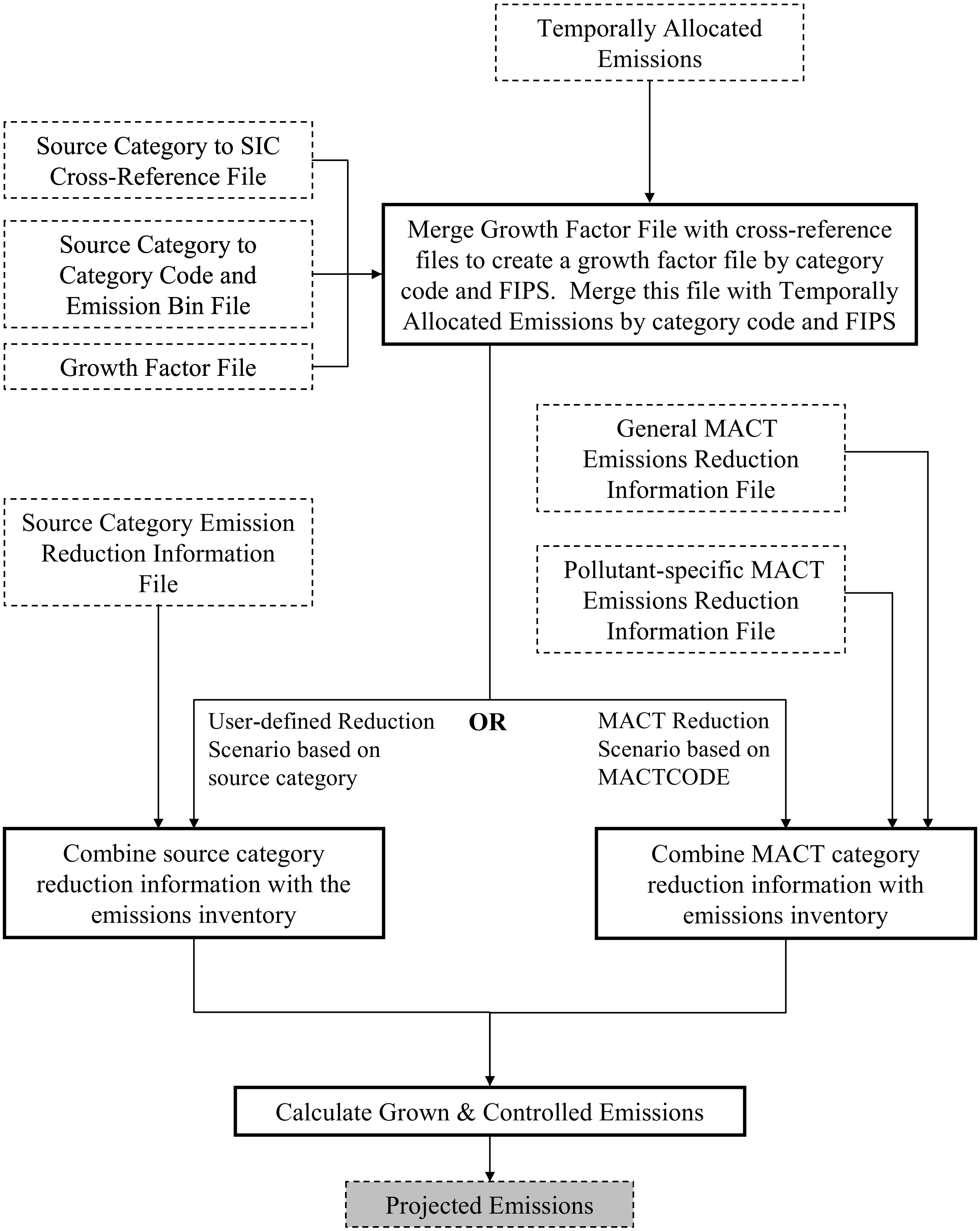

Figure 10-4. Area and Mobile Source Growth and Control Projection Flow Chart

Projections due to Economic Growth

AMProc assigns growth factors to each emissions record based on the state FIPS and the SIC code (similar to PtGrowCntl). AMProc uses an ancillary file containing a cross-reference between source category names and SIC codes to supply SIC codes where they are missing in the inventory (see Section 10.2.7). The growth factor is specific to both the base year and future year and is supplied to the program through an ancillary growth factor SAS® file (see Section 6.2.3). AMProc computes future 3-hour emission rates for each record by multiplying the base year 3-hour emission rates by the assigned growth factor, as follows.

Grown emissions = (Base year baseline emissions) x (Growth factor)

Each execution of AMProc results in an inventory file containing emissions projected to that one future year. Note that any record will be assigned the default growth factor of one when there is no assigned SIC code or when no match is found in the growth factor input file by state FIPS and SIC. In these cases, or, if you choose not to grow the emissions, the grown emissions will be unchanged from the base year emissions.

Projections due to User-Defined Emission Reduction Scenarios

AMProc can account for the impacts of user-defined emission reduction strategies. You can supply emission reduction information for each individual area or mobile source category in the emission inventory using the area_cntl.txt ancillary file (see Section 10.2.7). The emission reduction information in this file includes: (1) two control efficiencies for the reduction strategy (one for new sources and one for existing sources), (2) the percentage of emissions at existing sources that will come from new sources, and (3) an application control flag. These variables and their use in AMProc are the same as in the point source growth and control methodology in PtGrowCntl. See Section 6.1.2 of Chapter 6 for more details.

After the emission reduction information has been assigned to the emission records, the existing and new source projected emissions are calculated and are summed to determine the projected emissions for each inventory record. The calculations are:

$$\text{Total Projected Emissions} = \text{Projected Emissions}_{existing} + \text{Projected Emissions}_{new} \quad \text{(eq. 10-2)}$$

$$\text{Projected Emissions}_{existing} = \text{Grown Emissions} \times (1\text{-NewRate}/100) \times (1\text{-EffT}_{existing} / 100) \quad \text{(eq. 10-3)}$$

$$\text{Projected Emissions}_{new} = \text{Grown Emissions} \times (\text{NewRate}/100) \times (1\text{-EffT}_{new} / 100) \quad \text{(eq. 10-4)}$$

where

EffT = emission reduction strategy efficiency

NewRate = Percentage of emissions attributed to new sources

Projections due to MACT Emission Reduction Scenarios

As an alternative to applying user-defined reductions based on source category, you can have AMProc apply MACT emission reductions based on the inventory MACT code. AMProc assigns this MACT category-based reduction information to the emission records using the same two ancillary files, MACT_gen and MACT_spec, as are used in PtGrowCntl (Chapter 6). The use of these files and the emission reduction information they contain are described in more detail in Section 6.1.2.

In summary, you can specify general MACT reduction information through the MACT_gen ancillary file. General reduction information applies to an entire MACT category or MACT process (if the process has a unique MACT code), but not to a particular pollutant emitted by the process. You can assign pollutant-specific MACT reduction information through the MACT_spec ancillary file.

Note that because the MACT_spec file is also used to project point source emissions, this file may also include MACT reduction information identified by SCC. AMProc will not use any records including SCC information in the MACT_spec file for the projection. Thus, if you want to assign pollutant-specific information to the entire MACT category, make sure you include a record in the MACT_spec file in which the SCC fields are blank.

For an individual inventory record, the assignment of process and pollutant-specific MACT reduction information will supercede information assigned by the MACT code alone.

AMProc applies the new and/or existing MACT control efficiencies to the grown and temporally allocated emissions when the following criteria are met:

- The application control flag (MACT_APP) is equal to 1.
- The source control flag is 'B' (this value indicates that the control efficiency is applied to all source types).
- The projection year is greater than the compliance year or, if the compliance year is not provided, the projection year is greater than the MACT bin plus 1995.

See equations 10-2, 10-3 and 10-4 above for AMProc's calculation of the projected emissions.

10.1.7 Creates ASPEN input files, column formatted text and SAS® files

AMProc creates three different types of output files:
1. The ASPEN input files
2. A column formatted ASCII text file
3. SAS® output files – a core file and an extended file.

You control whether or not to create the extended SAS® file in your execution of AMProc, as discussed below.

ASPEN Input Files

The ASPEN model requires emission data in the form of one ASCII text file for each of the possible nine reactivity classes. Each file contains data for all pollutants having the same reactivity class. AMProc creates all nine files in the appropriate format. Each file consists of a header and body. The elements of the header are:

1. A run identifier: You supply this in the batch file (keyword RUNID in Table 10-4)
2. Wet and dry deposition codes: AMProc sets these to 0 for particulates and 1 for gaseous species. These values tell ASPEN whether to invoke the deposition algorithm for particulates (ASPEN does not perform deposition for gases).
3. Decay coefficients associated with the reactivity class: AMProc determines these from the ancillary file indecay.txt based on the value of the REACT variable (discussed in detail in Chapter 4, Section 4.2.3). This file contains a set of coefficients for each of the nine reactivity classes.

The file body contains source information such as census tract latitude and longitude, source group, and the emissions for each of eight 3-hour periods for each pollutant (of the appropriate reactivity class) emitted from the stack.

Using the run identifier keywords in the batch file, AMProc names the ASPEN input files in the form "EMISTYPE.USRLABEL.dRUNDATE.rREACT.inp". An example file name is "MV.Base96.3.d020499.r9.inp", where "Base96" is the keyword USRLABEL, "MV" (note that it would be "AR" for area sources) is the keyword EMISTYPE, "3" is the emissions group variable, "9" the REACT variable, and "d020499" is the keyword RUNDATE.

Column Formatted ASCII Files

AMProc creates a single column formatted ASCII text file containing data written to the ASPEN input emissions files. This file can provide easy access to the data for quality assurance purposes. You specify the prefix name of this file in your batch file (keywords EMISTYPE and USRLABEL); the suffix is "dat". Table 10-5 in Section 10.3.3 shows the format of this file.

*SAS® output file*s

There are two SAS®-formatted files written out by AMProc. One is the core output file, reflecting what is written to the ASPEN emissions files, and the other is the extended output file, which retains the source category information for each source, and is therefore much larger. You can specify that AMProc not produce the extended file in your execution of AMProc by setting the keyword SAVEFILE in your batch file (see Table 10-4 in Section 10.2.8) to 0 (zero). Tables 10-5 and 10-6 in Section 10.3.3 show the formats of the core and extended output files.

The name of the extended output file is the first 7 characters of the value assigned to the concatenation of the keywords EMISTYPE and USRLABEL with the suffix “##", where “##” is an engine-specific suffix. For example, if “EMISTYPE” is “MV” (mobile), “USRLABEL” is “Bas96", then the extended SAS®-formatted output file prefix would be "MVBas96". The file name of the core output file is the same as the extended file except that it is preceded by the letter “c”, e.g., "cMVBas96".

10.2 How do I run AMProc?

10.2.1 Prepare your area and mobile source emission inventory files for input into AMProc

Area Source Inventory Requirements

The area source inventory you use for input into AMProc must be the output inventory SAS® file from AreaPrep. This file will contain the variables listed in Table 10-1.

Table 10-1. Variables in the AMProc Input Area Source Inventory SAS® File
(Variables used by AMProc are in bold; Other variables listed were either created or used by AreaPrep)

Variable Name	Data Description	Type*
AMS	AMS 10-digit category code or SCC 8-digit category code; assigned in AreaPrep (see 8.1.2)	A10
CAS	unique pollutant code	A10
CAT_NAME	emissions category name	A90
EMIS	emissions (tons/year)	N
MACT	MACT code	A4
MATCH	information on how AreaPrep assigned spatial surrogates and AMS codes; assigned in AreaPrep	A4
POL_NAME	pollutant name	A50
POLLCODE	pollutant code (same value as CAS); assigned in AreaPrep	A10
SCC	SCC code	A8
SIC	SIC code	A4
SPATSURR	the assigned spatial surrogate from AreaPrep	N
STCOUNTY	5-digit FIPS code (state and county combined)	A5

*Ax = character string of length x, N = numeric

Onroad and Nonroad Mobile Source Inventory Requirements

The mobile source inventory you use for input into AMProc must be an output inventory SAS® file from MobilePrep. It can be either the onroad inventory, the nonroad inventory or the combined onroad and nonroad inventory. These files will contain the variables listed in Table 10-2.

Table 10-2. Variables in the AMProc Input Mobile Source Inventory SAS® File
(Variables used by AMProc are in bold; Other variables listed were either created or used by MobilePrep)

Variable Name	Data Description	Text*
AMS	AMS 10-digit category code or SCC 8-digit category code	A10
CAS	unique pollutant code	A15
CAT_NAME	emissions category name	A50
COUNTY	county 3-digit FIPS code	A3
EMIS	emissions (tons/year)	N
POLLCODE	unique pollutant code (same value as CAS)	A15
POL_NAME	pollutant name	A50
STATEN	2-digit State abbreviation	A2
STCOUNTY	5-digit FIPS code (state and county combined)	A5

*Ax = character string of length x, N = numeric

Splitting Your Input Emissions Files into Smaller Files

You may need to split the input emission inventory file into smaller files and run each of these through AMProc separately. Do this after running AreaPrep (for area sources) and MobilePrep (for mobile sources). File splitting will be necessary if you run out of disk space while running AMProc. You may not need to do this if your inventory contains a limited number of pollutants and/or source categories. The number of inventory subsets will be determined by the number of pollutants, source categories and counties that are being processed, and the amount of available free disk space.

10.2.2 Determine whether you need to modify the ancillary input files for AMProc

An ancillary file is any data file you input to the program other than your emission inventory. Table 10-3 lists the ancillary input files needed to run AMProc. In the following sections we discuss the content of most of these files and when you need to modify them. Appendix A contains the file formats of all of these files; see the table of contents in Appendix A for the list of ancillary files associated with AMProc.

Table 10-3. Ancillary Files for the Area and Mobile Source Processor

Keyword, File Description or File Name	Purpose	Need to Modify?	For-mat
indecay	Provides decay coefficients for 6 stability classes for the eight 3-hour time periods for the 9 reactivity classes	No	Text
HAP Table	Selects pollutants to be modeled, assigns classes, groups pollutants, adjusts emissions	If you want to change selection or characteristics of pollutants from files provided with EMS-HAP	Text
SAF#, where # is a number between 1-29 (inclusive)	Contain spatial allocation factors for the spatial surrogates available in EMS-HAP, also contain urban/rural dispersion flags for each tract	If you want to use updated spatial surrogate information or new surrogates; if you want to change the tract-level urban/rural dispersion designations	SAS®
taff_hourly.txt	Provides temporal profiles containing 24 hourly temporal allocation factors (TAFs) by SCC and/or AMS codes	If you want to use different source category specific temporal factors	Text
surrxref.txt	Contains AMS to spatial allocation surrogate cross-references	If you want to use different surrogates or have additional categories in your area/mobile inventories	Text
am_grp.txt	Provides ASPEN source group assignments by source category	If you want to make different source group assignments or have additional categories in your area/mobile inventories	Text
popflg96.txt	Contains county-level urban/rural designations	If you are specifying different source group assignments for urban vs. rural counties and want to use different county-level urban/rural designations	Text
gfXX_YY (where XX specifies projection year; YY specifies base year)	Provides the assignment of year specific growth factors by state and SIC code.	If you are growing your inventory and you need growth factors for a different projection year or base year	SAS®
area_sic.txt	Provides cross-reference between source categories and SIC codes for purpose of assigning growth factors by state and SIC code.	When additional or different SCC to SIC cross-references are needed to assign growth factors	Text
area_cntl.txt*	Provides emission reduction strategy information by area source category	Develop if you want to use category-based emission reduction strategies	Text
MACT_gen*	Provides emission reduction strategy information by MACT category	Develop by obtaining MACT-based reduction information	Text
MACT_spec*	Provides emission reduction information by MACT category and HAP identification code	Develop by obtaining MACT-based reduction information	Text

* These files are not currently being provided as part of EMS-HAP.

10.2.3 *Modify the HAP table input file*

We've supplied you with four HAP Table files.

1) point_area HAP table (haptabl_point_area.txt)
2) onroad mobile HAP table (haptabl_onroad.txt)
3) nonroad mobile HAP table (haptabl_offroad.txt)
4) precursor HAP table (haptabl_precursor.txt), which applies to precursors from point, area, onroad and nonroad sources.

Precursors are pollutants that cause HAPs to form secondarily in the atmosphere. They may or may not be HAPs themselves. More information about processing HAP precursors can be found in Appendix D, Section D.6.

AMProc uses a single HAP table with each run for processing your inventory. Before you run AMProc you'll need to select the appropriate HAP table and modify it to fit your modeling needs and your inventory. Select the onroad HAP table for onroad HAP emissions, the nonroad HAP table for nonroad HAP emissions and the point_area HAP table for area HAP emissions. You can use either onroad or nonroad for diesel particulate matter unless you change the coarse fine particulate matter allocation factors from those in the current HAP tables, and you change them such that they differ between onroad and nonroad emission types. Select the precursor HAP table if you are processing area or mobile source precursors.

See Section 4.2.3 for a detailed description of the format of the HAP Table files and how to modify them.

10.2.4 *Modify the file that assigns area and mobile source categories to source groups*

You can modify the emission groups ancillary input file, am_grp.txt, to specify different ASPEN source groups for different area or mobile source categories by county urban/rural designation. For example, if you want to determine the contribution of onroad mobile sources in urban areas to your ASPEN results, then assign a unique source group number (between zero and 9, inclusive) in the emission groups ancillary input file to every onroad mobile source category in the urban column, and make sure that no other category (area, point, nonroad mobile, rural onroad mobile) uses this number.

The format of am_grp.txt is shown in Appendix A, Figure 30. The CAT_NAME variable on this file is used to identify unique source categories. This file must contain one record for each category in the emission inventory. For each source category, this file specifies an emissions group for urban and for rural sources. It also assigns a unique category code for each source category for use in AMProc's growth and control module (see 10.2.7). The use of the category code makes the growth and control program run more efficiently.

10.2.5 Modify the file that assigns spatial surrogates to mobile source categories

The most important option in spatial allocation is the selection of the appropriate spatial allocation surrogates. AMProc assigns surrogates to mobile sources using the ancillary input file surrxref.txt. This file provides a spatial surrogate assignment for each unique AMS code. This file is also used to assign surrogates for area sources (in conjunction with other spatial surrogate assignment files) in AreaPrep (see Section 8.2.3).

You can assign different surrogates to source categories or add new source categories (by AMS code) to this file and assign surrogates to those. Table 8-3 gives a list of available spatial surrogates for EMS-HAP. Appendix A, Figure 27, gives the format of this file.

10.2.6 Modify the temporal allocation factor file

The temporal allocation factor file is a common file used for point, area and mobile sources. It provides hourly allocation factors that are applied to emissions sources based on 8-digit AIRS Source Classification Codes (SCC) or 10-digit Area and Mobile System (AMS) codes. The file is used to allocate emissions for each source into average diurnal profiles that are representative of a typical day. You can change temporal allocation factors for source categories in this file and you can add profiles for additional source categories. Appendix A, Figure 15, gives the format of this file.

10.2.7 Modify the growth factors and emission reduction information files

The growth and control algorithm can use the following input files, depending on the type of reduction scenario you want to apply:

- am_grp.txt file - cross-reference file from category name to category code
- area_sic.txt - cross-reference file from area or mobile source category to SIC
- GFXX_YY - growth factor file to grow from year XX to year YY
- area_cntl.txt - user-defined emission reduction information file
- MACT_gen.txt - general MACT emission reduction information file
- MACT_spec.txt - pollutant specific MACT emission reduction information file

The am_grp.txt file (also discussed in 10.2.4) is used to cross-reference a category name from the area_sic and area_cntl to a category code. Note that AMProc also uses am_grp.txt to assign a category code to each category name in the inventory. AMProc uses the category code (rather than the category name) in the growth and control module to allow the module to run more efficiently. You need to make sure that the category names in the am_grp.txt file exactly match the names in your emissions inventory and in the area_sic and area_cntl files.

Figure 33 of Appendix A, provides the file format and sample file contents of area_sic.txt. This file assigns a 2- or 3-digit SIC code for each emission source category. The SIC code is used to access appropriate growth factors from the growth factor file.

The growth factor file is specific to the emission inventory base year, and the year of the projection inventory. This file is described in Section 6.2.3 and the format is provided in Figure 19 of Appendix A.

Figure 32 of Appendix A, provides the file format of the area_cntl.txt file. Each record contains two efficiency parameters: emission reduction efficiency for existing sources and emission reduction efficiency for new sources. In addition, a percentage of the emissions attributable to new sources is also included.

The MACT_gen.txt and MACT_spec.txt files are described in Section 6.2.5 and the formats are provided in Figures 21a and 21b of Appendix A.

10.2.8 Prepare your batch file

The batch file serves two purposes: (1) allows you to pass "keywords" such as file names and locations, program options, and run identifiers to the program, and (2) sets up the execute statement for the program. A sample batch file for AMProc is shown in Figure 9 of Appendix B.

Specify your keywords

Table 10-4 describes all of the keywords required in the batch file. Use them to locate and name all input and output files and supply run identification information. Use them also to select program options, such as selecting the growth and control function (keyword GROWCNTL) and choosing which output files to create (keyword SAVEFILE). Further, you can run the program for a single HAP or State and get diagnostic information on a particular census tract. Note that the keywords cannot have blanks in their values, so if you don't want to run the program for a single HAP, you still need to provide a value for the pollutant code. The value provided in this circumstance does not need to represent an actual pollutant code; it is merely a place holder value for the keyword.

Table 10-4. Keywords in the AMProc Batch File

Keyword	Description of Value
	Run identifiers
RUNID	Run identification (at most 60 characters)
EMISLABL	Emissions category description (for titles only, at most 60 characters)
RUNDATE	Date, to help identify files (e.g., 011999)
EMISTYPE	Emissions file type (AR for area, MV for mobile)
USRLABEL	User-specified label used as prefix for output files (1 to 5 characters)
	Input Inventory Files
INPEMISS	Input emissions files directory
EMISFILE	Input county-level emissions file prefix (SAS®)

Table 10-4. Keywords in the AMProc Batch File (continued)

Keyword	Description of Value
	Ancillary Input files (Prefix of file name provided with EMS-HAP in parentheses)
INPFILES	The ancillary files directory
SAFFILE	Spatial allocation factor SAS® files prefix (safe#, where # is a 1 or 2-digit number)
TAFFILE	Temporal profile text file prefix (taff_hourly)
INDECAY	Reactivity class decay coefficients for 6 stability classes for eight 3-hour time periods (indecay)
HAPTABLE	HAP table file prefix (haptabl_point_area, haptabl_onroad, haptabl_offroad, or haptabl_precursor)
SURRXREF	Spatial surrogate assignments by AMS text file prefix (surrxref)
EMISBINS	ASPEN emission source groups assignment text file prefix (am_grp)
CNTYUR	County urban/rural cross-reference file (popflg96)
MACTGEN	General MACT-based emission reduction information text file prefix (MACT_gen)
MACTSPEC	Specific MACT-based emission reduction information text file prefix (MACT_spec)
SRCCNTL	Source category-based emission reduction information text file prefix (area_cntl)
	Program Options
SAVEFILE	1=save large SAS®-formatted file with all emissions information on a source category level basis for each census tract 0=don't save this large SAS® file
GROWCNTL	1= perform growth and control calculations; 0= don't perform growth and control calculations; 2=run growth and control only, using an existing temporally and spatially allocated emissions file
DOGROW	1=project emissions as a result of economic growth; 0=don't grow emissions
CNTLFLAG	1= assigns and applies user-defined reduction control information; 2= assigns and applies MACT reduction information; 0= doesn't apply any reduction information to emissions
PROCCHEM	1= Use pollutant-specific MACT reduction information; 0= don't use pollutant-specific MACT reduction information
REBIN	1=Reassign emission groups during growth and control processing; 0=don't reassign them
	Subsetting controls
LSUBSETP	1= process only one pollutant; 0=don't process only one pollutant
SUBSETP	The pollutant code to be subset to
LSUBSETG	1= process only one state; 0=don't process only one state
SUBSETG	State 2-character postal code abbreviation of the state to be subset to
	Diagnostics flags
LCPTIMES	1=print component CPU times; 0=don't print component CPU times
LDBG	1=printout of diagnostic information; 0=don't
LONECELL	1=printout diagnostics for a selected single cell (tract); 0=don't
ONECELL	The selected single cell
	Output files
OUTFILES	The output file directory
WORK2	Directory for large temporary work files

Prepare the execute statement

The last line in the batch file runs the AMProc program. In the sample batch file provided in Appendix B, you will see a line preceding the run line that creates a copy of the AMProc code having a unique name. It is this version of the program that is then executed in the last line. If you do this, the log and list files created by this run can be identified by this unique name. If you don't do this and run the program under a general name, every run of AMProc will create a log and list file that will replace any existing files of the same name.

You may find that you need to define a special area on your hard disk to use as work space when running AMProc. In the sample batch file, a directory for work space is defined by the keyword WORK2. The directory you reference here must be created prior to running the program.

10.2.9 Execute AMProc

There are two ways to execute the batch file. One way is to type 'source' and then the batch file name. Alternatively, first set the permission on the file to 'execute.' You do this by using the UNIX CHMOD command and adding the execute permission to yourself, as the owner of the file, to anyone in your user group, and/or to anyone on the system. For example, 'chmod u+x AMProc.bat' gives you permission to execute the batch file. Refer to your UNIX manual for setting other permissions. After you have set the file permission, you can execute the batch file by typing the file name on the command line, for example, 'AMProc.bat'.

10.3 How Do I Know My Run of AMProc Was Successful?

10.3.1 Check your SAS® log file

You should review the output log file to check for errors or other flags indicating incorrect processing. This review should include searching the log files for occurrences of the strings "error", "warning", "not found", and "uninitialized". These can indicate problems with input files or other errors.

10.3.2 Check your SAS® list file

The list file contains the following information:

- The options that you specified
- Contents of input emissions file
- Emissions totals and record counts, by pollutant, for the input emission inventory
- Summary of Input Emission Rates by Pollutant
- Summary of Input Emission Rates by State
- HAP table pollutant code list
- Warning message if there are pollutants in emissions file not matched to HAP table. Lists the pollutant codes in emissions inventory not matched to HAP table file.

- Warning message if records with no reactivity code were encountered when merging reactivity codes with emissions. Prints the first 10 records and a summary of emissions by pollutant.
- Pollutant sums by pollutant before and after collapsing to SAROAD codes
- Warning message if there are counties in the emissions file which do not have a match in the county urban/rural codes file
- Warning message if there are emissions categories not matched to source groups. Lists the unmatched categories.
- Table of assignment of spatial surrogates to source categories
- Surrogate-level summary of emissions
- Warning message if records with no matching surrogate code were encountered when merging spatial surrogate codes with emissions. These are assigned to population. Lists the AMS codes which did not match to spatial surrogates. Prints the first few non-matched records. Prints summaries of non-matched emissions by pollutant and by source category.
- Summary of emissions by pollutant after spatial surrogate matching
- Spatial surrogates frequency table
- Warning message if records with no matching spatial factors were encountered when matching spatial surrogates with emissions. Lists the first few records with no factors. Summarizes emissions without factors by pollutant, by county, by source category, and by surrogate.
- Summary of emission rates by pollutant after spatial allocation
- Summary of temporal profiles used
- Summary of emission rates by pollutant after temporal factor merge
- Warning message if records with no matching TAFs were encountered when merging temporal allocation factors with emissions. Lists the AMS codes which did not match to temporal factors. Prints the first few non-matched records. Prints summaries of non-matched emissions by pollutant and by source category.
- Summary of emission rates by pollutant after collapsing source categories to source groups
- Summary of temporally allocated emissions by pollutant
- Run times for processing components
- Pollutant sums by source category group
- Emissions summaries by reactivity class
- Contents of the core SAS® output emission data set
- Contents of the extended SAS® output emission data set
- Table of emissions totals by pollutant, with reactivity class, record counts, and the average emissions for a tract
- Summary of emissions by state
- Frequencies of emissions sources by reactivity class
- Emissions totals by reactivity class
- Growth and control warning messages and summaries

At succeeding steps in the processing, emissions are summed and printed in the processing output files. You should review these after completion of program execution, looking for changes in emissions, which then would need to be explained. These are the processing points where emissions sums are reported:

- After reading the emissions, before any processing
- Before collapsing from CAS pollutants to SAROAD pollutant groups
- After collapsing from CAS pollutants to SAROAD pollutant groups
- After match/merge of spatial surrogates with emissions
- After spatial allocation of emissions
- After temporal allocations of emissions
- When writing out the ASPEN emissions files

You should also check the number of records in the several datasets that are created and modified during the course of processing, to make sure they are reasonable. The number of records after conversion from inventory pollutant codes to SAROAD codes can change for three reasons: 1) some pollutants are dropped here, 2) some pollutants are split into two pollutants, and 3) after the pollutants have been assigned to SAROAD code groups, the emissions are summed to the SAROAD level. The increase in the number of records after spatial allocation results from the distribution of all county-level emissions to the census tracts within those counties. The number of records decreases when the emissions file is collapsed to the source group level. More detailed information about the number of records in intermediate files can be found in the processing log file.

Temporal allocation factors are matched to emission records according to source categories. If a source category is present in the emissions file but absent in the temporal allocation factor file, the emission record cannot be matched and is assigned a uniform (constant) profile. In this case a warning message is printed to the AMProc list file along with a summary of how many emission records were not matched, and a summary by source category of the non-matched emissions. Inspection of this information shows which emissions categories need to be added to the temporal allocation factor file, and the importance of each in terms of the amount of emissions in the categories.

In AMProc, spatial surrogates are matched to mobile source emission records according to source category AMS codes. If a source category is present in the emissions file but absent in the spatial surrogate file, the emission record cannot be matched and is assigned the default surrogate, population. In this case a warning message is printed to the AMProc output file along with a summary of how many emission records were not matched, and a summary by source category of the non-matched emissions. Inspection of this information allows you to see which emissions categories need to be added to the spatial surrogate file, and the importance of each of these in terms of the amount of emissions in the categories.

The spatial allocation factors are matched to emissions records according to spatial surrogates. If these do not match properly, AMProc prints a warning message, summaries and other information. The most common cause of non-matches is counties or census tracts missing from one or more spatial allocation factor files.

The HAP table file is matched to emission records according to the inventory pollutant code. If a pollutant is present in the emissions file but absent in the HAP table, the emission record cannot be matched. In this case a warning message is printed to the AMProc output file along with a summary of how many emission records were not matched, and a summary by pollutant of the non-matched emissions. Inspection of this information allows you to see which pollutants need to be added to the HAP table.

The ASPEN emissions source groups assignment file is matched to emission records according to source category and county urban/rural designation. If a source category is present in the emissions file but absent in the ASPEN source groups file, the emission record cannot be matched. In this case a warning message is printed to the AMProc output file along with a summary of how many emission records were not matched, and a summary by source category of the non-matched emissions. Inspection of this information allows you to see which source categories need to be added to the ASPEN source groups file.

The county data file is matched to emission records according to FIPS state and county codes. If a county is present in the emissions file but absent in the county data file, the emission record cannot be matched. In this case a warning message is printed to the AMProc output file along with a summary of how many emission records were not matched, and a summary by county of the non-matched emissions. Inspection of this information allows you to see which counties need to be added to the county data file.

10.3.3 Check other output files

You should check for the existence of the ASPEN-input files. You should check that all nine files were created and that emission data are included only in those files representing reactivities classes for which you know your inventory has emission data. You may also want to check the header of the files for the decay rate information.

You should check for the existence of the column formatted ASCII file and the core SAS® file. Tables 10-5 and 10-6 show the format of each of these files. If you chose to create the extended SAS® file (i.e., the keyword SAVEFILE=1), then you should check for its existence as well. Table 10-7 shows the format of the extended file.

Table 10-5. Format of AMProc ASCII Data File (Values in order listed)

Description	Type*
5-digit FIPS code; state and county combined	A5
Census tract centroid location longitude (negative decimal degrees)	10.5
Census tract centroid location latitude (decimal degrees)	10.5
ASPEN Source type (0=points, 3=pseudo-points)	A1
Urban/rural dispersion flag (1 for urban, 2 for rural)	1.0
ASPEN Stack ID (same as State/County FIPS code)	A5
constant = 999.	6.0
constant = 999.	6.0
constant = 999.	6.0
constant = 999.	6.0
Unique pollutant group code (SAROAD code)	A5
ASPEN source group (integer between 0 and 9, inclusive)	A1
Emissions rate (grams/second) for the first 3-hour time period**	E10.
Emissions rate, (grams/second) time period 2 **	E10.
Emissions rate, (grams/second) time period 3 **	E10.
Emissions rate, (grams/second) time period 4 **	E10.
Emissions rate, (grams/second) time period 5 **	E10.
Emissions rate, (grams/second) time period 6 **	E10.
Emissions rate, (grams/second) time period 7 **	E10.
Emissions rate, (grams/second) time period 8 **	E10.
Tract ID	A6
Vent/stack flag	A1
Building wake effects flag	A1
Baseline annual emissions rate (tons/year)	E12.5
Baseline annual emissions rate (grams/second)	E12.5

* Ax = character string of length x, x.y = numeric format with y places right of decimal, Ex. = exponential
** Emission values represent projected emissions when you choose to perform EMS-HAP's emission projection capabilities

Table 10-6. AMProc Core SAS® Output File Variables

Variable Name	Description	Type*
CELL	State and county FIPS codes concatenated with the 6-digit tract ID	A11
EMIS	Baseline annual emissions rate (grams/second)	N
EMISBIN	ASPEN source group (integer between 0 and 9, inclusive)	N
EMIS_TPY	Baseline annual emissions rate (tons/year)	N
IBLDG	Building wake effects flag	A1
IVENT	Vent/stack flag	A1
LAT	Census tract centroid location latitude (decimal degrees)	N
LON	Census tract centroid location longitude (negative decimal degrees)	N
NOSC	Excluded stability classes	A6
NOWD	Excluded wind directions	A6
NOWS	Excluded wind speeds	A6
POLLCODE	Unique pollutant-group code (SAROAD)	N
REACT	Reactivity class (integer between 1 and 9, inclusive)	N
SRCETYPE	Source type (0=points, 3=pseudo-points)	A1
STACKID	State/county FIPS code	A11
STCOUNTY	State/county FIPS code	A5
TEMIS1	Emissions rate (grams/second) for the first 3-hour time period **	N
TEMIS2	Emissions rate, (grams/second) time period 2 **	N
TEMIS3	Emissions rate, (grams/second) time period 3 **	N
TEMIS4	Emissions rate, (grams/second) time period 4 **	N
TEMIS5	Emissions rate, (grams/second) time period 5 **	N
TEMIS6	Emissions rate, (grams/second) time period 6 **	N
TEMIS7	Emissions rate, (grams/second) time period 7 **	N
TEMIS8	Emissions rate, (grams/second) time period 8 **	N
TRACTR	Tract ID	A6
UFLAG	Urban/rural dispersion flag (1=urban, 2=rural)	A1
WBANID	Meteorological station ID	A5

* Ax = character string of length x, x.y = numeric format with y places right of decimal, Ex. = exponential
** Emission values represent projected emissions when you choose to perform EMS-HAP's emission projection capabilities

Table 10-7. AMProc Extended SAS® Output File Variables

Variable Name	Description	Type*
AMS	AMS source category code	A10
AVETAF	Factor used to normalize temporal allocation factors	N
BASEMIS1**	Baseline emissions rate (tons/year), time period 1	N
BASEMIS2**	Baseline emissions rate (tons/year), time period 2	N
BASEMIS3**	Baseline emissions rate (tons/year), time period 3	N
BASEMIS4**	Baseline emissions rate (tons/year), time period 4	N
BASEMIS5**	Baseline emissions rate (tons/year), time period 5	N
BASEMIS6**	Baseline emissions rate (tons/year), time period 6	N
BASEMIS7**	Baseline emissions rate (tons/year), time period 7	N
BASEMIS8**	Baseline emissions rate (tons/year), time period 8	N
CATCODE	Source category code specified in the source group cross-reference file	A4
CELL	State and county FIPS codes concatenated with the 6-digit tract ID	A11
EMIS	Baseline annual emissions rate (tons/year)	N
EMISBIN	ASPEN source group	N
EXISTEFF**	Control efficiency for existing sources	N
GF**	Growth factor	N
LAT	Census tract centroid location latitude (decimal degrees)	N
LON	Census tract centroid location longitude (negative decimal degrees)	N
MACT	MACT code	A4
NEW_EFF**	Control efficiency for new sources	N
NEWRATE**	Percentage of grown emissions attributed to new sources	N
NTI_HAP	Code identifying HAP on the Clean Air Act HAP list	A4
POLLCODE	Unique pollutant-group code (SAROAD)	N
REACT	Reactivity class	N
SICX**	4-digit SIC code	A4
STCOUNTY	State/county FIPS code	A5
SURR	Spatial allocation surrogate code	N

Table 10-7. AMProc Extended SAS® Output File Variables (continued)

Variable Name	Description	Type*
TF3HR1	Temporal allocation factor for the first 3-hour time period (dimensionless)	N
TF3HR2	Temporal factor, time period 2	N
TF3HR3	Temporal factor, time period 3	N
TF3HR4	Temporal factor, time period 4	N
TF3HR5	Temporal factor, time period 5	N
TF3HR6	Temporal factor, time period 6	N
TF3HR7	Temporal factor, time period 7	N
TF3HR8	Temporal factor, time period 8	N
TEMIS1	Emissions rate (tons/year) for the first 3-hour time period; represents projected emissions when emission projections are done	N
TEMIS2	Emissions rate (tons/year), time period 2; represents projected emissions when emission projections are done	N
TEMIS3	Emissions rate (tons/year), time period 3; represents projected emissions when emission projections are done	N
TEMIS4	Emissions rate (tons/year), time period 4; represents projected emissions when emission projections are done	N
TEMIS5	Emissions rate (tons/year), time period 5; represents projected emissions when emission projections are done	N
TEMIS6	Emissions rate (tons/year), time period 6; represents projected emissions when emission projections are done	N
TEMIS7	Emissions rate (tons/year), time period 7; represents projected emissions when emission projections are done	N
TEMIS8	Emissions rate (tons/year), time period 8; represents projected emissions when emission projections are done	N
UFLAG	Urban/rural dispersion flag (1=urban, 2=rural)	A1

* Ax = character string of length x, N = numeric
** Variables included only when emission projections are done

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Appendix A: EMS-HAP Ancillary File Formats

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

File Name: apt_allc

File Type: SAS®

Variables and Structure

Name	Type*	Description
ST_FIPS	A2	State FIPS code
Cty_FIPS	A3	County FIPS code
Locid	A4	
Lat	N	Latitude of the airport
Lon	N	Longitude of the airport
Alloc	N	Allocation factor for activity within a specific airport. Sums to 1.0 for all of the airports in a particular county.
Arpt_nam	A25	Airport name
City	A6	
County	A1	
State	A2	Postal abbreviation
Activity	N	Airport activity, not used
Fraction	N	Test variable, not used
Air_carr	A6	Carrier code
Arpt_use	A2	Airport use, not used
*Ax=character string of length x, N=numeric		

Sample records

```
01 001  1A9 32.43877500  86.51044778 1.0000 Autauga County
 Prattville         Autauga   AL    0.08  1.0000 PU

01 003  4R4 30.46211250  87.87801972 1.0000 Fairhope Muni
 Fairhope           Baldwin   AL    3.00  0.9259 PU

01 005  EUF 31.95131917  85.12892500 1.0000 Weedon Field
 Eufaula            Barbour   AL    3.00  0.9740 PU

01 007  0A8 32.93679056  87.08888306 1.0000 Bibb County
 Centreville        Bibb      AL    0.08  1.0000 PU

01 009  20A 33.97231972  86.37942722 1.0000 Robbins Field
 Oneonta            Blount    AL    0.08  1.0000 PU
```

NOTE: Records in the actual file are not wrapped.

Figure 1. Airport Location and Allocation File (apt_allc)

File Name: zipcodes

File Type: SAS®

Variables and Structure

Name	Type*	Description
CntLon	N	Longitude of the zip code centroid (negative for West)
CntLat	N	Latitude of the zip code centroid
FIPS	A5	State and county FIPS codes.
Zip_Code	A5	Zip Code
*Ax=character string of length x, N=numeric		

Sample records

```
-156.767    60.3045     00001       00000
-147.933    66.3257     00002       00000
-156.977    57.5460     00003       00000
-153.122    60.2933     00004       00000
-149.675    62.4791     00006       00000
-152.441    68.9926     00007       00000
-130.561    55.3437     00008       00000
-161.996    62.5095     00010       00000
-150.557    59.9493     00011       00000
-120.059    39.0849     00013       06061
-120.503    40.7815     00019       06035
-119.270    37.5986     00020       06039
-123.612    39.4520     00022       06045
-120.745    41.5977     00025       06049
-121.188    39.8527     00028       06063
-121.025    35.7180     00031       06079
-119.927    34.9444     00032       06083
-120.300    39.4885     00033       06091
-123.313    41.6818     00034       06093
-121.793    41.4740     00035       06093
-122.725    40.0801     00037       06103
-121.703    40.1609     00038       06103
-123.209    40.3513     00039       06105
-119.573    37.9598     00040       06109
-119.829    38.5142     00044       06003
-122.390    39.5797     00047       06021
-122.813    39.3149     00048       06033
-123.787    41.5751     00049       06015
-123.620    41.2205     00050       06023
-120.373    38.8950     00051       06017
-120.297    38.6574     00052       06017
-123.697    40.8768     00054       06023
-123.253    40.9764     00055       06105
-119.621    37.6995     00058       06043
```

Figure 2. Zip Code File (zipcodes)

File Name: cty_cntr

File Type: SAS®

Variables and Structure

Name	Type*	Description
FIPS	A5	State and county FIPS codes
Cyname	A25	County Name
AvgLat	N	Latitude of the county centroid
AvgLon	N	Longitude of the county centroid (negative for West)
Stname	A20	State Name
Area_mi2	N	Area of County (square miles)
Rad_mi	N	Radius of County (miles)
*Ax=character string of length x, N=numeric		

Sample records

01001	Autauga	32.4967	-86.5162	Alabama	597	14
01003	Baldwin	30.6183	-87.7776	Alabama	1589	22
01005	Barbour	31.8521	-85.2971	Alabama	884	17
01007	Bibb	33.0190	-87.0847	Alabama	625	14
01009	Blount	33.9834	-86.5568	Alabama	643	14
01011	Bullock	32.0948	-85.7230	Alabama	625	14
01013	Butler	31.7685	-86.6697	Alabama	779	16
01015	Calhoun	33.7048	-85.8266	Alabama	611	14
01017	Chambers	32.8743	-85.2889	Alabama	596	14
01019	Cherokee	34.1673	-85.6360	Alabama	553	13
01021	Chilton	32.8601	-86.6811	Alabama	695	15
01023	Choctaw	31.9981	-88.2686	Alabama	909	17
01025	Clarke	31.6937	-87.8321	Alabama	1230	20
01027	Clay	33.2497	-85.8423	Alabama	605	14
01029	Cleburne	33.6396	-85.5005	Alabama	561	13
01031	Coffee	31.3612	-85.9429	Alabama	680	15
01033	Colbert	34.7323	-87.7110	Alabama	589	14
01035	Conecuh	31.4348	-86.9805	Alabama	854	16
01037	Coosa	32.9756	-86.1582	Alabama	657	14
01039	Covington	31.2736	-86.3953	Alabama	1038	18
01041	Crenshaw	31.7370	-86.2985	Alabama	611	14
01043	Cullman	34.1542	-86.8498	Alabama	738	15
01045	Dale	31.4013	-85.6303	Alabama	561	13
01047	Dallas	32.3727	-87.0579	Alabama	975	18
01049	DeKalb	34.4634	-85.7886	Alabama	778	16
01051	Elmore	32.5648	-86.2204	Alabama	622	14
01053	Escambia	31.0848	-87.2756	Alabama	951	17
01055	Etowah	34.0185	-86.0205	Alabama	542	13

Figure 3. County File (cty_cntr)

File Name: st_cntr

File Type: SAS®

Variables and Structure

Name	Type*	Description
StFips	A2	State FIPS (code)
State	A2	State Name (2-letter abbreviation)
*Ax=character string of length x, N=numeric		

Sample records

```
01    AL
04    AZ
05    AR
06    CA
08    CO
09    CT
10    DE
11    DC
12    FL
13    GA
16    ID
17    IL
18    IN
19    IA
20    KS
21    KY
22    LA
23    ME
24    MD
25    MA
26    MI
27    MN
28    MS
29    MO
30    MT
31    NE
32    NV
33    NH
34    NJ
35    NM
36    NY
37    NC
38    ND
39    OH
40    OK
41    OR
42    PA
44    RI
45    SC
46    SD
47    TN
48    TX
```

Figure 4. State File (st_cntr)

File Name: counties

File Type: SAS®

Variables and Structure

Name	Type*	Description
County	N	County FIPS code
State	N	State FIPS code
Segment	N	County Segment Number
Density	N	Density for lower resolution map
X	N	Unprojected longitude in radians
Y	N	Unprojected latitude in radians
*Ax=character string of length x, N=numeric		

Sample records

```
1         1          1           6        1.51449     0.57006
1         1          1           3        1.51343     0.57004
1         1          1           3        1.51344     0.57081
1         1          1           6        1.51239     0.57081
1         1          1           6        1.51191     0.57082
1         1          1           0        1.50819     0.57084
1         1          1           6        1.50818     0.56884
1         1          1           6        1.50818     0.56879
1         1          1           0        1.50816     0.56566
1         1          1           6        1.50846     0.56550
1         1          1           6        1.50858     0.56549
1         1          1           6        1.50871     0.56547
1         1          1           6        1.50882     0.56550
1         1          1           6        1.50892     0.56559
1         1          1           3        1.50902     0.56557
1         1          1           6        1.50902     0.56545
1         1          1           6        1.50903     0.56533
1         1          1           6        1.50905     0.56522
1         1          1           6        1.50906     0.56510
1         1          1           6        1.50916     0.56503
1         1          1           6        1.50925     0.56492
1         1          1           6        1.50933     0.56485
1         1          1           6        1.50945     0.56490
1         1          1           6        1.50955     0.56486
1         1          1           6        1.50957     0.56475
1         1          1           6        1.50955     0.56464
1         1          1           6        1.50956     0.56453
1         1          1           0        1.50966     0.56451
1         1          1           6        1.50970     0.56450
1         1          1           6        1.50977     0.56449
```

Figure 5. Counties File (counties)

File Name: bound6

File Type: SAS®

Variables and Structure

Name	Type*	Description
Xmax	N	Maximum x-value
Xmin	N	Minimum x-value
Ymax	N	Maximum y-value
Ymin	N	Minmum y-value
Segct	N	Seg,ment count
StCt	N	Start count
BegSeg	N	Beginning segment
EndSeg	N	Ending segment
BegSt	N	Beginning state
EndSt	N	Ending state
County	N	County FIPS code
State	N	State FIPS code
Segment	N	County Segment Number
*Ax=character string of length x, N=numeric		

Sample records

1.51703	1.50816	0.57084	0.56387	164	164	1	164	1	.	1	1	1
1.53639	1.52492	0.54660	0.52746	429	592	165	593	1	.	3	1	1
1.49658	1.48441	0.56109	0.55183	186	777	594	779	1	.	5	1	1
1.52579	1.51627	0.58025	0.57299	44	820	780	823	1	.	7	1	1
1.51780	1.50627	0.59795	0.58931	202	1021	824	1025	1	.	9	1	1
1.50097	1.49068	0.56380	0.55641	87	1107	1026	1112	1	.	11	1	1

Figure 6. Boundary File (bound6)

File Name: cntyctr2

File Type: SAS®

Variables and Structure

Name	Type*	Description
FIPST	A5	State FIPS codes.
FIPCNTY	A5	County FIPS code
State	A2	State (2-letter abbreviation)
Lon	N	Longitude of the county centroid (negative for West)
Lat	N	Latitude of the county centroid
County	A25	County Name
TrueCnty	A25	True County Name
*Ax=character string of length x, N=numeric		

Sample records

1	1	AL	86.6642	32.5245	AUTAUGA	AUTAUGA
1	3	AL	87.7021	30.7599	BALDWIN	BALDWIN
1	5	AL	85.4021	31.8822	BARBOUR	BARBOUR
1	7	AL	87.1486	33.0384	BIBB	BIBB
1	9	AL	86.6334	34.0127	BLOUNT	BLOUNT
1	11	AL	85.7047	32.0816	BULLOCK	BULLOCK
1	13	AL	86.6773	31.7440	BUTLER	BUTLER
1	15	AL	85.8380	33.7621	CALHOUN	CALHOUN
1	17	AL	85.3594	32.9185	CHAMBERS	CHAMBERS
1	19	AL	85.6211	34.2320	CHEROKEE	CHEROKEE
1	21	AL	86.6969	32.8655	CHILTON	CHILTON
1	23	AL	88.2019	32.0040	CHOCTAW	CHOCTAW
1	25	AL	87.8198	31.5915	CLARKE	CLARKE
1	27	AL	85.9075	33.2946	CLAY	CLAY
1	29	AL	85.5963	33.7168	CLEBURNE	CLEBURNE
1	31	AL	85.9928	31.4006	COFFEE	COFFEE
1	33	AL	87.7832	34.7294	COLBERT	COLBERT
1	35	AL	87.0479	31.4721	CONECUH	CONECUH
1	37	AL	86.2590	32.9292	COOSA	COOSA
1	39	AL	86.4441	31.2610	COVINGTON	COVINGTON
1	41	AL	86.3228	31.7458	CRENSHAW	CRENSHAW
1	43	AL	86.7850	34.0858	CULLMAN	CULLMAN
1	45	AL	85.6035	31.4077	DALE	DALE
1	47	AL	87.1441	32.3880	DALLAS	DALLAS
1	49	AL	85.8158	34.5299	DEKALB	DE KALB
1	51	AL	86.1442	32.5897	ELMORE	ELMORE
1	53	AL	87.1521	31.1279	ESCAMBIA	ESCAMBIA
1	55	AL	86.0353	34.0211	ETOWAH	ETOWAH

Figure 7. County Mapping File (cntyctr2)

File Name: trctarry

File Type: SAS®

Variables and Structure

Name	Type*	Description
FIPS	A5	State and county FIPS codes.
T1 ... T1652	A6	Random array of tract numbers
N	N	missing or = 1653
*Ax=character string of length x, N=numeric		

Sample records *(including variables T1 through T10 only)*

01001	20300	21000	20100	20700	20400	21100	20800	20200	20900	20600
01003	10902	10400	11100	11202	10600	11300	10300	11600	10703	11401
01005	950700	950600	950500	950300	950400	950100	950200	950800	950900	
01007	951300	951600	951400	951500						
01009	50400	50300	50600	50500	50200	50102	50101	50700		
01011	952300	952400	952200	952100						
01013	952800	953300	953100	953200	952700	953400	952900	953500	953000	
01015	2500	1700	2600	1000	1600	1800	2100	1900	1300	200
01017	954100	954600	954200	953800	954300	954700	954000	953700	954400	953900
01019	955800	955900	955700	956100	956000					
01021	60402	60700	60500	60102	60200	60101	60300	60600	60401	
01023	956700	956800	957000	956900						
01025	958000	957900	957500	957800	957600	957700				
01027	959200	959000	958900	959100						
01029	959500	959600	959700	959800						
01031	10400	10800	11000	11100	10600	10700	10300	10900	10200	11300
01033	20400	21000	20100	20700	20500	20600	20800	20900	20200	20300
01035	960200	960300	960700	960600	960400	960500				
01037	961000	961200	961100							
01039	961600	962700	962600	962100	962500	961900	962800	962900	961700	962400
01041	963600	963400	963700	963800	963900	963500				

Figure 8. Tract Array File (trctarry)

File Name: tractinf

File Type: SAS®

Variables and Structure

Name	Type*	Description
FIPS	A5	State and County FIPS code
Tract	A6	Tract Identification Number
TrLon	N	Longitude of the tract centroid
TrLat	N	Latitude of the tract centroid
TrRad	N	Radius of the tract
Uflag	N	Urban/Rural flag. Values: 1 (urban), 2 (rural).
*Ax=character string of length x, N=numeric.		

Sample records

```
01001    20100     -86.486433          32.474244           1.77    2
01001    20200     -86.472171          32.471439           1.03    2
01001    20300     -86.45861           32.474265           1.31    2
01001    20400     -86.443581          32.467688           1.43    2
01001    20500     -86.427195          32.449808           2.33    2
01001    20600     -86.476381          32.44054            1.64    2
01001    20700     -86.450539          32.448456           2.71    2
01001    20800     -86.499096          32.521553          10.07    2
01001    20900     -86.510556          32.639226           9.66    2
01001    21000     -86.749412          32.610292          11.12    2
01001    21100     -86.703688          32.466033          12.51    2
01003    10100     -87.777357          31.067326          17.93    2
01003    10200     -87.679484          30.954101           8.39    2
01003    10300     -87.829813          30.822099          10.81    2
01003    10400     -87.6968            30.759083          15.37    2
01003    10500     -87.777433          30.89022            2.39    2
01003    10600     -87.774911          30.861673           2.41    2
01003    10701     -87.895933          30.674223           7.20    2
01003    10702     -87.894121          30.640161           4.27    2
01003    10703     -87.838217          30.629101           6.67    2
01003    10800     -87.900319          30.594581           5.03    2
01003    10901     -87.680218          30.588978          10.32    2
01003    10902     -87.726362          30.549474           5.95    2
01003    11000     -87.707953          30.49058            6.46    2
01003    11100     -87.84749           30.502787           5.05    2
01003    11201     -87.894621          30.533266           2.18    2
01003    11202     -87.904921          30.512735           4.82    2
01003    11300     -87.880924          30.437874           7.94    2
01003    11401     -87.759805          30.390277          11.08    2
01005    950100    -85.170708          31.977997          12.79    2
01005    950200    -85.450932          31.887413          12.85    2
```

Figure 9. Tract Information File, including location of centroid and urban/rural flag (tractinf)

File Name: def_scc.txt

File Type: ASCII Text

Variables and Structure

Name	Type*	Column	Length	Decimals	Description
SCC	C	1	10		Source Category Code
AvgHt	N	12	14	10	Default Stack Height (in meters)
AvgDiam	N	27	14	10	Default Stack Diameter (in meters)
AvgVel	N	42	14	10	Default Stack Exit Gas Velocity (in meters/second)
AvgTemp	N	57	16	10	Default Stack Exit Gas Temperature (in Kelvin)
defflag	C	74	6		Default data flag that provides the source of the default data (in the sample file, SCCNTI refers to defaults used in generating the 1996 NTI, and SCCGEN was based on averages computed from 1996 NTI data).
*C = character, N = numeric.					

Sample of File Contents

```
01020060    26.2006604013   0.8778257557  17.9984759970   308.1833333333 SCCgen
10000199    12.3992887986   0.7680975362  16.9987299975   547.1833333333 SCCgen
10100101    91.4063474750   4.5719527517  23.4699289010   421.6769452153 SCCgen
10100201   252.3749047498   6.5532131064  28.9560579121   433.3333333333 SCCNTI
10100202   137.1602743205   5.1816103632  23.1648463297   413.8888888889 SCCNTI
10100203   137.4650749302   4.4958089916  28.0416560833   427.2222222222 SCCNTI
10100204    67.0561341123   2.7523495047  11.5824231648   436.1111111111 SCCNTI
10100205    77.8547842810   3.8948728183  30.0310461192   461.0396825397 SCCgen
```

Figure 10. SCC-Based Default Stack Parameter File (def_scc.txt)

File Name: def_sic.txt

File Type: ASCII Text

Variables and Structure

Name	Type*	Column	Length	Decimals	Description
SIC	C	1	5		State and County FIPS code
AvgHt	N	10	14	10	Default Stack Height (in meters)
AvgDiam	N	25	14	10	Default Stack Diameter (in meters)
AvgVel	N	40	14	10	Default Stack Exit Gas Velocity (meters/second)
AvgTemp	N	55	16	10	Default Stack Exit Gas Temperature (in Kelvin)
defflag	C	72	6		Default data flag that provides the source of the default data (in the sample file, SICNTI refers to defaults used in generating the 1996 NTI, and SICGEN was based on averages computed from 1996 NTI data).
*C = character, N = numeric.					

Sample of File Contents

```
0782      20.0297543452   0.9579447730   8.0619761240   476.1904761905 SICgen
0851       7.3152146304   0.8534417069  12.0640081280   450.0000000000 SICgen
0913       3.6576073152   4.1148082296   0.7040894082   316.6666666667 SICgen
0971       9.3016737758   0.4620269241 143.7890525781   870.1157407407 SICgen
1009       3.0480060960   0.2011684023   3.9989839980   295.5555555556 SICgen
1011      38.4018288037   2.4384048768  17.9984759970   360.1833333333 SICNTI
1021      18.3024786832   0.8445422628  13.3421590655   307.9009249972 SICgen
1031      21.0312420625   0.5577851156  46.9392938786   294.4444444444 SICgen
```

Figure 11. SIC-Based Default Stack Parameters File (def_sic.txt)

File Name: varlist.txt

File Type: ASCII Text

Variables and Structure

Name	Type*	Column	Length	Description
Var	C	1	8	Name of variable to be retained in inventory
Keep	C	16	1	Keep flag ('Y' to retain variable)
*C=character, N=numeric				

Sample of File Contents

```
ADDRTYPE       N
AIRBASIN       N
AIRSPLID       N
AIRSPTID       N
AMS_CODE       N
AQCR           N
CITY           N
COUNTRY        N
CTRLSTAT       Y
CTY_FIPS       N
DB_NO          N
DESCRIPT       N
DIAM_FLG       N
D_HORIZ        N
D_UNITS        N
D_VERT         N
EMISTYPE       N
EPA_REG        N
FED2DESC       N
FED_ID         N
FED_ID2        N
FENCEDIS       N
FIPFLAG        N
FLOWRATE       N
FLOW_FLG       N
HT_FLG         N
IDDF_FLG       N
LLPROB         N
MACTFLAG       Y
METHCODE       N
NTI_CODE       N
N_STACKS       N
PLUME_HT       N
SEGMT_ID       N
SEQ_NO         N
SITENAME       N
```

Figure 12. Additional Variables File (varlist.txt)

File Name: haptabl_XXX.txt

File Type: ASCII Text

Variables and Structure

Name	Type*	Column	Length	Decimals	Description
POLLDESC	C	1	45		Individual chemical name, prior to aggregation
SAROADDC	C	47	50		Name of the aggregated SAROAD code
POLLCODE	C	100	10		Code identifying individual chemical in inventory (typically a Chemical Abstracts System [CAS] No.)
REACT	N	113	1		Reactivity or Particle Size Class
KEEP	C	121	1		Flag determining whether chemical will be modeled
SAROAD	C	128	5		Defines a single chemical or group of chemicals for modeling. Can be an historic SAROAD code, or arbitrarily assigned.
FACTOR	N	135	7	4	Emission adjustment factor
NTI_HAP	C	144	3		Code identifying HAP on the Clean Air Act HAP list. Describes HAP code used only in growth and control program
*C = character, N = numeric.					

Sample of File Contents

```
POLLDESC                                     HAPDESC                                             POLLCODE    React   Keep    SaroadFactor   NTI
(Dichloromethyl) benzene                     (Dichloromethyl) benzene - nonHAP                   98873                N              1.0000
Pyrene                                       16-PAH, fine PM                                     129000        2      N      80232  1.0000   165
16-PAH                                       16-PAH, fine PM                                     40            2      N      80232  1.0000   165
Benzofluoranthenes                           16-PAH, fine PM                                     56832736      2      N      80232  1.0000   165
Phenanthrene                                 16-PAH, fine PM                                     85018         2      N      80232  1.0000   165
Benzo[g,h,i,]perylene                        16-PAH, fine PM                                     191242        2      N      80232  1.0000   165
Benzo[b+k]fluoranthene                       16-PAH, fine PM                                     102           2      N      80232  1.0000   165
Indeno[1,2,3-c,d]pyrene                      16-PAH, fine PM                                     193395        2      N      80232  1.0000   165
Benzo[b]fluoranthene                         16-PAH, fine PM                                     205992        2      N      80232  1.0000   165
Benzo[k]fluoranthene                         16-PAH, fine PM                                     207089        2      N      80232  1.0000   165
Chrysene                                     16-PAH, fine PM                                     218019        2      N      80232  1.0000   165
Benzo[a]pyrene                               16-PAH, fine PM                                     50328         2      N      80232  1.0000   165
Dibenzo[a,h]anthracene                       16-PAH, fine PM                                     53703         2      N      80232  1.0000   165
Benz[a]anthracene                            16-PAH, fine PM                                     56553         2      N      80232  1.0000   165
```

Figure 13. HAP Table File (haptabl_XXX.txt)

Table 1. HAP Table File Used to Process 1996 NTI Point and Area Source Emissions Data

POLLDESC	HAPDESC	POLLCODE	React	Keep	Saroad	Factor	NTI
(Dichloromethyl) benzene	(Dichloromethyl) benzene - nonHAP	98873		N		1.0000	
Pyrene	16-PAH, fine PM	129000	2	N	80232	1.0000	165
16-PAH	16-PAH, fine PM	40	2	N	80232	1.0000	165
Benzofluoranthenes	16-PAH, fine PM	56832736	2	N	80232	1.0000	165
Phenanthrene	16-PAH, fine PM	85018	2	N	80232	1.0000	165
Benzo[g,h,i,]perylene	16-PAH, fine PM	191242	2	N	80232	1.0000	165
Benzo[b+k]fluoranthene	16-PAH, fine PM	102	2	N	80232	1.0000	165
Indeno[1,2,3-c,d]pyrene	16-PAH, fine PM	193395	2	N	80232	1.0000	165
Benzo[b]fluoranthene	16-PAH, fine PM	205992	2	N	80232	1.0000	165
Benzo[k]fluoranthene	16-PAH, fine PM	207089	2	N	80232	1.0000	165
Chrysene	16-PAH, fine PM	218019	2	N	80232	1.0000	165
Benzo[a]pyrene	16-PAH, fine PM	50328	2	N	80232	1.0000	165
Dibenzo[a,h]anthracene	16-PAH, fine PM	53703	2	N	80232	1.0000	165
Benz[a]anthracene	16-PAH, fine PM	56553	2	N	80232	1.0000	165
1-Phenanthrene	16-PAH, fine PM	283	2	N	80232	1.0000	165
Acenaphthalene	16-PAH, fine PM	78	2	N	80232	1.0000	165
Acenaphthene	16-PAH, fine PM	83329	2	N	80232	1.0000	165
Acenaphthylene	16-PAH, fine PM	208968	2	N	80232	1.0000	165
Anthracene	16-PAH, fine PM	120127	2	N	80232	1.0000	165
Fluoranthene	16-PAH, fine PM	206440	2	N	80232	1.0000	165
Fluorene	16-PAH, fine PM	86737	2	N	80232	1.0000	165
Naphthalene	16-PAH, fine PM	91203	2	N	80232	1.0000	165
2,6-Dimethyl-4-heptanone	2,6-Dimethyl-4-heptanone - nonHAP	108838		N		1.0000	
4-Vinylcyclohexene	4-Vinylcyclohexene - nonHAP	100403		N		1.0000	
Benzo[b+k]fluoranthene	7-PAH, fine PM	102	2	Y	80233	1.0000	165
Indeno[1,2,3-c,d]pyrene	7-PAH, fine PM	193395	2	Y	80233	1.0000	165
Benzo[b]fluoranthene	7-PAH, fine PM	205992	2	Y	80233	1.0000	165
Benzo[k]fluoranthene	7-PAH, fine PM	207089	2	Y	80233	1.0000	165
Chrysene	7-PAH, fine PM	218019	2	Y	80233	1.0000	165
Benzo[a]pyrene	7-PAH, fine PM	50328	2	Y	80233	1.0000	165
Dibenzo[a,h]anthracene	7-PAH, fine PM	53703	2	Y	80233	1.0000	165
Benz[a]anthracene	7-PAH, fine PM	56553	2	Y	80233	1.0000	165
7-PAH	7-PAH, fine PM	75	2	Y	80233	1.0000	165
Benzofluoranthenes	7-PAH, fine PM	56832736	2	Y	80233	1.0000	165
Acetaldehyde	Acetaldehyde	75070	5	Y	43503	1.0000	37
Acetamide	Acetamide	60355	7	N	80101	1.0000	38
Acetonitrile	Acetonitrile	75058	1	N	70016	1.0000	39
Acetophenone	Acetophenone	98862	1	N	80103	1.0000	40
2-Acetylaminofluorene	Acetylaminofluorene, 2- , fine PM	53963	2	N	53963	1.0000	23
Acrolein	Acrolein	107028	5	Y	43505	1.0000	41
Acrylamide	Acrylamide	79061	7	N	80105	1.0000	42
Acrylic acid	Acrylic acid	79107	5	N	43407	1.0000	43
Acrylonitrile	Acrylonitrile	107131	1	Y	43704	1.0000	44
Allyl chloride	Allyl chloride	107051	5	N	80108	1.0000	45
4-Aminobiphenyl	Aminobiphenyl, 4-	92671		N	92671	1.0000	33
Aniline	Aniline	62533	8	N	45701	1.0000	46
o-Anisidine	Anisidine, o-	90040	7	N	80110	1.0000	149
ANTIMONY TRICHLORIDE	Antimony Compounds, coarse PM	10025919	3	N	80311	0.2402	47

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

Antimony trioxide	Antimony Compounds, coarse PM	1309644	3	N	80311	0.3759	47
Antimony Oxide	Antimony Compounds, coarse PM	1327339	3	N	80311	0.3570	47
ANTIMONY TRISULFIDE	Antimony Compounds, coarse PM	1345046	3	N	80311	0.3226	47
Antimony Pentafluoride	Antimony Compounds, coarse PM	619	3	N	80311	0.2528	47
Antimony	Antimony Compounds, coarse PM	7440360	3	N	80311	0.4500	47
Antimony & Compounds	Antimony Compounds, coarse PM	92	3	N	80311	0.4500	47
	Antimony Compounds, coarse PM	ANTCMPS	3	N	80311	0.4500	47
Antimony & Compounds	Antimony Compounds, coarse PM	1	3	N	80311	0.4500	47
ANTIMONY TRICHLORIDE	Antimony Compounds, fine PM	10025919	2	N	80111	0.2935	47
Antimony trioxide	Antimony Compounds, fine PM	1309644	2	N	80111	0.4594	47
Antimony Oxide	Antimony Compounds, fine PM	1327339	2	N	80111	0.4363	47
ANTIMONY TRISULFIDE	Antimony Compounds, fine PM	1345046	2	N	80111	0.3942	47
Antimony Pentafluoride	Antimony Compounds, fine PM	619	2	N	80111	0.3089	47
Antimony	Antimony Compounds, fine PM	7440360	2	N	80111	0.5500	47
Antimony & Compounds	Antimony Compounds, fine PM	92	2	N	80111	0.5500	47
	Antimony Compounds, fine PM	ANTCMPS	2	N	80111	0.5500	47
Antimony & Compounds	Antimony Compounds, fine PM	1	2	N	80111	0.5500	47
ARSENIC PENTOXIDE	Arsenic Cmpds. (inorganic, incl. arsine), coarse PM	1303282	3	Y	80312	0.2673	48
ARSENIC ACID	Arsenic Cmpds. (inorganic, incl. arsine), coarse PM	1327522	3	Y	80312	0.2164	48
Arsenic Trioxide	Arsenic Cmpds. (inorganic, incl. arsine), coarse PM	1327533	3	Y	80312	0.3105	48
Arsenic compounds (inorganic)	Arsenic Cmpds. (inorganic, incl. arsine), coarse PM	601	3	Y	80312	0.4100	48
Arsenic	Arsenic Cmpds. (inorganic, incl. arsine), coarse PM	7440382	3	Y	80312	0.4100	48
Arsine	Arsenic Cmpds. (inorganic, incl. arsine), coarse PM	7784421	3	Y	80312	0.3941	48
Arsenic & Compounds (inorganic including arsin	Arsenic Cmpds. (inorganic, incl. arsine), coarse PM	93	3	Y	80312	0.4100	48
Arsenic & Compounds (inorganic including arsin	Arsenic Cmpds. (inorganic, incl. arsine), coarse PM	2	3	Y	80312	0.4100	48
ARSENIC PENTOXIDE	Arsenic Compounds (inorganic, incl. arsine), fine PM	1303282	2	Y	80112	0.3846	48
ARSENIC ACID	Arsenic Compounds (inorganic, incl. arsine), fine PM	1327522	2	Y	80112	0.3114	48
Arsenic Trioxide	Arsenic Compounds (inorganic, incl. arsine), fine PM	1327533	2	Y	80112	0.4469	48
Arsenic compounds (inorganic)	Arsenic Compounds (inorganic, incl. arsine), fine PM	601	2	Y	80112	0.5900	48
Arsenic	Arsenic Compounds (inorganic, incl. arsine), fine PM	7440382	2	Y	80112	0.5900	48
Arsine	Arsenic Compounds (inorganic, incl. arsine), fine PM	7784421	2	Y	80112	0.5671	48
Arsenic & Compounds (inorganic including arsin	Arsenic Compounds (inorganic, incl. arsine), fine PM	93	2	Y	80112	0.5900	48
Arsenic & Compounds (inorganic including arsin	Arsenic Compounds (inorganic, incl. arsine), fine PM	2	2	Y	80112	0.5900	48
Asbestos	Asbestos, coarse PM	1332214	3	N		1.0000	49
Asbestos	Asbestos, fine PM	1332214	2	N		1.0000	49
Benzaldehyde	Benzaldehyde - nonHAP	100527		N		1.0000	
Benzene	Benzene (including benzene from gasoline)	71432	1	Y	45201	1.0000	50
Benzidine	Benzidine, gas	92875	7	N	80115	1.0000	51
Benzoic acid	Benzoic acid - nonHAP	65850		N		1.0000	
Benzotrichloride	Benzotrichloride	98077	1	N	80116	1.0000	52
Benzoyl chloride	Benzoyl chloride - nonHAP	98884		N		1.0000	
Benzyl chloride	Benzyl chloride	100447	1	N	45810	1.0000	53
Beryllium & Compounds	Beryllium Compounds, coarse PM	109	3	Y	80318	0.3200	54
Beryllium Oxide	Beryllium Compounds, coarse PM	1304569	3	Y	80318	0.1153	54
BERYLLIUM SULFATE	Beryllium Compounds, coarse PM	13510491	3	Y	80318	0.0275	54
Beryllium	Beryllium Compounds, coarse PM	7440417	3	Y	80318	0.3200	54
BERYLLIUM FLUORIDE	Beryllium Compounds, coarse PM	7787497	3	Y	80318	0.0613	54
Beryllium & Compounds	Beryllium Compounds, coarse PM	3	3	Y	80318	0.3200	54
Beryllium & Compounds	Beryllium Compounds, fine PM	109	2	Y	80118	0.6800	54
Beryllium Oxide	Beryllium Compounds, fine PM	1304569	2	Y	80118	0.2450	54

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

BERYLLIUM SULFATE	Beryllium Compounds, fine PM	13510491	2	Y	80118	0.0583	54
Beryllium	Beryllium Compounds, fine PM	7440417	2	Y	80118	0.6800	54
BERYLLIUM FLUORIDE	Beryllium Compounds, fine PM	7787497	2	Y	80118	0.1304	54
Beryllium & Compounds	Beryllium Compounds, fine PM	3	2	Y	80118	0.6800	54
Biphenyl	Biphenyl	92524	9	N	45226	1.0000	56
Bis(2-ethylhexyl)phthalate	Bis(2-ethylhexyl)phthalate (DEHP), gas	117817	1	N	45470	1.0000	57
Bis(chloromethyl)ether	Bis(chloromethyl) ether	542881	1	N	80121	1.0000	58
Bisphenol A	Bisphenol A - nonHAP	80057		N		1.0000	
Bromoform	Bromoform	75252	1	N	80122	1.0000	59
1,3-Butadiene	Butadiene, 1,3-	106990	7	Y	43218	1.0000	10
CADMIUM CHLORIDE	Cadmium Compounds, coarse PM	10108642	3	Y	80324	0.1471	60
CADMIUM SULFATE	Cadmium Compounds, coarse PM	10124364	3	Y	80324	0.1294	60
CADMIUM NITRATE	Cadmium Compounds, coarse PM	10325947	3	Y	80324	0.1141	60
Cadmium & Compounds	Cadmium Compounds, coarse PM	125	3	Y	80324	0.2400	60
Cadmium Oxide	Cadmium Compounds, coarse PM	1306190	3	Y	80324	0.2101	60
CADMIUM SULFIDE	Cadmium Compounds, coarse PM	1306236	3	Y	80324	0.1867	60
Cadmium	Cadmium Compounds, coarse PM	7440439	3	Y	80324	0.2400	60
CADMIUM IODIDE	Cadmium Compounds, coarse PM	7790809	3	Y	80324	0.0737	60
Cadmium & Compounds	Cadmium Compounds, coarse PM	4	3	Y	80324	0.2400	60
CADMIUM CHLORIDE	Cadmium Compounds, fine PM	10108642	2	Y	80124	0.4660	60
CADMIUM SULFATE	Cadmium Compounds, fine PM	10124364	2	Y	80124	0.4098	60
CADMIUM NITRATE	Cadmium Compounds, fine PM	10325947	2	Y	80124	0.3613	60
Cadmium & Compounds	Cadmium Compounds, fine PM	125	2	Y	80124	0.7600	60
Cadmium Oxide	Cadmium Compounds, fine PM	1306190	2	Y	80124	0.6652	60
CADMIUM SULFIDE	Cadmium Compounds, fine PM	1306236	2	Y	80124	0.5912	60
Cadmium	Cadmium Compounds, fine PM	7440439	2	Y	80124	0.7600	60
CADMIUM IODIDE	Cadmium Compounds, fine PM	7790809	2	Y	80124	0.2332	60
Cadmium & Compounds	Cadmium Compounds, fine PM	4	2	Y	80124	0.7600	60
Calcium Cyanamide	Calcium Cyanamide	156627		N		1.0000	61
Captan	Captan, gas	133062	7	N	80127	1.0000	62
Carbaryl	Carbaryl, gas	63252	5	N	80128	1.0000	63
Carbon disulfide	Carbon disulfide	75150	1	N	43934	1.0000	64
Carbon tetrachloride	Carbon tetrachloride	56235	1	Y	43804	1.0000	65
Carbonyl sulfide	Carbonyl sulfide	463581	1	N	43933	1.0000	66
Catechol	Catechol	120809	5	N	80132	1.0000	67
Chloramben	Chloramben	133904		N		1.0000	68
Chlordane	Chlordane, gas	57749	1	N	80134	1.0000	69
Chlorine	Chlorine	7782505	1	N	80135	1.0000	70
Chloroacetic acid	Chloroacetic acid	79118	1	N	80136	1.0000	71
2-Chloroacetophenone	Chloroacetophenone, 2-	532274	1	N		1.0000	24
Chlorobenzene	Chlorobenzene	108907	1	N	45801	1.0000	178
Chlorobenzilate	Chlorobenzilate, fine PM	510156	2	N		1.0000	73
Chloroform	Chloroform	67663	1	Y	43803	1.0000	74
Chloromethyl methyl ether	Chloromethyl methyl ether	107302	1	N	80139	1.0000	75
Chloroprene	Chloroprene	126998	6	N	43862	1.0000	76
Chlorotoluene	Chlorotoluene - nonHAP	25168052		N		1.0000	
Calcium chromate	Chromium Compounds, fine PM	13765190	2	Y	80141	0.2366	77
SODIUM CHROMATE(VI)	Chromium Compounds, coarse PM	10034829	3	Y	80341	0.0931	77
CHROMIUM CHLORIDE	Chromium Compounds, coarse PM	10060125	3	Y	80341	0.0952	77
Chromic Sulfate	Chromium Compounds, coarse PM	10101538	3	Y	80341	0.0496	77

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

Barium chromate	Chromium Compounds, coarse PM	10294403	3	Y	80341	0.0595	77
Sodium dichromate	Chromium Compounds, coarse PM	10588019	3	Y	80341	0.1151	77
POTAS ZNC CHROM HYDR	Chromium Compounds, coarse PM	11103869	3	Y	80341	0.0632	77
CHROMIC ACID*OBSOLET	Chromium Compounds, coarse PM	11115745	3	Y	80341	0.1278	77
CHROMIUM DIOXIDE	Chromium Compounds, coarse PM	12018018	3	Y	80341	0.1795	77
CHROMIUM ZINC OXIDE	Chromium Compounds, coarse PM	12018198	3	Y	80341	0.1292	77
ZINC CHROMATES	Chromium Compounds, coarse PM	1308130	3	Y	80341	0.0831	77
CHROMIUM HYDROXIDE	Chromium Compounds, coarse PM	1308141	3	Y	80341	0.1464	77
Chromic Oxide	Chromium Compounds, coarse PM	1308389	3	Y	80341	0.1984	77
Chromium trioxide	Chromium Compounds, coarse PM	1333820	3	Y	80341	0.1508	77
Zinc Chromate	Chromium Compounds, coarse PM	13530659	3	Y	80341	0.0831	77
CHROMIC ACID	Chromium Compounds, coarse PM	13530682	3	Y	80341	0.1278	77
Chromium & Compounds	Chromium Compounds, coarse PM	136	3	Y	80341	0.2900	77
LITHIUM CHROMATE	Chromium Compounds, coarse PM	14307358	3	Y	80341	0.1161	77
CHROMYL CHLORIDE	Chromium Compounds, coarse PM	14977618	3	Y	80341	0.0974	77
Chromium III	Chromium Compounds, coarse PM	16065831	3	Y	80341	0.2900	77
LEAD CHROMATE OXIDE	Chromium Compounds, coarse PM	18454121	3	Y	80341	0.0276	122
Chromium +6	Chromium Compounds, coarse PM	18540299	3	Y	80341	0.2900	77
ZINC CHROMITE	Chromium Compounds, coarse PM	50922297	3	Y	80341	0.0813	77
Chromium	Chromium Compounds, coarse PM	7440473	3	Y	80341	0.2900	77
Chromic Acid	Chromium Compounds, coarse PM	7738945	3	Y	80341	0.1278	77
Lead chromate	Chromium Compounds, coarse PM	7758976	3	Y	80341	0.0467	122
CHROMIC ACID,(H2CR04	Chromium Compounds, coarse PM	7775113	3	Y	80341	0.1278	77
POTASSIUM DICHROMATE	Chromium Compounds, coarse PM	7778509	3	Y	80341	0.1025	77
CHROMYL FLUORIDE	Chromium Compounds, coarse PM	7788967	3	Y	80341	0.1236	77
POTASSIUM CHROMATE	Chromium Compounds, coarse PM	7789006	3	Y	80341	0.0776	77
Strontium chromate	Chromium Compounds, coarse PM	7789062	3	Y	80341	0.0741	77
AMMONIUM DICHROMATE	Chromium Compounds, coarse PM	7789095	3	Y	80341	0.1197	77
Calcium chromate	Chromium Compounds, coarse PM	13765190	3	Y	80341	0.0966	77
Chromium & Compounds	Chromium Compounds, coarse PM	5	3	Y	80341	0.2900	77
SODIUM CHROMATE(VI)	Chromium Compounds, fine PM	10034829	2	Y	80141	0.2279	77
CHROMIUM CHLORIDE	Chromium Compounds, fine PM	10060125	2	Y	80141	0.2331	77
Chromic Sulfate	Chromium Compounds, fine PM	10101538	2	Y	80141	0.1213	77
Barium chromate	Chromium Compounds, fine PM	10294403	2	Y	80141	0.1458	77
Sodium dichromate	Chromium Compounds, fine PM	10588019	2	Y	80141	0.2819	77
POTAS ZNC CHROM HYDR	Chromium Compounds, fine PM	11103869	2	Y	80141	0.1548	77
CHROMIC ACID*OBSOLET	Chromium Compounds, fine PM	11115745	2	Y	80141	0.3128	77
CHROMIUM DIOXIDE	Chromium Compounds, fine PM	12018018	2	Y	80141	0.4395	77
CHROMIUM ZINC OXIDE	Chromium Compounds, fine PM	12018198	2	Y	80141	0.3164	77
ZINC CHROMATES	Chromium Compounds, fine PM	1308130	2	Y	80141	0.2036	77
CHROMIUM HYDROXIDE	Chromium Compounds, fine PM	1308141	2	Y	80141	0.3583	77
Chromic Oxide	Chromium Compounds, fine PM	1308389	2	Y	80141	0.4858	77
Chromium trioxide	Chromium Compounds, fine PM	1333820	2	Y	80141	0.3692	77
Zinc Chromate	Chromium Compounds, fine PM	13530659	2	Y	80141	0.2036	77
CHROMIC ACID	Chromium Compounds, fine PM	13530682	2	Y	80141	0.3128	77
Chromium & Compounds	Chromium Compounds, fine PM	136	2	Y	80141	0.7100	77
LITHIUM CHROMATE	Chromium Compounds, fine PM	14307358	2	Y	80141	0.2842	77
CHROMYL CHLORIDE	Chromium Compounds, fine PM	14977618	2	Y	80141	0.2383	77
Chromium III	Chromium Compounds, fine PM	16065831	2	Y	80141	0.7100	77
LEAD CHROMATE OXIDE	Chromium Compounds, fine PM	18454121	2	Y	80141	0.0676	122

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

Chromium +6	Chromium Compounds, fine PM	18540299	2	Y	80141	0.7100	77
ZINC CHROMITE	Chromium Compounds, fine PM	50922297	2	Y	80141	0.1990	77
Chromium	Chromium Compounds, fine PM	7440473	2	Y	80141	0.7100	77
Chromic Acid	Chromium Compounds, fine PM	7738945	2	Y	80141	0.3128	77
Lead chromate	Chromium Compounds, fine PM	7758976	2	Y	80141	0.1142	122
CHROMIC ACID,(H2CR04	Chromium Compounds, fine PM	7775113	2	Y	80141	0.3128	77
POTASSIUM DICHROMATE	Chromium Compounds, fine PM	7778509	2	Y	80141	0.2510	77
CHROMYL FLUORIDE	Chromium Compounds, fine PM	7788967	2	Y	80141	0.3026	77
POTASSIUM CHROMATE	Chromium Compounds, fine PM	7789006	2	Y	80141	0.1901	77
Strontium chromate	Chromium Compounds, fine PM	7789062	2	Y	80141	0.1813	77
AMMONIUM DICHROMATE	Chromium Compounds, fine PM	7789095	2	Y	80141	0.2929	77
Chromium & Compounds	Chromium Compounds, fine PM	5	2	Y	80141	0.7100	77
COBALT SULFATE	Cobalt Compounds, coarse PM	10124433	3	N	80342	0.0760	78
COBALT OXIDE	Cobalt Compounds, coarse PM	1307966	3	N	80342	0.1573	78
COBALT OXIDE-CO3O4	Cobalt Compounds, coarse PM	1308061	3	N	80342	0.1468	78
COBALT SULFIDE	Cobalt Compounds, coarse PM	1317426	3	N	80342	0.1295	78
COBALT ALUMINATE	Cobalt Compounds, coarse PM	1345160	3	N	80342	0.0666	78
Cobalt & Compounds	Cobalt Compounds, coarse PM	139	3	N	80342	0.2000	78
COBALT CARBONATE 1:1	Cobalt Compounds, coarse PM	513791	3	N	80342	0.0991	78
COBALT NAPHTHA	Cobalt Compounds, coarse PM	61789513	3	N	80342	0.0290	78
Cobalt Hydrocarbonyl	Cobalt Compounds, coarse PM	16842038	3	N	80342	0.0689	78
Cobalt	Cobalt Compounds, coarse PM	7440484	3	N	80342	0.2000	78
Cobalt & Compounds	Cobalt Compounds, coarse PM	6	3	N	80342	0.2000	78
COBALT SULFATE	Cobalt Compounds, fine PM	10124433	2	N	80142	0.3042	78
COBALT OXIDE	Cobalt Compounds, fine PM	1307966	2	N	80142	0.6292	78
COBALT OXIDE-CO3O4	Cobalt Compounds, fine PM	1308061	2	N	80142	0.5874	78
COBALT SULFIDE	Cobalt Compounds, fine PM	1317426	2	N	80142	0.5182	78
COBALT ALUMINATE	Cobalt Compounds, fine PM	1345160	2	N	80142	0.2666	78
Cobalt & Compounds	Cobalt Compounds, fine PM	139	2	N	80142	0.8000	78
COBALT CARBONATE 1:1	Cobalt Compounds, fine PM	513791	2	N	80142	0.3964	78
COBALT NAPHTHA	Cobalt Compounds, fine PM	61789513	2	N	80142	0.1158	78
Cobalt Hydrocarbonyl	Cobalt Compounds, fine PM	16842038	2	N	80142	0.2782	78
Cobalt	Cobalt Compounds, fine PM	7440484	2	N	80142	0.8000	78
Cobalt & Compounds	Cobalt Compounds, fine PM	6	2	N	80142	0.8000	78
Coke Oven Emissions	Coke Oven Emissions, fine PM	140	2	Y	80411	1.0000	79
Cresols (includes o, m, & p)/Cresylic Acids	Cresol/Cresylic acid (mixed isomers), fine PM	331	2	N	45605	1.0000	80
o-Cresol	Cresol/Cresylic acid (mixed isomers), fine PM	95487	2	N	45605	1.0000	80
p-Cresol	Cresol/Cresylic acid (mixed isomers), gas	106445	2	N	45605	1.0000	80
m-Cresol	Cresol/Cresylic acid (mixed isomers), gas	108394	2	N	45605	1.0000	80
Cresol	Cresol/Cresylic acid (mixed isomers), gas	1319773	2	N	45605	1.0000	80
Cumene	Cumene	98828	9	N	45210	1.0000	81
SODIUM CYANIDE	Cyanide Compounds, coarse PM	143339	3	N	80143	0.5309	82
Potassium Cyanide	Cyanide Compounds, coarse PM	151508	3	N	80143	0.3996	82
SILVER CYANIDE	Cyanide Compounds, coarse PM	506649	3	N	80143	0.1943	82
ZINC CYANIDE C2N2ZH	Cyanide Compounds, coarse PM	557211	3	N	80143	0.4432	82
POTASSIUM FERROCYANI	Cyanide Compounds, fine PM	13943583	2	N	80144	0.4238	82
BENZYL CYANIDE	Cyanide Compounds, fine PM	140294	2	N	80144	0.2221	82
POTASS NICKEL CYANID	Cyanide Compounds, fine PM	14220178	2	N	80144	0.4019	82
GOLD CYANIDE	Cyanide Compounds, fine PM	37187647	2	N	80144	0.1167	82
COPPER CYANIDE	Cyanide Compounds, fine PM	544923	2	N	80144	0.2905	82

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

GOLD POTASSIUM CYANI	Cyanide Compounds, fine PM	554074	2	N	80144	0.1806	82
Cyanide	Cyanide Compounds, fine PM	57125	2	N	80144	1.0000	82
Cyanide & Compounds	Cyanide Compounds, gas	144	1	N	80145	1.0000	82
Hydrogen Cyanide	Cyanide Compounds, gas	74908	1	N	80145	0.9627	82
2-Methyl-Propanenitrile	Cyanide Compounds, gas	78820	1	N	80145	1.0000	82
Cyanide & Compounds	Cyanide Compounds, gas	7	1	N	80145	1.0000	82
2,4-Dichlorophenoxy acetic acid	D, 2,4- (including salts and esters), gas	94757	1	N	80146	1.0000	19
DDE (1,1-dichloro-2,2-bis(p-chlorophenyl) ethy	DDE	72559	2	N		1.0000	83
Dibenzofuran	Dibenzofuran, gas	132649	1	N	80247	1.0000	902
1,2-Dibromo-3-chloropropane	Dibromo-3-chloropropane, 1,2-	96128	1	N	92672	1.0000	6
Dibutyl phthalate	Dibutylphthalate, gas	84742	1	N	45452	1.0000	86
1,4-Dichlorobenzene	Dichlorobenzene,p 1,4-	106467	1	N	45807	1.0000	13
3,3'-Dichlorobenzidene	Dichlorobenzidene, 3,3'- , gas	91941	1	N	80150	1.0000	26
Dichloroethyl ether	Dichloroethyl ether (Bis[2-chloroethyl]ether)	111444	5	N	80151	1.0000	87
1,3-Dichloropropene	Dichloropropene, 1,3-	542756	4	Y	80152	1.0000	11
Dichlorvos	Dichlorvos	62737	4	N	80153	1.0000	88
Diesel PM	Diesel, coarse PM	80400	3	Y	80401	1.0000	
Diesel PM	Diesel, fine PM	80400	2	Y	80400	1.0000	
Diethanolamine	Diethanolamine	111422	7	N	80154	1.0000	89
Diethyl sulfate	Diethyl sulfate	64675	1	N	80156	1.0000	90
3,3'-Dimethoxybenzidine	Dimethoxybenzidine, 3,3'-, gas	119904	7	N	80157	1.0000	27
4-Dimethylaminoazobenzene	Dimethyl aminoazobenzene, 4- , fine PM	60117	2	N	92673	1.0000	34
Dimethylcarbamoyl chloride	Dimethyl carbamoyl chloride	79447	0	N	92674	1.0000	93
N,N-Dimethylformamide	Dimethyl formamide	68122	7	N	43450	1.0000	142
1,1-Dimethyl hydrazine	Dimethyl hydrazine, 1,1-	57147	7	N	80159	1.0000	3
Dimethyl phthalate	Dimethyl phthalate	131113	1	N	45451	1.0000	91
Dimethyl Sulfate	Dimethyl sulfate	77781	1	N	80161	1.0000	92
3,3'-Dimethylbenzidine	Dimethylbenzidine, 3,3'- , fine PM	119937	2	N	92675	1.0000	28
4,6-Dinitro-o-cresol	Dinitro-o-cresol, 4,6- , gas	534521	1	N	80162	1.0000	32
2,4-Dinitrophenol	Dinitrophenol, 2,4- , gas	51285	5	N	80163	1.0000	20
2,4-Dinitrotoluene	Dinitrotoluene, 2,4-	121142	1	N	80164	1.0000	21
p-Dioxane	Dioxane, 1, 4	123911	5	N	80165	1.0000	108
Dioxins	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	155	2	Y	80412	0.0000	903
2,3,7,8-Tetrachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	1746016	2	Y	80412	1.0000	903
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	19408743	2	Y	80412	0.1000	903
Pentachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	36088229	2	Y	80412	0.0500	903
Pentachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	30402154	2	Y	80412	0.0495	903
Octachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	3268879	2	Y	80412	0.0010	903
1,2,3,4,6,7,8-heptachlorodibenzo-p-/dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	35822469	2	Y	80412	0.0100	903
Octachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	39001020	2	Y	80412	0.0010	903
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	39227286	2	Y	80412	0.1000	903
1,2,3,7,8-pentachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	40321764	2	Y	80412	0.5000	903
2,3,7,8-Tetrachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	51207319	2	Y	80412	0.1000	903
1,2,3,4,7,8,9-heptachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	55673897	2	Y	80412	0.0100	903
2,3,4,7,8-pentachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	57117314	2	Y	80412	0.5000	903
1,2,3,7,8-pentachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	57117416	2	Y	80412	0.0500	903
1,2,3,6,7,8-hexachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	57117449	2	Y	80412	0.1000	903
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	57653857	2	Y	80412	0.1000	903
2,3,7,8-TCDD TEQ	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	600	2	Y	80412	1.0000	903
2,3,4,6,7,8-hexachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	60851345	2	Y	80412	0.1000	903

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

Dibenzofurans (chlorinated) {PCDFs}	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	609	2	Y	80412	0.0000	903
Dioxins, total, w/o individ. isomers reported	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	610	2	Y	80412	0.0000	903
1,2,3,4,6,7,8-heptachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	67562394	2	Y	80412	0.0100	903
1,2,3,4,7,8-hexachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	70648269	2	Y	80412	0.1000	903
1,2,3,7,8,9-hexachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	72918219	2	Y	80412	0.1000	903
Dioxins/Furans as TEQ	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	701	2	Y	80412	1.0000	903
Hexachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	34465468	2	Y	80412	0.0000	903
Polychlorinated dibenzo-p-dioxin, total	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	623	2	Y	80412	0.0000	903
Polychlorinated dibenzofurans, total	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	624	2	Y	80412	0.0000	903
Total tetrachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	41903575	2	Y	80412	0.0000	903
Dioxins	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	155	2	Y	80245	1.0000	903
2,3,7,8-Tetrachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	1746016	2	Y	80245	1.0000	903
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	19408743	2	Y	80245	0.1000	903
Pentachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	36088229	2	Y	80245	0.0500	903
Pentachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	30402154	2	Y	80245	0.0495	903
Octachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	3268879	2	Y	80245	0.0010	903
1,2,3,4,6,7,8-heptachlorodibenzo-p-/dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	35822469	2	Y	80245	0.0100	903
Octachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	39001020	2	Y	80245	0.0010	903
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	39227286	2	Y	80245	0.1000	903
1,2,3,7,8-pentachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	40321764	2	Y	80245	0.5000	903
2,3,7,8-Tetrachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	51207319	2	Y	80245	0.1000	903
1,2,3,4,7,8,9-heptachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	55673897	2	Y	80245	0.0100	903
2,3,4,7,8-pentachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	57117314	2	Y	80245	0.5000	903
1,2,3,7,8-pentachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	57117416	2	Y	80245	0.0500	903
1,2,3,6,7,8-hexachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	57117449	2	Y	80245	0.1000	903
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	57653857	2	Y	80245	0.1000	903
2,3,7,8-TCDD TEQ	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	600	2	Y	80245	1.0000	903
2,3,4,6,7,8-hexachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	60851345	2	Y	80245	0.1000	903
Dibenzofurans (chlorinated) {PCDFs}	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	609	2	Y	80245	0.5000	903
Dioxins, total, w/o individ. isomers reported	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	610	2	Y	80245	1.0000	903
1,2,3,4,6,7,8-heptachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	67562394	2	Y	80245	0.0100	903
1,2,3,4,7,8-hexachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	70648269	2	Y	80245	0.1000	903
1,2,3,7,8,9-hexachlorodibenzofuran	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	72918219	2	Y	80245	0.1000	903
Dioxins/Furans as TEQ	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	701	2	Y	80245	1.0000	903
Hexachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	34465468	2	Y	80245	0.1000	903
Polychlorinated dibenzo-p-dioxin, total	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	623	2	Y	80245	1.0000	903
Polychlorinated dibenzofurans, total	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	624	2	Y	80245	0.1000	903
Total tetrachlorodibenzo-p-dioxin	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	41903575	2	Y	80245	1.0000	903
1,2-Diphenylhydrazine	Diphenylhydrazine, 1,2-	122667	0	N	92676	1.0000	7
1-Chloro-2,3-Epoxypropane	Epichlorohydrin (l-Chloro-2,3-epoxypropane)	106898	9	N	43863	1.0000	94
1,2-Epoxybutane	Epoxybutane, 1,2-	106887	1	N	80167	1.0000	8
Ethyl Chloride	Ethyl Chloride (Chloroethane)	75003	1	N	43812	1.0000	97
Ethyl Acrylate	Ethyl acrylate	140885	5	N	43438	1.0000	95
Ethyl carbamate chloride	Ethyl carbamate (Urethane)	51796	1	N	80170	1.0000	96
Ethyl Benzene	Ethylbenzene	100414	4	Y	45203	1.0000	98
Ethylene Dibromide	Ethylene dibromide (Dibromoethane)	106934	1	Y	43837	1.0000	99
Ethylene Dichloride	Ethylene dichloride (1,2-Dichloroethane)	107062	1	Y	43815	1.0000	100
Ethylene Glycol	Ethylene glycol	107211	9	N	43370	1.0000	101
Ethylene Oxide	Ethylene oxide	75218	1	Y	43601	1.0000	102
Ethylene thiourea	Ethylene thiourea	96457	7	N	80177	1.0000	103

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

Ethyleneimine	Ethyleneimine (Aziridine)	151564	7	N	80175	1.0000	104
Ethylidene Dichloride	Ethylidene dichloride (1,1-Dichloroethane)	75343	1	N	43813	1.0000	105
Fine Mineral Fibers	Fine mineral fibers, coarse PM	383	3	N		1.0000	106
Glasswool (man-made fibers)	Fine mineral fibers, coarse PM	613	3	N		1.0000	106
Formaldehyde	Formaldehyde	50000	5	Y	43502	1.0000	107
Furfuryl alcohol	Furfuryl alcohol - nonHAP	98000		N		1.0000	
Gasoline	Gasoline - nonHAP	8006619		N		1.0000	
Ethylene Glycol Methyl Ether	Glycol ethers, gas	100805	4	N	43367	1.0000	108
Ethylene Glycol Methyl Ether	Glycol ethers, gas	109864	4	N	43367	1.0000	108
Ethylene Glycol Monomethyl Ether Acetate	Glycol ethers, gas	110496	4	N	43367	1.0000	108
1,2-Dimethoxyethane	Glycol ethers, gas	110714	4	N	43367	1.0000	108
Cellosolve Solvent	Glycol ethers, gas	110805	4	N	43367	1.0000	108
Cellosolve Acetate	Glycol ethers, gas	111159	4	N	43367	1.0000	108
Butyl Cellosolve	Glycol ethers, gas	111762	4	N	43367	1.0000	108
Diethylene Glycol Monomethyl Ether	Glycol ethers, gas	111773	4	N	43367	1.0000	108
Diethylene glycol monoethyl ether	Glycol ethers, gas	111900	4	N	43367	1.0000	108
Diethylene glycol dimethyl ether	Glycol ethers, gas	111966	4	N	43367	1.0000	108
2-Butoxyethyl Acetate	Glycol ethers, gas	112072	4	N	43367	1.0000	108
Carbitol Acetate	Glycol ethers, gas	112152	4	N	43367	1.0000	108
2-(Hexyloxy)Ethanol	Glycol ethers, gas	112254	4	N	43367	1.0000	108
Diethylene Glycol Monobutyl Ether	Glycol ethers, gas	112345	4	N	43367	1.0000	108
Methoxytriglycol	Glycol ethers, gas	112356	4	N	43367	1.0000	108
Triethylene glycol dimethyl ether	Glycol ethers, gas	112492	4	N	43367	1.0000	108
Ethoxytriglycol	Glycol ethers, gas	112505	4	N	43367	1.0000	108
N-Hexyl Carbitol	Glycol ethers, gas	112594	4	N	43367	1.0000	108
Phenyl Cellosolve	Glycol ethers, gas	122996	4	N	43367	1.0000	108
Butyl Carbitol Acetate	Glycol ethers, gas	124174	4	N	43367	1.0000	108
Triglycol Monobutyl Ether	Glycol ethers, gas	143226	4	N	43367	1.0000	108
Glycol ethers	Glycol ethers, gas	171	4	N	43367	1.0000	108
Propyl Cellosolve	Glycol ethers, gas	2807309	4	N	43367	1.0000	108
Propylene Glycol Monomethyl Ether	Glycol ethers, non HAP	107982	4	N		1.0000	
Propylene Glycol Methyl Ether Acetate	Glycol ethers, non HAP	108656	4	N		1.0000	
Isopropyl Glycol	Glycol ethers, non HAP	109591	4	N		1.0000	
3-Ethoxy-1-Propanol	Glycol ethers, non HAP	111353	4	N		1.0000	
Diethylene Glycol	Glycol ethers, non HAP	111466	4	N		1.0000	
Triethylene Glycol	Glycol ethers, non HAP	112276	4	N		1.0000	
1-Ethoxy-2-Propanol	Glycol ethers, non HAP	1569024	4	N		1.0000	
Dipropylene Glycol Monomethyl Ether	Glycol ethers, non HAP	34590948	4	N		1.0000	
Diethylene Glycol Di(3-Aminopropyl) Ether	Glycol ethers, non HAP	4246519	4	N		1.0000	
1,1-Dimethoxyethane	Glycol ethers, non HAP	534156	4	N		1.0000	
Propylene Glycol T-Butyl Ether	Glycol ethers, non HAP	621	4	N		1.0000	
Nonyl Phenyl Polyethylene Glycol Ether	Glycol ethers, non HAP	9016459	4	N		1.0000	
Glycols, Polyethylene, Mono(1,1,3,3-Tetramethy	Glycol ethers, non HAP	9036195	4	N		1.0000	
Glycols, Polyethylene, Polypropylene Monobutyl	Glycol ethers, non HAP	9038953	4	N		1.0000	
Heptachlor	Heptachlor, gas	76448	4	N	80182	1.0000	109
Hexachlorobenzene	Hexachlorobenzene	118741	1	Y	80183	1.0000	110
Hexachlorobutadiene	Hexachlorobutadiene	87683	1	N	80184	1.0000	111
Hexachlorocyclopentadiene	Hexachlorocyclopentadiene	77474	1	N	80185	1.0000	112
Hexachloroethane	Hexachloroethane	67721	1	N	80186	1.0000	113
Hexamethylene diisocyanate	Hexamethylene-1,6-diisocyanate, gas	822060	1	N		1.0000	114

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

Hexamethylphosphoramide	Hexamethylphosphoramide	680319	0	N		1.0000	115
Hexane	Hexane	110543	9	Y	43231	1.0000	116
Hydrazine	Hydrazine	302012	7	Y	80188	1.0000	117
Hydrazine monohydrate	Hydrazine monohydrate - nonHAP	7803578		N		1.0000	
Hydrochloric acid	Hydrochloric acid (Hydrogen chloride), fine PM	7647010	2	N	80189	1.0000	118
Hydrogen fluoride	Hydrogen fluoride (Hydrofluoric acid), fine PM	7664393	2	N	80190	1.0000	119
Hydroquinone	Hydroquinone	123319	5	N	80191	1.0000	120
Isobutyraldehyde	Isobutyraldehyde - nonHAP	78842		N		1.0000	
Isodecanol	Isodecanol - nonHAP	25339177		N		1.0000	
Isophorone	Isophorone	78591	7	N	80192	1.0000	121
Isophorone diisocyanate	Isophorone diisocyanate - nonHAP	4098719		N		1.0000	
Isovaleraldehyde	Isovaleraldehyde - nonHAP	590863		N		1.0000	
Lead Arsenite	Lead Compounds, coarse PM	10031137	3	Y	80393	0.1385	122
LEAD NITRATE	Lead Compounds, coarse PM	10099748	3	Y	80393	0.1627	122
LEAD TITANATE	Lead Compounds, coarse PM	12060003	3	Y	80393	0.1777	122
LEAD TITANATE ZIRCON	Lead Compounds, coarse PM	12626812	3	Y	80393	0.1777	122
LEAD OXIDE	Lead Compounds, coarse PM	1309600	3	Y	80393	0.2252	122
LEAD TETROXIDE P 304	Lead Compounds, coarse PM	1314416	3	Y	80393	0.2357	122
Lead Oxide	Lead Compounds, coarse PM	1317368	3	Y	80393	0.2414	122
LEAD MONO OXIDE	Lead Compounds, coarse PM	13173681	3	Y	80393	0.2414	122
LEAD FLUOROBORATE	Lead Compounds, coarse PM	13814965	3	Y	80393	0.1415	122
LEAD CHROMATE OXIDE	Lead Compounds, coarse PM	18454121	3	Y	80393	0.1972	122
Lead & Compounds	Lead Compounds, coarse PM	195	3	Y	80393	0.2600	122
LEAD CARBONATE	Lead Compounds, coarse PM	598630	3	Y	80393	0.2016	122
Lead compounds (inorganic)	Lead Compounds, coarse PM	602	3	Y	80393	0.2600	122
Lead Oxide	Lead Compounds, coarse PM	620	3	Y	80393	0.2414	122
Lead	Lead Compounds, coarse PM	7439921	3	Y	80393	0.2600	122
LEAD SULFATE	Lead Compounds, coarse PM	7446142	3	Y	80393	0.1776	122
Lead chromate	Lead Compounds, coarse PM	7758976	3	Y	80393	0.1667	122
LEAD ARSENATE	Lead Compounds, coarse PM	7784409	3	Y	80393	0.1552	122
LEAD NEODECANOATE	Lead Compounds, coarse PM	27253287	3	Y	80393	0.0980	122
Lead acetate	Lead Compounds, coarse PM	301042	3	Y	80393	0.1656	122
Lead compounds (other than inorganic)	Lead Compounds, coarse PM	603	3	Y	80393	0.2600	122
LEAD NAPHTHENATE	Lead Compounds, coarse PM	61790145	3	Y	80393	0.0970	122
LEAD STEARATE	Lead Compounds, coarse PM	7428480	3	Y	80393	0.0696	122
Tetraethyl Lead	Lead Compounds, coarse PM	78002	3	Y	80393	0.1666	122
Alkylated lead	Lead Compounds, coarse PM	88	3	Y	80393	0.2600	122
Lead Arsenite	Lead Compounds, fine PM	10031137	2	Y	80193	0.3941	122
LEAD NITRATE	Lead Compounds, fine PM	10099748	2	Y	80193	0.4629	122
LEAD TITANATE	Lead Compounds, fine PM	12060003	2	Y	80193	0.5059	122
LEAD TITANATE ZIRCON	Lead Compounds, fine PM	12626812	2	Y	80193	0.5059	122
LEAD OXIDE	Lead Compounds, fine PM	1309600	2	Y	80193	0.6410	122
LEAD TETROXIDE P 304	Lead Compounds, fine PM	1314416	2	Y	80193	0.6710	122
Lead Oxide	Lead Compounds, fine PM	1317368	2	Y	80193	0.6869	122
LEAD MONO OXIDE	Lead Compounds, fine PM	13173681	2	Y	80193	0.6869	122
LEAD FLUOROBORATE	Lead Compounds, fine PM	13814965	2	Y	80193	0.4026	122
LEAD CHROMATE OXIDE	Lead Compounds, fine PM	18454121	2	Y	80193	0.5612	122
Lead & Compounds	Lead Compounds, fine PM	195	2	Y	80193	0.7400	122
LEAD NEODECANOATE	Lead Compounds, fine PM	27253287	2	Y	80193	0.2789	122
Lead acetate	Lead Compounds, fine PM	301042	2	Y	80193	0.4714	122

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

LEAD CARBONATE	Lead Compounds, fine PM	598630	2	Y	80193	0.5738	122
Lead compounds (inorganic)	Lead Compounds, fine PM	602	2	Y	80193	0.7400	122
Lead compounds (other than inorganic)	Lead Compounds, fine PM	603	2	Y	80193	0.7400	122
LEAD NAPHTHENATE	Lead Compounds, fine PM	61790145	2	Y	80193	0.2762	122
Lead Oxide	Lead Compounds, fine PM	620	2	Y	80193	0.6869	122
LEAD STEARATE	Lead Compounds, fine PM	7428480	2	Y	80193	0.1981	122
Lead	Lead Compounds, fine PM	7439921	2	Y	80193	0.7400	122
LEAD SULFATE	Lead Compounds, fine PM	7446142	2	Y	80193	0.5056	122
Lead chromate	Lead Compounds, fine PM	7758976	2	Y	80193	0.4744	122
LEAD ARSENATE	Lead Compounds, fine PM	7784409	2	Y	80193	0.4417	122
Tetraethyl Lead	Lead Compounds, fine PM	78002	2	Y	80193	0.4741	122
Alkylated lead	Lead Compounds, fine PM	88	2	Y	80193	0.7400	122
1,2,3,4,5,6-Hexachlorocyclyhexane	Lindane (all isomers), gas	58899	4	N	80194	1.0000	4
Maleic Anhydride	Maleic anhydride	108316	6	N	43603	1.0000	125
MANGANESE NITRATE	Manganese Compounds, coarse PM	10377669	3	Y	80396	0.1013	126
Manganese Dioxide	Manganese Compounds, coarse PM	1313139	3	Y	80396	0.2085	126
Manganese Tetroxide	Manganese Compounds, coarse PM	1317357	3	Y	80396	0.2377	126
MANGANESE NAPTHENATE	Manganese Compounds, coarse PM	1336932	3	Y	80396	0.0450	126
Manganese & Compounds	Manganese Compounds, coarse PM	198	3	Y	80396	0.3300	126
Manganese	Manganese Compounds, coarse PM	7439965	3	Y	80396	0.3300	126
MANGANESE TALLATE	Manganese Compounds, coarse PM	8030704	3	Y	80396	0.3300	126
Manganese sulfate	Manganese Compounds, coarse PM	7785877	3	Y	80396	0.1201	126
Manganese & Compounds	Manganese Compounds, coarse PM	11	3	Y	80396	0.3300	126
MANGANESE NITRATE	Manganese Compounds, fine PM	10377669	2	Y	80196	0.2057	126
Manganese Dioxide	Manganese Compounds, fine PM	1313139	2	Y	80196	0.4234	126
Manganese Tetroxide	Manganese Compounds, fine PM	1317357	2	Y	80196	0.4826	126
MANGANESE NAPTHENATE	Manganese Compounds, fine PM	1336932	2	Y	80196	0.0913	126
Manganese & Compounds	Manganese Compounds, fine PM	198	2	Y	80196	0.6700	126
Manganese	Manganese Compounds, fine PM	7439965	2	Y	80196	0.6700	126
MANGANESE TALLATE	Manganese Compounds, fine PM	8030704	2	Y	80196	0.6700	126
Manganese sulfate	Manganese Compounds, fine PM	7785877	2	Y	80196	0.2437	126
Manganese & Compounds	Manganese Compounds, fine PM	11	2	Y	80196	0.6700	126
Mercuric chloride	Mercury Compounds, fine PM	7487947	2	Y	80197	0.7388	127
Mercury & Compounds	Mercury Compounds, gas	199	1	Y	80405	1.0000	127
MERCURY (ORGANIC)	Mercury Compounds, gas	22967926	1	Y	80405	1.0000	127
MERCURY ACETATO PHEN	Mercury Compounds, gas	62384	1	Y	80405	0.5957	127
Mercury	Mercury Compounds, gas	7439976	1	Y	80405	1.0000	127
Mercury & Compounds	Mercury Compounds, gas	12	1	Y	80405	1.0000	127
Methacrylic acid	Methacrylic acid - nonHAP	79414		N		1.0000	
Methanol	Methanol	67561	1	N	43301	1.0000	128
Methly Methly Isobutyl Carbinol	Methly Isobutyl Carbinol - nonHAP	108112		N		1.0000	
Methoxychlor	Methoxychlor, gas	72435	1	N	80199	1.0000	129
Methyl acrylate	Methyl acrylate - nonHAP	96333		N		1.0000	
Methyl bromide	Methyl bromide (Bromomethane)	74839	1	N	80200	1.0000	130
Methyl chloride	Methyl chloride (Chloromethane)	74873	1	N	43801	1.0000	131
Methyl Chloroform	Methyl chloroform (1,1,1-Trichloroethane)	71556	1	N	43814	1.0000	132
Methyl ethyl ketone	Methyl ethyl ketone (2-Butanone)	78933	9	N	43552	1.0000	133
Methylhydrazine	Methyl hydrazine	60344	7	N	80205	1.0000	140
Methyl iodide	Methyl iodide (Iodomethane)	74884	1	N	80206	1.0000	134
Methyl isobutyl ketone	Methyl isobutyl ketone (Hexone)	108101	5	N	43560	1.0000	135

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

Methyl isocyanate	Methyl isocyanate	624839	5	N	80208	1.0000	136
Methyl methacrylate	Methyl methacrylate	80626	7	N	43441	1.0000	137
Methyl tert-butyl ether	Methyl tert butyl ether	1634044	1	Y	43376	1.0000	138
Methylene chloride	Methylene chloride (Dichloromethane)	75092	9	Y	43802	1.0000	139
4,4'-Methylenebis(2-chloraniline)	Methylenebis(2-chloroaniline), 4,4'- , gas	101144	7	N	80211	1.0000	29
4,4'-Methylenedianiline	Methylenedianiline, 4,4'- , gas	101779	5	N	46111	1.0000	30
4,4'-Methylenediphenyl diisocyanate	Methylenediphenyl diisocyanate, 4,4'- (MDI), gas	101688	5	N	45730	1.0000	31
N,N-Dimethylaniline	N,N-Diethyl aniline (N,N-Dimethylaniline)	121697	8	N	80155	1.0000	141
N-Nitroso-N-methylurea	N-Nitroso-N-methylurea	684935		N		1.0000	143
N-Nitrosodimethylamine	N-Nitrosodimethylamine	62759	0	N	80221	1.0000	144
N-Nitrosomorpholine	N-Nitrosomorpholine	59892	0	N	80222	1.0000	145
Naphthalene	Naphthalene, fine PM	91203	2	N	46702	0.5000	165
Naphthalene	Naphthalene, gas	91203	5	N	46701	0.5000	165
NICKEL SULFATE.6H2O	Nickel Compounds, coarse PM	10101970	3	Y	80316	0.0916	147
Nickel subsulfide	Nickel Compounds, coarse PM	12035722	3	Y	80316	0.1002	147
NICKEL HYDROXIDE	Nickel Compounds, coarse PM	12054487	3	Y	80316	0.2597	147
NICKEL CARBIDE	Nickel Compounds, coarse PM	12710360	3	Y	80316	0.1280	147
NICKEL NITRATE	Nickel Compounds, coarse PM	13138459	3	Y	80316	0.1317	147
Nickel oxide	Nickel Compounds, coarse PM	1313991	3	Y	80316	0.3223	147
NICKEL(111) OXIDE	Nickel Compounds, coarse PM	1314063	3	Y	80316	0.2911	147
NICKEL BROMIDE NIBR2	Nickel Compounds, coarse PM	13462889	3	Y	80316	0.1102	147
Nickel carbonyl	Nickel Compounds, coarse PM	13463393	3	Y	80316	0.1410	147
NICKEL SULFAMATE	Nickel Compounds, coarse PM	13770893	3	Y	80316	0.0959	147
Nickel & Compounds	Nickel Compounds, coarse PM	226	3	Y	80316	0.4100	147
Nickel acetate	Nickel Compounds, coarse PM	373024	3	Y	80316	0.1362	147
NICKEL DIACETATE TET	Nickel Compounds, coarse PM	6018899	3	Y	80316	0.0967	147
Nickel	Nickel Compounds, coarse PM	7440020	3	Y	80316	0.4100	147
NICKEL CHLORIDE	Nickel Compounds, coarse PM	7718549	3	Y	80316	0.1857	147
NICKEL SULFATE	Nickel Compounds, coarse PM	7786814	3	Y	80316	0.1556	147
Nickel & Compounds	Nickel Compounds, coarse PM	14	3	Y	80316	0.4100	147
NICKEL SULFATE.6H2O	Nickel Compounds, fine PM	10101970	2	Y	80216	0.1318	147
Nickel subsulfide	Nickel Compounds, fine PM	12035722	2	Y	80216	0.1442	147
NICKEL HYDROXIDE	Nickel Compounds, fine PM	12054487	2	Y	80216	0.3736	147
NICKEL CARBIDE	Nickel Compounds, fine PM	12710360	2	Y	80216	0.1841	147
NICKEL NITRATE	Nickel Compounds, fine PM	13138459	2	Y	80216	0.1896	147
Nickel oxide	Nickel Compounds, fine PM	1313991	2	Y	80216	0.4637	147
NICKEL(111) OXIDE	Nickel Compounds, fine PM	1314063	2	Y	80216	0.4189	147
NICKEL BROMIDE NIBR2	Nickel Compounds, fine PM	13462889	2	Y	80216	0.1585	147
NICKEL SULFAMATE	Nickel Compounds, fine PM	13770893	2	Y	80216	0.1381	147
Nickel & Compounds	Nickel Compounds, fine PM	226	2	Y	80216	0.5900	147
Nickel acetate	Nickel Compounds, fine PM	373024	2	Y	80216	0.1959	147
NICKEL DIACETATE TET	Nickel Compounds, fine PM	6018899	2	Y	80216	0.1392	147
Nickel	Nickel Compounds, fine PM	7440020	2	Y	80216	0.5900	147
NICKEL CHLORIDE	Nickel Compounds, fine PM	7718549	2	Y	80216	0.2673	147
NICKEL SULFATE	Nickel Compounds, fine PM	7786814	2	Y	80216	0.2238	147
Nickel carbonyl	Nickel Compounds, fine PM	13463393	2	Y	80216	0.2029	147
Nickel & Compounds	Nickel Compounds, fine PM	14	2	Y	80216	0.5900	147
Nitrobenzene	Nitrobenzene	98953	4	N	45702	1.0000	148
4-Nitrobiphenyl	Nitrobiphenyl, 4-	92933		N		1.0000	35
4-Nitrophenol	Nitrophenol, 4-	100027	4	N	80218	1.0000	36

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

2-Nitropropane	Nitropropane, 2-	79469	4	N	80219	1.0000	25
Anthracene	POM, total (including total PAH)	120127	2	Y	80230	1.0000	165
Dibenzo[a,i]pyrene	POM, total (including total PAH)	189559	2	Y	80230	1.0000	165
D[a,h]pyrene	POM, total (including total PAH)	189640	2	Y	80230	1.0000	165
D[a,e]pyrene	POM, total (including total PAH)	192654	2	Y	80230	1.0000	165
Benzo[e]pyrene	POM, total (including total PAH)	192972	2	Y	80230	1.0000	165
Perylene	POM, total (including total PAH)	198550	2	Y	80230	1.0000	165
B[j]fluoranthen	POM, total (including total PAH)	205823	2	Y	80230	1.0000	165
Acenaphthylene	POM, total (including total PAH)	208968	2	Y	80230	1.0000	165
D[a,j]acridine	POM, total (including total PAH)	224420	2	Y	80230	1.0000	165
1-Phenanthrene	POM, total (including total PAH)	283	2	Y	80230	1.0000	165
5-Methylchrysene	POM, total (including total PAH)	3697243	2	Y	80230	1.0000	165
3-Methylcholanthrene	POM, total (including total PAH)	56495	2	Y	80230	1.0000	165
7,12-Dimethylbenz[a]anthracene	POM, total (including total PAH)	57976	2	Y	80230	1.0000	165
Acenaphthalene	POM, total (including total PAH)	78	2	Y	80230	1.0000	165
Acenaphthene	POM, total (including total PAH)	83329	2	Y	80230	1.0000	165
1-methylnaphthalene	POM, total (including total PAH)	90120	2	Y	80230	1.0000	165
2-Methylnaphthalene	POM, total (including total PAH)	91576	2	Y	80230	1.0000	165
Benzo[b+k]fluoranthene	POM, total (including total PAH)	102	2	Y	80230	1.0000	165
Benzo[g,h,i,]perylene	POM, total (including total PAH)	191242	2	Y	80230	1.0000	165
Indeno[1,2,3-c,d]pyrene	POM, total (including total PAH)	193395	2	Y	80230	1.0000	165
Benzo[b]fluoranthene	POM, total (including total PAH)	205992	2	Y	80230	1.0000	165
Benzo[k]fluoranthene	POM, total (including total PAH)	207089	2	Y	80230	1.0000	165
Chrysene	POM, total (including total PAH)	218019	2	Y	80230	1.0000	165
PAH, total	POM, total (including total PAH)	234	2	Y	80230	1.0000	165
Polycyclic Organic Matter	POM, total (including total PAH)	246	2	Y	80230	1.0000	165
Benzo[a]pyrene	POM, total (including total PAH)	50328	2	Y	80230	1.0000	165
Dibenzo[a,h]anthracene	POM, total (including total PAH)	53703	2	Y	80230	1.0000	165
Benz[a]anthracene	POM, total (including total PAH)	56553	2	Y	80230	1.0000	165
16-PAH	POM, total (including total PAH)	40	2	Y	80230	1.0000	165
Fluoranthene	POM, total (including total PAH)	206440	2	Y	80230	1.0000	165
Fluorene	POM, total (including total PAH)	86737	2	Y	80230	1.0000	165
Phenanthrene	POM, total (including total PAH)	85018	2	Y	80230	1.0000	165
Pyrene	POM, total (including total PAH)	129000	2	Y	80230	1.0000	165
Benzofluoranthenes	POM, total (including total PAH)	56832736	2	Y	80230	1.0000	165
2-Chloronaphthalene	POM, total (including total PAH)	91587	2	Y	80230	1.0000	165
Paraffin	Paraffin - nonHAP	8002742		N		1.0000	
Parathion	Parathion, gas	56382	7	N	80223	1.0000	156
Pentachloronitrobenzene	Pentachloronitrobenzene (Quintobenzene), gas	82688	1	N	80224	1.0000	157
Pentachlorophenol	Pentachlorophenol, gas	87865	1	N	80225	1.0000	158
Phenol	Phenol	108952	5	N	45300	1.0000	72
p-Phenylenediamine	Phenylenediamine, p-	106503	7	N	80227	1.0000	154
Phosgene	Phosgene	75445	9	N	80228	1.0000	160
Phosphine	Phosphine	7803512		N	80229	1.0000	161
Phosphorus	Phosphorus	7723140	2	N	80229	1.0000	162
Phosphorus Oxychloride	Phosphorus Compounds, non HAP	10025873	2	N		1.0000	
Triphenyl phosphite	Phosphorus Compounds, non HAP	101020	2	N		1.0000	
PHOSPHOROUS ACID	Phosphorus Compounds, non HAP	10294561	2	N		1.0000	
Triphenyl phosphate	Phosphorus Compounds, non HAP	115866	2	N		1.0000	
Phosphorous nitride	Phosphorus Compounds, non HAP	12136913	2	N		1.0000	

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

PHOSPHOROUS SALT	Phosphorus Compounds, non HAP	13011546	2	N		1.0000	
PHOSPHORUS TRIOXIDE	Phosphorus Compounds, non HAP	1314245	2	N		1.0000	
Phosphorus Pentoxide	Phosphorus Compounds, non HAP	1314563	2	N		1.0000	
Phosphorus Pentasulfide	Phosphorus Compounds, non HAP	1314803	2	N		1.0000	
PHOSPHOROTHIOIC ACID	Phosphorus Compounds, non HAP	2921882	2	N		1.0000	
Phosphoric Acid	Phosphorus Compounds, non HAP	7664382	2	N		1.0000	
Phosphorus Trichloride	Phosphorus Compounds, non HAP	7719122	2	N		1.0000	
Zinc Phosphate	Phosphorus Compounds, non HAP	7779900	2	N		1.0000	
Triorthocresyl phosphate	Phosphorus Compounds, non HAP	78308	2	N		1.0000	
PHOSPHORIC ACID,RX P	Phosphorus Compounds, non HAP	92203026	2	N		1.0000	
Phosphorus Compounds	Phosphorus Compounds, non HAP	398	2	N		1.0000	
Phthalic anhydride	Phthalic anhydride	85449	1	N	45601	1.0000	163
Polychlorinated biphenyls	Polychlorinated biphenyls (Aroclors), fine PM	1336363	2	Y	80231	1.0000	164
1,3-Propanesultone	Propanesultone,1,3-	1120714	0	N		1.0000	12
beta-Propiolactone	Propiolactone, beta-	57578	1	N		1.0000	55
Propionaldehyde	Propionaldehyde	123386	5	Y	43504	1.0000	166
Propoxur	Propoxur (Baygon), gas	114261	5	N	80235	1.0000	167
Propylene Dichloride	Propylene dichloride (1,2-Dichloropropane)	78875	1	Y	43838	1.0000	168
Propylene oxide	Propylene oxide	75569	1	N	43602	1.0000	169
1,2-Propylenimine	Propylenimine (2-Methylaziridine), 1,2-	75558	7	N	80238	1.0000	9
Quinoline	Quinoline	91225	5	Y	80239	1.0000	170
Quinone	Quinone	106514	7	N	80240	1.0000	171
Iodine-131	Radionuclides (including radon), gas	24267569	1	N	80241	1.0000	172
Radionuclides (including radon)	Radionuclides (including radon), gas	400	1	N	80241	1.0000	172
Radionuclides	Radionuclides (including radon), gas	605	1	N	80241	1.0000	172
Radon and its decay products	Radionuclides (including radon), gas	606	1	N	80241	1.0000	172
SELENIUM OXIDE	Selenium Compounds, coarse PM	12640890	3	N	80343	0.0712	173
Selenium & Compounds	Selenium Compounds, coarse PM	253	3	N	80343	0.1000	173
SELENIUM OXIDE SEO2	Selenium Compounds, coarse PM	7446084	3	N	80343	0.0712	173
Selenium sulfide	Selenium Compounds, coarse PM	7446346	3	N	80343	0.0711	173
Selenium Disulfide	Selenium Compounds, coarse PM	7488564	3	N	80343	0.0552	173
Selenium	Selenium Compounds, coarse PM	7782492	3	N	80343	0.1000	173
Selenium & Compounds	Selenium Compounds, coarse PM	17	3	N	80343	0.1000	173
SELENIUM OXIDE	Selenium Compounds, fine PM	12640890	2	N	80242	0.6404	173
Selenium & Compounds	Selenium Compounds, fine PM	253	2	N	80242	0.9000	173
SELENIUM OXIDE SEO2	Selenium Compounds, fine PM	7446084	2	N	80242	0.6404	173
Selenium sulfide	Selenium Compounds, fine PM	7446346	2	N	80242	0.6403	173
Selenium Disulfide	Selenium Compounds, fine PM	7488564	2	N	80242	0.4966	173
Selenium	Selenium Compounds, fine PM	7782492	2	N	80242	0.9000	173
Selenium & Compounds	Selenium Compounds, fine PM	17	2	N	80242	0.9000	173
Styrene	Styrene	100425	7	Y	45220	1.0000	174
Styrene oxide	Styrene oxide	96093	1	N	80244	1.0000	175
Tert-dodecyl mercaptan	Tert-dodecyl mercaptan - nonHAP	25103586		N		1.0000	
1,1,2,2-Tetrachloroethane	Tetrachloroethane, 1,1,2,2-	79345	1	Y	80246	1.0000	1
Tetrachloroethylene	Tetrachloroethylene (Perchloroethylene)	127184	9	Y	43817	1.0000	176
Tetrahydrofuran	Tetrahydrofuran, non HAP	109999	0	N		1.0000	
Titanium tetrachloride	Titanium tetrachloride	7550450	1	N	80248	1.0000	177
Toluene	Toluene	108883	4	Y	45202	1.0000	108
Toluene-2,4-diamine	Toluene diamine-2,4	95807	7	N	80250	1.0000	179
2,4-Toluene diisocyanate	Toluene diisocyanate, 2,4-	584849	1	N	45731	1.0000	22

Table 1. Point and Area HAP Table File: Used to Process the 1996 NTI Point and Area Source Emissions Data (continued)

o-Toluidine	Toluidine, o-	95534	7	N	80252	1.0000	151
Toxaphene	Toxaphene (chlorinated camphene), fine PM	8001352	2	N		1.0000	180
1,2,4-Trichlorobenzene	Trichlorobenzene, 1,2,4-	120821	1	N	45830	1.0000	5
1,1,2-Trichloroethane	Trichloroethane, 1,1,2-	79005	9	N	43820	1.0000	2
Trichloroethylene	Trichloroethylene	79016	9	Y	43824	1.0000	181
2,4,5-Trichlorophenol	Trichlorophenol, 2,4,5-	95954	1	N		1.0000	17
2,4,6-Trichlorophenol	Trichlorophenol, 2,4,6-	88062	1	N	80256	1.0000	18
Triethylamine	Triethylamine	121448	1	N		1.0000	182
Trifluralin	Trifluralin, gas	1582098	7	N	80257	1.0000	183
2,2,4-Trimethylpentane	Trimethylpentane, 2,2,4-	540841	1	N	43250	1.0000	15
Tris(2-chloroethyl)phosphate	Tris(2-chloroethyl)phosphate - nonHAP	115968		N		1.0000	
	Unknown-Silver - non HAP	7440224		N		1.0000	
	Unknown-invalid CAS #	78133		N		1.0000	
Vinyl acetate	Vinyl acetate	108054	5	N	43453	1.0000	184
Vinyl bromide	Vinyl bromide	593602	9	N	80260	1.0000	185
Vinyl chloride	Vinyl chloride	75014	1	Y	43860	1.0000	186
Vinylidene chloride	Vinylidene chloride (1,1-Dichloroethylene)	75354	4	N	80262	1.0000	187
Vinylidene chloride	Vinylidene chloride (1,1-Dichloroethylene), Inert	75354	1	N	80307	1.0000	187
p-Xylene	Xylenes (mixed isomers)	106423	5	Y	45102	1.0000	188
m-Xylene	Xylenes (mixed isomers)	108383	5	Y	45102	1.0000	188
Xylenes (mixture of o, m, and p isomers)	Xylenes (mixed isomers)	1330207	5	Y	45102	1.0000	188
o-Xylene	Xylenes (mixed isomers)	95476	5	Y	45102	1.0000	188

Table 2. Precursor HAP Table File: Used to Process Point, Area and Mobile Precursor Inventory (HAP and nonHAP VOCs combined)

POLLDESC	HAPDESC	POLLCODE	React	Keep	Saroad	Factor	NTI
Propene	Acetaldehyde precursors-inert surrogate	P33	1	Y	80301	0.5250	
Butene, 2-	Acetaldehyde precursors-inert surrogate	P10	1	Y	80301	1.5800	
Pentene, 2-	Acetaldehyde precursors-inert surrogate	P19	1	Y	80301	0.6300	
Hexene, 2-	Acetaldehyde precursors-inert surrogate	P13	1	Y	80301	0.5200	
Heptene, 2-	Acetaldehyde precursors-inert surrogate	P12	1	Y	80301	0.4500	
Octene, 2-	Acetaldehyde precursors-inert surrogate	P18	1	Y	80301	0.3900	
Nonene, 2-	Acetaldehyde precursors-inert surrogate	P17	1	Y	80301	0.6300	
Butene,2-, 2-methyl	Acetaldehyde precursors-inert surrogate	P16	1	Y	80301	0.9450	
Pentene, 2-, 3-methyl	Acetaldehyde precursors-inert surrogate	P23	1	Y	80301	0.7800	
Pentene, 2-, 4-methyl	Acetaldehyde precursors-inert surrogate	P26	1	Y	80301	0.5200	
Ethanol	Acetaldehyde precursors-inert surrogate	P28	1	Y	80301	0.0480	
Propene	Acetaldehyde precursors-reactive surrogate	P33	7	Y	80100	0.5250	
Butene, 2-	Acetaldehyde precursors-reactive surrogate	P10	7	Y	80100	1.5800	
Pentene, 2-	Acetaldehyde precursors-reactive surrogate	P19	7	Y	80100	0.6300	
Hexene, 2-	Acetaldehyde precursors-reactive surrogate	P13	7	Y	80100	0.5200	
Heptene, 2-	Acetaldehyde precursors-reactive surrogate	P12	7	Y	80100	0.4500	
Octene, 2-	Acetaldehyde precursors-reactive surrogate	P18	7	Y	80100	0.3900	
Nonene, 2-	Acetaldehyde precursors-reactive surrogate	P17	7	Y	80100	0.6300	
Butene,2-, 2-methyl	Acetaldehyde precursors-reactive surrogate	P16	7	Y	80100	0.9450	
Pentene, 2-, 3-methyl	Acetaldehyde precursors-reactive surrogate	P23	7	Y	80100	0.7800	
Pentene, 2-, 4-methyl	Acetaldehyde precursors-reactive surrogate	P26	7	Y	80100	0.5200	
Ethanol	Acetaldehyde precursors-reactive surrogate	P28	7	Y	80100	0.0480	
Butadiene, 1,3-	Acrolein precusor - inert surrogate	106990	1	Y	80302	1.0000	
Toluene	Cresol Precursors - inert surrogate	108883	1	N	80306	0.2880	
Toluene	Cresol Precursors - reactive surrogate	108883	4	N	80506	0.2880	
Ethene	Formaldehyde precursors-inert surrogate	P29	1	Y	80303	0.5136	
Propene	Formaldehyde precursors-inert surrogate	P33	1	Y	80303	0.7100	
Butene, 1-	Formaldehyde precursors-inert surrogate	P01	1	Y	80303	0.5400	
Pentene, 1-	Formaldehyde precursors-inert surrogate	P07	1	Y	80303	0.4300	
Hexene, 1-	Formaldehyde precursors-inert surrogate	P04	1	Y	80303	0.3600	
Heptene, 1-	Formaldehyde precursors-inert surrogate	P03	1	Y	80303	0.3100	
Octene, 1-	Formaldehyde precursors-inert surrogate	P06	1	Y	80303	0.2700	
Nonene, 1-	Formaldehyde precursors-inert surrogate	P05	1	Y	80303	0.2400	
Decene, 1-	Formaldehyde precursors-inert surrogate	P02	1	Y	80303	0.2100	
Propene, 2-methyl (Isobutene)	Formaldehyde precursors-inert surrogate	P30	1	Y	80303	0.8640	
Butene, 1-, 2-methyl	Formaldehyde precursors-inert surrogate	P14	1	Y	80303	0.6880	
Butadiene, 1,3-	Formaldehyde precursors-inert surrogate	106990	1	Y	80303	1.1200	
Butene, 1-, 3-methyl	Formaldehyde precursors-inert surrogate	P21	1	Y	80303	0.4300	
Pentene, 1-, 3-methyl	Formaldehyde precursors-inert surrogate	P22	1	Y	80303	0.3600	
Butene, 1-, 2,3-dimethyl	Formaldehyde precursors-inert surrogate	P08	1	Y	80303	0.5760	
Isoprene	Formaldehyde precursors-inert surrogate	P32	1	Y	80303	0.8844	
Butene, 1-, 2-ethyl	Formaldehyde precursors-inert surrogate	P11	1	Y	80303	0.5760	
Pentene, 1-, 2-methyl	Formaldehyde precursors-inert surrogate	P15	1	Y	80303	0.5760	
Pentene, 1-, 4-methyl	Formaldehyde precursors-inert surrogate	P25	1	Y	80303	0.3600	
Pentene, 1-, 2,4,4-trimethyl	Formaldehyde precursors-inert surrogate	P09	1	Y	80303	0.4320	
Acetaldehyde	Formaldehyde precursors-inert surrogate	75070	1	Y	80303	0.3400	
MTBE	Formaldehyde precursors-inert surrogate	1634044	1	Y	80303	0.0143	
Methanol	Formaldehyde precursors-inert surrogate	67561	1	Y	80303	0.0282	

Table 2. HAP Table File Used to Process 1996 NET Point and Area Source Speciated VOC Emissions Data (continued)

Ethene	Formaldehyde precursors-reactive surrogate	P29	6	Y	80180	0.5136
Propene	Formaldehyde precursors-reactive surrogate	P33	6	Y	80180	0.7100
Butene, 1-	Formaldehyde precursors-reactive surrogate	P01	6	Y	80180	0.5400
Pentene, 1-	Formaldehyde precursors-reactive surrogate	P07	6	Y	80180	0.4300
Hexene, 1-	Formaldehyde precursors-reactive surrogate	P04	6	Y	80180	0.3600
Heptene, 1-	Formaldehyde precursors-reactive surrogate	P03	6	Y	80180	0.3100
Octene, 1-	Formaldehyde precursors-reactive surrogate	P06	6	Y	80180	0.2700
Nonene, 1-	Formaldehyde precursors-reactive surrogate	P05	6	Y	80180	0.2400
Decene, 1-	Formaldehyde precursors-reactive surrogate	P02	6	Y	80180	0.2100
Propene, 2-methyl (Isobutene)	Formaldehyde precursors-reactive surrogate	P30	6	Y	80180	0.8640
Butene, 1-, 2-methyl	Formaldehyde precursors-reactive surrogate	P14	6	Y	80180	0.6880
Butadiene, 1,3-	Formaldehyde precursors-reactive surrogate	106990	6	Y	80180	1.1200
Butene, 1-, 3-methyl	Formaldehyde precursors-reactive surrogate	P21	6	Y	80180	0.4300
Pentene, 1-, 3-methyl	Formaldehyde precursors-reactive surrogate	P22	6	Y	80180	0.3600
Butene, 1-, 2,3-dimethyl	Formaldehyde precursors-reactive surrogate	P08	6	Y	80180	0.5760
Isoprene	Formaldehyde precursors-reactive surrogate	P32	6	Y	80180	0.8844
Butene, 1-, 2-ethyl	Formaldehyde precursors-reactive surrogate	P11	6	Y	80180	0.5760
Pentene, 1-, 2-methyl	Formaldehyde precursors-reactive surrogate	P15	6	Y	80180	0.5760
Pentene, 1-, 4-methyl	Formaldehyde precursors-reactive surrogate	P25	6	Y	80180	0.3600
Pentene, 1-, 2,4,4-trimethyl	Formaldehyde precursors-reactive surrogate	P09	6	Y	80180	0.4320
Acetaldehyde	Formaldehyde precursors-reactive surrogate	75070	6	Y	80180	0.3400
MTBE	Formaldehyde precursors-reactive surrogate	1634044	6	Y	80180	0.0143
Methanol	Formaldehyde precursors-reactive surrogate	67561	6	Y	80180	0.0282
Butene, 1-, 2-methyl	MEK precursors-inert surrogate	P14	1	N	80304	0.8600
Butane	MEK precursors-inert surrogate	P27	1	N	80304	0.0309
Isopentane	MEK precursors-inert surrogate	P31	1	N	80304	0.0249
Pentane, 3-methyl	MEK precursors-inert surrogate	P24	1	N	80304	0.0213
Butene, 1-, 2-methyl	MEK precursors-reactive surrogate	P14	7	N	80204	0.8600
Butane	MEK precursors-reactive surrogate	P27	7	N	80204	0.0309
Isopentane	MEK precursors-reactive surrogate	P31	7	N	80204	0.0249
Pentane, 3-methyl	MEK precursors-reactive surrogate	P24	7	N	80204	0.0213
Methylene Chloride	Phosgene precursors - inert surrogate	75092	1	N	80350	1.1600
Tetrachloroethylene	Phosgene precursors - inert surrogate	127184	1	N	80350	0.2816
Trichloroethylene	Phosgene precursors - inert surrogate	79016	1	N	80350	0.2988
Vinylidene Chloride	Phosgene precursors - inert surrogate	75354	1	N	80350	0.7446
Vinylidene Chloride	Phosgene precursors - reactive 4 surrogate	75354	4	N	80550	0.7446
Methylene Chloride	Phosgene precursors - reactive 9 surrogate	75092	9	N	80450	1.1600
Tetrachloroethylene	Phosgene precursors - reactive 9 surrogate	127184	9	N	80450	0.2816
Trichloroethylene	Phosgene precursors - reactive 9 surrogate	79016	9	N	80450	0.2988
Butene, 1-	Propionaldehyde precursors-inert surrogate	P01	1	Y	80305	0.5200
Pentene, 2-	Propionaldehyde precursors-inert surrogate	P19	1	Y	80305	0.8300
Hexene, 3-	Propionaldehyde precursors-inert surrogate	P20	1	Y	80305	1.3800
Butene, 1-	Propionaldehyde precursors-reactive surrogate	P01	7	Y	80234	0.5200
Pentene, 2-	Propionaldehyde precursors-reactive surrogate	P19	7	Y	80234	0.8300
Hexene, 3-	Propionaldehyde precursors-reactive surrogate	P20	7	Y	80234	1.3800

Table 3. Onroad Mobile HAP Table File: Used to Process 1996 NTI Onroad Mobile Source Emissions Data

POLLDESC	HAPDESC	POLLCODE	React	Keep	Saroad	Factor	NTI
16-PAH	16-PAH, fine PM	40	2	N	80232	1.0000	165
7-PAH	7-PAH, fine PM	75	2	Y	80233	1.0000	165
Acetaldehyde	Acetaldehyde	75070	5	Y	43503	1.0000	37
Acrolein	Acrolein	107028	5	Y	43505	1.0000	41
Arsenic & Compounds (inorganic including arsin	Arsenic Cmpds. (inorganic, incl. arsine), coarse PM	93	3	Y	80312	0.1000	48
Arsenic & Compounds (inorganic including arsin	Arsenic Compounds (inorganic, incl. arsine), fine PM	93	2	Y	80112	0.9000	48
Benzene	Benzene (including benzene from gasoline)	71432	1	Y	45201	1.0000	50
1,3-Butadiene	Butadiene, 1,3-	106990	7	Y	43218	1.0000	10
Chromium & Compounds	Chromium Compounds, coarse PM	136	3	Y	80341	0.1400	77
Chromium & Compounds	Chromium Compounds, fine PM	136	2	Y	80141	0.8600	77
Diesel PM, coarse	Diesel, coarse PM	dpmcoarse	3	Y	80401	1.0000	
Diesel PM, fine	Diesel, fine PM	dpmfine	2	Y	80400	1.0000	
Diesel PM	Diesel, coarse PM	80400	3	Y	80401	0.0800	
Diesel PM	Diesel, fine PM	80400	2	Y	80400	0.9200	
Dioxins/Furans as TEQ	Dioxins/Furans as 2,3,7,8TCCD TEQ, Lower Bound, Fine	701	2	Y	80412	1.0000	903
Dioxins/Furans as TEQ	Dioxins/Furans as 2,3,7,8TCCD TEQ, Upper Bound, Fine	701	2	Y	80245	1.0000	903
Ethyl Benzene	Ethylbenzene	100414	4	Y	45203	1.0000	98
Formaldehyde	Formaldehyde	50000	5	Y	43502	1.0000	107
Hexane	Hexane	110543	9	Y	43231	1.0000	116
Lead & Compounds	Lead Compounds, coarse PM	195	3	Y	80393	0.2400	122
Lead & Compounds	Lead Compounds, fine PM	195	2	Y	80193	0.7600	122
Manganese & Compounds	Manganese Compounds, coarse PM	198	3	Y	80396	0.3600	126
Manganese & Compounds	Manganese Compounds, fine PM	198	2	Y	80196	0.6400	126
Mercury & Compounds	Mercury Compounts, fine PM	199	2	Y	80197	1.0000	127
Methyl tert-butyl ether	Methyl tert butyl ether	1634044	1	Y	43376	1.0000	138
Nickel & Compounds	Nickel Compounds, coarse PM	226	3	Y	80316	0.1700	147
Nickel & Compounds	Nickel Compounds, fine PM	226	2	Y	80216	0.8300	147
16-PAH	POM, total (including total PAH)	40	2	Y	80230	1.0000	165
Propionaldehyde	Propionaldehyde	123386	5	Y	43504	1.0000	166
Styrene	Styrene	100425	7	Y	45220	1.0000	174
Toluene	Toluene	108883	4	Y	45202	1.0000	108
Xylenes (mixture of o, m, and p isomers)	Xylenes (mixed isomers)	1330207	5	Y	45102	1.0000	188

Table 4. Nonroad Mobile HAP Table File: Used to Process 1996 NTI Nonroad Mobile Source Emissions Data

POLLDESC	HAPDESC	POLLCODE	React	Keep	Saroad	Factor	NTI
16-PAH	16-PAH, fine PM	40	2	N	80232	1.0000	165
7-PAH	7-PAH, fine PM	75	2	Y	80233	1.0000	165
Acetaldehyde	Acetaldehyde	75070	5	Y	43503	1.0000	37
Acrolein	Acrolein	107028	5	Y	43505	1.0000	41
Arsenic & Compounds (inorganic including arsin	Arsenic Cmpds. (inorganic, incl. arsine), coarse PM	93	3	Y	80312	0.1700	48
Arsenic & Compounds (inorganic including arsin	Arsenic Compounds (inorganic, incl. arsine), fine PM	93	2	Y	80112	0.8300	48
Benzene	Benzene (including benzene from gasoline)	71432	1	Y	45201	1.0000	50
Beryllium & Compounds	Beryllium Compounds, coarse PM	109	3	Y	80318	0.6100	54
Beryllium & Compounds	Beryllium Compounds, fine PM	109	2	Y	80118	0.3900	54
1,3-Butadiene	Butadiene, 1,3-	106990	7	Y	43218	1.0000	10
Cadmium & Compounds	Cadmium Compounds, coarse PM	125	3	Y	80324	0.6200	60
Cadmium & Compounds	Cadmium Compounds, fine PM	125	2	Y	80124	0.3800	60
Chromium & Compounds	Chromium Compounds, coarse PM	136	3	Y	80341	0.2000	77
Chromium & Compounds	Chromium Compounds, fine PM	136	2	Y	80141	0.8000	77
Diesel PM, coarse	Diesel, coarse PM	dpmcoarse	3	Y	80401	1.0000	
Diesel PM, fine	Diesel, fine PM	dpmfine	2	Y	80400	1.0000	
Diesel PM	Diesel, coarse PM	80400	3	Y	80401	0.0800	
Diesel PM	Diesel, fine PM	80400	2	Y	80400	0.9200	
Ethyl Benzene	Ethylbenzene	100414	4	Y	45203	1.0000	98
Formaldehyde	Formaldehyde	50000	5	Y	43502	1.0000	107
Hexane	Hexane	110543	9	Y	43231	1.0000	116
Lead & Compounds	Lead Compounds, coarse PM	195	3	Y	80393	0.1200	122
Lead & Compounds	Lead Compounds, fine PM	195	2	Y	80193	0.8800	122
Manganese & Compounds	Manganese Compounds, coarse PM	198	3	Y	80396	0.2100	126
Manganese & Compounds	Manganese Compounds, fine PM	198	2	Y	80196	0.7900	126
Mercury & Compounds	Mercury Compounts, fine PM	199	2	Y	80197	1.0000	127
Methyl tert-butyl ether	Methyl tert butyl ether	1634044	1	Y	43376	1.0000	138
Nickel & Compounds	Nickel Compounds, coarse PM	226	3	Y	80316	0.5100	147
Nickel & Compounds	Nickel Compounds, fine PM	226	2	Y	80216	0.4900	147
16-PAH	POM, total (including total PAH)	40	2	Y	80230	1.0000	165
Propionaldehyde	Propionaldehyde	123386	5	Y	43504	1.0000	166
Selenium & Compounds	Selenium Compounds, coarse PM	253	3	N	80343	0.1100	173
Selenium & Compounds	Selenium Compounds, fine PM	253	2	N	80242	0.8900	173
Styrene	Styrene	100425	7	Y	45220	1.0000	174
Toluene	Toluene	108883	4	Y	45202	1.0000	108
Xylenes (mixture of o, m, and p isomers)	Xylenes (mixed isomers)	1330207	5	Y	45102	1.0000	188

File Name: ctyflag

File Type: SAS®

Variables and Structure

Name	Type*	Description
FIPS	A5	State and county FIPS codes.
Uflag	N	Urban or rural flag, 1 indicates the entire county is urban, 2 - the entire county is rural, 9 - the county is mixed urban and rural
*Ax=character string of length x, N=numeric		

Sample of File Contents

```
01001         2
01003         2
01005         2
01007         2
01009         2
01011         2
01013         2
01015         9
01017         2
01019         2
01021         2
01023         2
01025         2
01027         2
01029         2
01031         2
01033         9
01035         2
01037         2
01039         2
01041         2
01043         2
01045         2
01047         9
01049         2
01051         2
01053         2
01055         9
01057         2
01059         2
01061         2
01063         2
01065         2
01067         2
```

Figure 14. County-level Urban/Rural Flag File (ctyflag)

File Name: taff_hourly.txt

File Type: ASCII Text

Variables and Structure

Name	Type*	Column	Length	Dec-imals	Description
SCC_AMS	C	1	10		SCC code or AMS code, SCC codes are preceded by 2 blank spaces at the beginning of the line. AMS codes begin in space 1.
Hour_1 thru Hour_24	N	13, 21, 29, etc.	8 each	5	Hourly emission allocation factors. The factors sum to 1.0
Desc_1	C	205	54		Level 1 description of the SCC or AMS (corresponding to the 1-digit SCC)
Desc_2	C	259	54		Level 2 description (corresponding to the 3-digit SCC)
Desc_3	C	313	70		Level 3 description (corresponding to the 6-digit SCC)
Desc_4	C	383	70		Level 4 description (corresponding to the 8-digit SCC)
*C=character, N=numeric					

Sample record from the SCC-based section of the file

```
  10100101  0.03262 0.03126 0.03053 0.03042 0.03103 0.03269 0.03624 0.04057
0.04375 0.04559 0.04626 0.04650 0.04611 0.04563 0.04479 0.04462 0.04542 0.04622
0.04611 0.04628 0.04560 0.04280 0.03862 0.03420 External Combustion Boilers

Electric Generation
Anthracite Coal
Pulverized Coal
```

Sample records from the AMS-based section of the file

```
2201001000   0.01702 0.01258 0.01028 0.00922 0.01019 0.01632 0.03711 0.05684
0.05215 0.04945 0.04945 0.05665 0.05896 0.05877 0.06112 0.06741 0.07361 0.07018
0.05767 0.04766 0.03827 0.03438 0.02886 0.02301
Mobile Sources
Highway Vehicles - Gasoline
Light Duty Gasoline Vehicles (LDGV)
Total: All Road Types

2201060000   0.01702 0.01258 0.01028 0.00922 0.01019 0.01632 0.03711 0.05684
0.05215 0.04945 0.04945 0.05665 0.05896 0.05877 0.06112 0.06741 0.07361 0.07018
0.05767 0.04766 0.03827 0.03438 0.02886 0.02301
Mobile Sources
Highway Vehicles - Gasoline
Light Duty Gasoline Trucks 1 & 2 (LDGT)
```

Figure 15. Temporal Allocation Factor File (taff_hourly.txt)

File Name: scc2ams.txt

File Type: ASCII Text

Variables and Structure

Name	Type*	Column	Length	Description
SCC	C	1	8	SCC code
SCC_AMS	C	11	10	SCC code or AMS code, SCC codes are preceded by 2 blank spaces at the beginning of the line. AMS codes begin in space 11.
Spatial	C	2	24	Spatial surrogate code; required for area and mobile source processing
Cat_name	C	70	28	SCC category name, required for area and mobile source processing
*C=character, N=numeric				

Sample of File Contents

```
SCC_code(8),xx,SCC_AMS(10),xx,Spatial(2),xx,Cat_name(70)
101015      10101502   19  Geothermal Power
301       2301010000   3   Industrial Inorganic Chemical Manufacturing
302       2302000000   3   Miscellaneous Foods and Kindred Products
302002    2302000000   2   Roasted Coffee
302004      30200420   7   Food and Agricultural Products:  Cotton Ginning
302007      30200771   3   Rice Milling
302009      30200903   3   Malt Beverages
302010      30201004   3   Distilled and Blended Liquors Production
302015      30201501   7   Raw Cane Sugar
302016      30201601   3   Beet Sugar
302019      30201999   3   Edible Fats and Oils, nec
302030      30203001   3   Dairy Products
302040      30204001   3   Cereal Breakfast Foods
303       2303000000   3   Misc. Primary Metal Products Manufacturing
303001      30300101   3   Primary Aluminum Production
303005      30400204   3   Copper Foundries
303023      30302301   3   Taconite Iron Ore Processing
304         30301542   3   Iron and Steel Forging
304003      30400330   3   Gray and Ductile Iron Foundries
304004      30400401   3   Secondary Lead Smelting
304007      30301501   3   Iron and Steel Foundries:  Steel Foundries
30402200    30402201   3   Metal Heat Treating Manufacturing
305008      30500812   3   Ceramic Wall and Floor Tile Manufacturing
305014      30501404   3   Pressed & Blown Glass & Glassware Manufacturing
305016      30501601   3   Lime Manufacturing
305050      30505001   3   Asphalt Concrete Manufacturing
307       2307000000   3   Plywood/Particle Board Manufacturing
307007      30700715   3   Softwood Veneer and Plywood
307008      30700899   3   Sawmills and Planing Mills, general
307030      30703099   3   Wood Products, Nec
308       2308000000   3   Miscellaneous Plastics Products
```

Figure 16. SCC to AMS Cross-Reference File (scc2ams.txt)

File Name: sic2ams.txt

File Type: ASCII Text

Variables and Structure

Name	Type*	Column	Length	Description
SIC	C	1	4	SIC code
SCC_AMS	C	7	10	SCC code or AMS code, SCC codes are preceded by 2 blank spaces at the beginning of the line. AMS codes begin in space 7.
Spatial	C	20	2	
Cat_name	C	24	70	
*C=character, N=numeric				

Sample of File Contents

```
SIC_code(4),xx,SCC_AMS(10),xxx,Spatial(2),xx,Cat_name(70)
1311  2310000000   19  Crude Petroleum and Natural Gas
1446  2325000000   3   Industrial Sand
2011  2302000000   3   Meat Packing Plants
2013  2302000000   3   Sausages And Other Prepared Meats
2015  2302000000   3   Poultry Slaughtering and Processing
2016  2302000000   3   Poultry Dressing Plants
2020    30203001   3   Dairy Products
2022  2302000000   3   Cheese, Natural and Processed
2023  2302000000   3   Condensed and Evaporated milk
2033  2302000000   3   Canned Fruits and Vegetables
2034  2302000000   3   Dehydrated Fruits, Vegetables, and Soups
2035  2302000000   3   Pickles, Sauces, And Salad Dressings
2037  2302000000   3   Frozen fruits, Fruit Juices and Vegetables
2038  2302000000   3   Frozen Specialties, nec
2041  2302000000   3   Flour and Other Grain Mill Products
2043    30204001   3   Cereal Breakfast Foods
2044    30200771   3   Rice Milling
2045  2302050000   3   Prepared Flour Mixes And Doughs
2046  2302000000   3   Wet Corn Milling
2047  2302000000   3   Dog and Cat Food
2048  2805001000   3   Prepared Feeds Manufacturing
2061    30201501   3   Raw Cane Sugar
2062    30201501   3   Cane Sugar Refining
2063    30201601   3   Beet Sugar
2066  2302000000   3   Chocolate And Cocoa Products
2077  2302000000   3   Animal And Marine Fats And Oils
2079    30201999   3   Edible Fats and Oils, nec
2082    30200903   3   Malt Beverages
2083    30200708   3   Malt
2085    30201004   3   Distilled and Blended Liquors Production
2086  2302000000   3   Bottled and Canned Soft Drinks
2087  2302000000   3   Flavoring Extracts and Syrups Production
2090  2302000000   3   Miscellaneous Foods and Kindred Products
```

Figure 17. SIC to SCC or AMS Cross-Reference File (sic2ams.txt)

File Name: mact2ams.txt

File Type: ASCII Text

Variables and Structure

Name	Type*	Column	Length	Decimals	Description
MACTCAT	C	1	4		MACT category code
MACTdesc	C	7	70		MACT category description
SCC	C	80	8		SCC code
SCCdesc	C	90	80		SCC description
SCC_AMS	C	174	10		SCC code or AMS code, SCC codes are preceded by 2 blank spaces at the beginning of the line. AMS codes begin in space 174
*C=character, N=numeric					

Sample of File Contents

Note: Column placements have been adjusted to accommodate page width.

```
0101  Engine Test Facilities                          204001    Aircraft Engine Testing                   20400110
0101  Engine Test Facilities                          204003    Turbine                                   20400110
0101  Engine Test Facilities                          204004    Reciprocating Engine                      20400110
0101  Engine Test Facilities                          204800    Equipment Leaks                           20400110
0101  Engine Test Facilities                          20400110  Jet A Fuel                                20400110
0101  Engine Test Facilities                          20400112  JP-4 Fuel                                 20400110
0101  Engine Test Facilities                          20400199  Other Not Classified                      20400110
0101  Engine Test Facilities                          20400301  Natural Gas                               20400110
0101  Engine Test Facilities                          20400302  Diesel/Kerosene                           20400110
0101  Engine Test Facilities                          20400303  Distillate Oil                            20400110
0101  Engine Test Facilities                          20400304  Landfill Gas                              20400110
0101  Engine Test Facilities                          20400305  Kerosene/Naphtha                          20400110
0101  Engine Test Facilities                          20400399  Other Not Classified                      20400110
0101  Engine Test Facilities                          20400401  Gasoline                                  20400110
```

Figure 18. MACT Category to SCC or AMS Cross-Reference File (mact2scc.txt)

File Name: **GFXX_YY**

File Type: SAS®

Variables and File Structure

Name	Type*	Column	Length	Dec-imals	Description
FIPSST	C	1	2		FIPS State code
SIC	C	4	3		SIC code, generally 2 digits left justified, but sometimes 3 digits
GF	N	8	12	10	Growth factor
*C = character, N = numeric.					

Sample of File Contents

```
01 1   1.0407186414
01 2   1.0407186414
01 7   1.1072844918
01 8   1.1072844918
01 9   1.1072844918
01 10  1.0163934426
01 11  1.0639196439
01 12  1.0639196439
01 13  0.9796269023
01 14  1.0416666667
01 15  1.0276939178
01 16  1.0276939178
01 17  1.0276939178
01 20  1.0349711707
01 21  0.9397590361
01 22  1.0611094805
01 23  1.0359140418
01 24  1.0156041474
01 25  1.0904799371
01 26  1.052496047
01 27  1.0256709452
01 28  1.0169783677
01 29  1.0499432463
01 30  1.0453389362
01 31  1.0666666667
01 32  1.0227272727
01 33  1.0345286506
01 34  1.0378504673
01 35  1.1381616302
01 36  1.1174489726
01 37  1.0761151758
01 38  1.0319715808
01 39  1.0442739079
01 40  1.06587473
```

Figure 19. Growth Factor File to Grow from Year XX to Year YY (GFXX_YY)

File Name: **ptscc2sic.txt**

File Type: ASCII Text

Variables and File Structure

Name	Type*	Column	Length	Description
SCC Name	C	1	40	Source Category Code (SCC) name (for descriptive purposes; not read by PtGrowCntl)
SCC	C	41	8	SCC
SIC	C	50	4	Standard Industrial Code (SIC)
SIC Name	C	55	35	SIC name (for descriptive purposes; not read by PtGrowCntl)
*C = character, N = numeric.				

Sample of File Contents

```
External Comb Boilers-Utilities-Coal    10100201 4911 Svcs-Electric
External Comb Boilers-Utilities-Coal    10100202 4911 Svcs-Electric
External Comb Boilers-Utilities-Coal    10100203 4911 Svcs-Electric
External Comb Boilers-Utilities-Coal    10100204 4911 Svcs-Electric
External Comb Boilers-Utilities-Coal    10100212 4911 Svcs-Electric
External Comb Boilers-Utilities-Coal    10100222 4911 Svcs-Electric
External Comb Boilers-Utilities-Coal    10100223 4911 Svcs-Electric
External Comb Boilers-Utilities-Coal    10100224 4911 Svcs-Electric
External Comb Boilers-Utilities-Coal    10100226 4911 Svcs-Electric
External Comb Boilers-Utilities-Coal    10100301 4911 Svcs-Electric
External Comb Boilers-Utilities-Coal    10100302 4911 Svcs-Electric
External Comb Boilers-Utilities-Coal    10100303 4911 Svcs-Electric
External Comb Boilers-Utilities-Coal    10100306 4911 Svcs-Electric
External Comb Boilers-Utilities-Oil     10100401 4911 Svcs-Electric
External Comb Boilers-Utilities-Oil     10100404 4911 Svcs-Electric
External Comb Boilers-Utilities-Oil     10100501 4911 Svcs-Electric
External Comb Boilers-Utilities-Gas     10100601 4911 Svcs-Electric
External Comb Boilers-Utilities-Gas     10100604 4911 Svcs-Electric
External Comb Boilers-Industrial-Coal   10200104 2271 Woven Carpets and Rugs
External Comb Boilers-Industrial-Coal   10200201 1094 Uranium/Radium Ores
External Comb Boilers-Industrial-Coal   10200202 1011 Iron Ores
External Comb Boilers-Industrial-Coal   10200203 2046 Wet Corn Milling
External Comb Boilers-Industrial-Coal   10200204 1011 Iron Ores
External Comb Boilers-Industrial-Coal   10200205 1429 Crushed/Broken Stone,NEC
External Comb Boilers-Industrial-Bit Coa10200210 2047 Pet Food
External Comb Boilers-Industrial-Coal   10200212 2046 Wet Corn Milling
External Comb Boilers-Industrial-Coal   10200217 2075 Soybean Oil Mills
External Comb Boilers-Industrial-Coal   10200219 2111 Cigarettes
External Comb Boilers-Industrial-Coal   10200221 2063 Beet Sugar
External Comb Boilers-Industrial-Coal   10200222 2062 Cane Sugar Refining
External Comb Boilers-Industrial-Coal   10200224 2063 Beet Sugar
```

Figure 20. SCC to SIC Cross-Reference File (ptscc2sic.txt)

***File Name:* MACT_gen.txt**

File Type: ASCII Text

Variables and File Structure

Name	Type*	Column	Length	Dec-imals	Description
MACTcode	C	1	4		MACT category code, right justified
MACTexis	N	6	6	2	Control efficiency to be applied to existing emission sources
MACT_new	N	13	6	2	Control efficiency to be applied to new, modified, or reconstructed emission sources
MACTrate	N	20	6	2	Percentage of future emission attributed to new sources
Bin	C	27	2		MACT standard bin, this can have four possible values: 2, 4, 7, or 10.
Flag	C	30	1		Not currently used. Can take a value of A, B, C or D A - categories where the compliance date precedes the base year of analysis B - categories for which specific efficiencies have been compiled C - categories for which no specific efficiencies are available. D - categories which are expected to be dropped from the MACT list.
Complyr	C	32	4		Expected deadline for affected emission sources to comply with standards; used with the bin to determine if MACT controls are applied
MACT_app	C	37	1		Application control flag: set to 1 if controls are to be applied, set to 0 if control are not to be applied
MACT_src	C	39	1		Source control flag: set to M to apply controls only to major point sources, set to B to apply controls to all point sources
MACT name	C	41	39		MACT category name (for descriptive purposes, not read by PtGrowCntl)
*C = character, N = numeric.					

No sample file is currently provided as a part of EMS-HAP

Figure 21a. General MACT Reduction Information File (MACT_gen.txt)

File Name: **MACT_spec.txt**

File Type: ASCII Text

Variables and File Structure

Name	Type*	Column	Length	Dec-imals	Description
MACTcode	C	1	4		MACT category code
NTI_HAP	C	6	3		HAP identification code
SAROAD	C	10	5		Not currently used: Pollutant code assigned by PtAspenProc
SCC8	C	17	8		8-digit SCC
SCC6	C	26	6		6-digit SCC
EffXspec	N	34	6	2	Control efficiency to be applied to existing emission sources
EffNspec	N	41	6	2	Control efficiency to be applied to new, modified, or reconstructed emission sources
SnewRate	N	48	6	2	Percentage of future emissions attributed to new sources
SApp_Eff	C	55	1		Application control flag: set to 1 if controls are to be applied, set to 0 not to apply controls
SApp_Src	C	57	1		Source control flag: set to M to apply controls only to major point sources, set to B to apply controls to all sources
PollName	C	52	30		Pollutant name (for descriptive purposes, not read by PtGrowCntl)
ProcName	C	82	33		Process name (for descriptive purposes, not read by PtGrowCntl)
MACTname	C	141	90		MACT category name (for descriptive purposes, not read by PtGrowCntl)
*C = character, N = numeric.					

No sample file is currently provided as a part of EMS-HAP

Figure 21b. Specific MACT Reduction Information File (MACT_spec.txt)

File Name: **SITE_spec.txt**

File Type: ASCII Text

Variables and File Structure

Name	Type*	Column	Length	Dec-imals	Description
ACT_ID	C	1	25		Facility-level activity identification code
NTI_HAP	C	27	3		HAP identification code
SAROAD	C	31	5		Not currently used: Pollutant code assigned by PtAspenProc
EffXspec	N	37	6	2	Control efficiency to be applied to existing emission sources
EffNspec	N	44	6	2	Control efficiency to be applied to new, modified, or reconstructed emission sources
SNewRate	N	51	6	2	Percentage of future emissions attributed to new sources
SApp_Eff	C	58	1		Application control flag: set to 1 if controls are to be applied, set to 0 not to apply controls
PollName	C	62	40		Pollutant name (for descriptive purposes, not read by PtGrowCntl)
*C = character, N = numeric.					

No sample file is currently provided as a part of EMS-HAP

Figure 22. Specific Facility Reduction Information File (SITE_spec.txt)

***File Name:* MACT_grp.txt**

File Type: ASCII Text

Variables and File Structure:

Name	Type*	Column	Length	Description
MACTcode	C	1	4	MACT category code
MACT_grp	C	6	3	ASPEN source group
*C=character, N=numeric				

Sample of File Contents

```
0101   6
0102   6
0103   6
0104   6
0105   6
0106   6
0201   4
0202   5
0203   4
0204   4
0205   2
0206   7
0207   6
0301   6
0302   1
0303   6
0304   4
0305   6
0306   7
0307   7
0308   6
0309   6
0310   4
0401   6
0402   6
0403   6
0404   6
0405   6
0406   6
0407   6
0408   6
0409   5
0410   4
0411   6
0412   4
0501   4
0502   5
0503   2
```

Figure 23. ASPEN Source Group Assignment by MACT Category File (MACT_grp.txt)

File Name: **SCC6_grp.txt**

File Type: ASCII Text

Variables and File Structure:

Name	Type*	Column	Length	Description
SCC	C	1	6	6-digit SCC code
ADD_grp	C	8	3	ASPEN source group
SCCrank	C	12	2	Hierarchy rank of ASPEN source group assignment
*C=character, N=numeric				

Sample of File Contents

```
301001   0  5
301003   0  5
301005   0  5
301006   0  5
301007   0  5
301008   0  5
301009   0  5
301010   0  5
301014   0  5
301015   0  5
301018   0  5
301019   0  5
301020   0  5
301021   0  5
301023   0  5
301024   0  5
301025   0  5
301026   0  5
301027   0  5
301030   0  5
301031   0  5
301032   0  5
301033   0  5
301034   0  5
301035   0  5
301040   0  5
301050   0  5
301060   0  5
301070   0  5
301091   0  5
301099   0  5
301100   0  5
301120   0  5
301121   0  5
301125   0  5
301126   0  5
```

Figure 24. ASPEN Source Group Assignment by SCC Code File (SCC6_grp.txt)

***File Name:* SIC_grp.txt**

File Type: ASCII Text

Variables and File Structure

Name	Type*	Column	Length	Description
SIC	C	1	4	SIC code
ADD_grp	C	6	3	ASPEN source group
SCCrank	C	10	2	Hierarchy rank of ASPEN source group assignment
*C=character, N=numeric				

Sample of File Contents

```
2011   0  5
2013   0  5
2015   0  5
2020   0  5
2021   0  5
2022   0  5
2023   0  5
2024   0  5
2026   0  5
2032   0  5
2033   0  5
2034   0  5
2035   0  5
2037   0  5
2038   0  5
2041   0  5
2043   0  5
2044   0  5
2045   0  5
2046   0  5
2047   0  5
2048   0  5
2051   0  5
2052   0  5
2062   0  5
2063   0  5
2064   0  5
2066   0  5
2067   0  5
2074   0  5
2075   0  5
2076   0  5
2077   0  5
2079   0  5
2080   0  5
2082   0  5
```

Figure 25. ASPEN Source Group Assignment by SIC Code File (SIC_grp.txt)

File Name: indecay.txt

File Type: ASCII Text

Variables and Structure

Name	Type*	Column	Length/ format	Description
Reactivity class	C	1	1	Ranges from 1 to 9
Time block	C	3	1	Ranges from 1 to 8
Decay coefficients	N	5	6 nos. at 10E3	Coefficients for stability classes A through F.
*C=character, N=numeric				

Sample File Content

```
1 1 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
1 2 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
1 3 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
1 4 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
1 5 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
1 6 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
1 7 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
1 8 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
4 1 9.870E-07 9.870E-07 9.870E-07 9.870E-07 9.870E-07 9.870E-07
4 2 9.870E-07 9.870E-07 9.870E-07 9.870E-07 9.870E-07 9.870E-07
4 3 1.180E-05 7.890E-06 3.950E-06 1.970E-06 9.870E-07 9.870E-07
4 4 7.890E-05 5.920E-05 3.950E-05 1.970E-05 9.870E-07 9.870E-07
4 5 6.710E-05 5.130E-05 3.550E-05 1.970E-05 9.870E-07 9.870E-07
4 6 2.370E-05 1.780E-05 1.180E-05 7.890E-06 9.870E-07 9.870E-07
4 7 1.970E-06 1.970E-06 1.970E-06 9.870E-07 9.870E-07 9.870E-07
4 8 9.870E-07 9.870E-07 9.870E-07 9.870E-07 9.870E-07 9.870E-07
5 1 2.470E-06 2.470E-06 2.470E-06 2.470E-06 2.470E-06 2.470E-06
5 2 2.470E-06 2.470E-06 2.470E-06 2.470E-06 2.470E-06 2.470E-06
5 3 2.960E-05 1.970E-05 9.870E-06 4.930E-06 2.470E-06 2.470E-06
5 4 1.970E-04 1.480E-04 9.870E-05 4.930E-05 2.470E-06 2.470E-06
5 5 1.680E-04 1.280E-04 8.880E-05 4.930E-05 2.470E-06 2.470E-06
5 6 5.920E-05 4.440E-05 2.960E-05 1.970E-05 2.470E-06 2.470E-06
5 7 4.930E-06 4.930E-06 4.930E-06 2.470E-06 2.470E-06 2.470E-06
5 8 2.470E-06 2.470E-06 2.470E-06 2.470E-06 2.470E-06 2.470E-06
6 1 4.930E-06 4.930E-06 4.930E-06 4.930E-06 4.930E-06 4.930E-06
6 2 4.930E-06 4.930E-06 4.930E-06 4.930E-06 4.930E-06 4.930E-06
6 3 5.920E-05 3.950E-05 1.970E-05 9.870E-06 4.930E-06 4.930E-06
6 4 3.950E-04 2.960E-04 1.970E-04 9.870E-05 4.930E-06 4.930E-06
6 5 3.350E-04 2.570E-04 1.780E-04 9.870E-05 4.930E-06 4.930E-06
6 6 1.180E-04 8.880E-05 5.920E-05 3.950E-05 4.930E-06 4.930E-06
6 7 9.870E-06 9.870E-06 9.870E-06 4.930E-06 4.930E-06 4.930E-06
6 8 4.930E-06 4.930E-06 4.930E-06 4.930E-06 4.930E-06 4.930E-06
7 1 5.010E-04 5.010E-04 5.010E-04 5.010E-04 5.010E-04 5.010E-04
7 2 3.210E-05 3.210E-05 3.210E-05 3.210E-05 5.010E-04 5.010E-04
7 3 9.000E-05 6.040E-05 3.080E-05 1.600E-05 5.010E-04 5.010E-04
7 4 5.930E-04 4.450E-04 2.970E-04 1.490E-04 8.140E-06 8.140E-06
7 5 5.040E-04 3.860E-04 2.670E-04 1.490E-04 8.140E-06 8.140E-06
7 6 1.790E-04 1.340E-04 9.000E-05 5.990E-05 8.140E-06 8.140E-06
7 7 3.950E-05 3.950E-05 3.950E-05 3.210E-05 5.010E-04 5.010E-04
7 8 5.010E-04 5.010E-04 5.010E-04 5.010E-04 5.010E-04 5.010E-04
8 1 1.230E-05 1.230E-05 1.230E-05 1.230E-05 1.230E-05 1.230E-05
8 2 1.230E-05 1.230E-05 1.230E-05 1.230E-05 1.230E-05 1.230E-05
8 3 1.480E-04 9.870E-05 4.930E-05 2.470E-05 1.230E-05 1.230E-05
8 4 9.870E-04 7.400E-04 4.930E-04 2.470E-04 1.230E-05 1.230E-05
8 5 8.390E-04 6.410E-04 4.440E-04 2.470E-04 1.230E-05 1.230E-05
8 6 2.960E-04 2.220E-04 1.480E-04 9.870E-05 1.230E-05 1.230E-05
8 7 2.470E-05 2.470E-05 2.470E-05 1.230E-05 1.230E-05 1.230E-05
```

Figure 26. Decay Rate File (indecay.txt)

File Name: surrxref.txt

File Type: ASCII Text

Variables and Structure

Name	Type*	Column	Length	Description
AMS	C	1	10	AMS code
Ssur	C	12	2	Numeric code representing the spatial surrogate that should be used (from the available entries in Table 4-3.
Desc	C	34	200	Description of the AMS category
*C=character, N=numeric				

Sample record from the SCC-based section of the file

```
2101000000 4
Electric Utility              Stationary Source Fuel Combust

2101001000 4
Electric Utility              Anthracite Coal

2101002000 4
Electric Utility              Bituminous/Subbituminous Coal

2101003000 4
Electric Utility              Lignite Coal

2101004000 4
Electric Utility              Distillate Oil

2101004001 4
Distillate Oil                All Boiler Types

2101005000 4
Electric Utility              Residual Oil

2101006000 4
Electric Utility              Natural Gas

2101006001 4
Natural Gas                   All Boiler Types

2101006002 4
Natural Gas                   All I.C. Engine Types
```

Figure 27. Spatial Surrogate Assignment File (surrxref.txt)

File Name: **mact2ams.txt**

File Type: ASCII Text

Variables and File Structure

Name	Type*	Column	Length	Decimals	Description
MACT	C	1	4		MACT category code
AMS	C	7	10		AMS code or point source SIC code that gives the best fit to temporal allocation data
Surr	C	19	2		Spatial surrogate for spatial allocation
Descript	C	28	50		Category description
*C = character, N = numeric.					

Sample of File Contents

```
0105  20100101    6       Stationary IC Engines
0106  2100000000  3       Stationary Turbines
0406  2305000000  3       Refractories Manufacturing
0501  2310000000  19      Oil & Nat. Gas Production
0601  2501060050  2       Gas Dispensing, Gasoline Distribution Stage I
1609  2461000000  6       Commercial Sterilization
1636  2305000000  3       Friction Products
1802  2601000000  19      Municipal Waste Combustors
```

Figure 28. MACT Category to AMS or SCC Code Cross-Reference File (mact2ams.txt)

File Names: SAFn (where n = 1-22)

File Type: SAS®

Variables and Structure

Name	Type*	Description
Cell	A11	State (2-digit) and county (3-digit) FIPS codes, followed by the 6-digit Census tract code, with leading zeros where appropriate
StCounty	A5	State and county FIPS code
Uflag_1	A1	Urban/rural flag. Urban = 1, Rural = 2. Assignments of urban and rural codes were made using 1990 Census data.
LandLon	N	Longitude of the tract centroid (not used)
LandLat	N	Latitude of the tract centroid (not used)
Ntract	N	Number of tracts in the county
SAFn (where n = 1, 2, etc.)	N	Spatial allocation factor, defined as the fraction of county level activity that is assigned to each tract. This variable totals to 1 for each county.
*Ax=character string of length x, N=numeric		

Sample record from the SCC-based section of the file

```
01001020100  01001  2  -86.4864 32.4742  11    0.108108108108
01001020200  01001  2  -86.4722 32.4714  11    0.175675675676
01001020300  01001  2  -86.4586 32.4743  11    0.105405405405
01001020400  01001  2  -86.4436 32.4677  11    0.213513513514
01001020500  01001  2  -86.4272 32.4498  11    0.0351351351351
01001020600  01001  2  -86.4764 32.4405  11    0.186486486486
01001020700  01001  2  -86.4505 32.4485  11    0.0459459459459
01001020800  01001  2  -86.4991 32.5216  11    0.0297297297297
01001020900  01001  2  -86.5106 32.6392  11    0.0297297297297
01001021000  01001  2  -86.7494 32.6103  11    0.0108108108108
01001021100  01001  2  -86.7037 32.466   11    0.0594594594595
01003010100  01003  2  -87.7774 31.0673  21    0.0083005679336
01003010200  01003  2  -87.6795 30.9541  21    0.0096111839231
01003010300  01003  2  -87.8298 30.8221  21    0.039755351682
01003010400  01003  2  -87.6968 30.7591  21    0
01003010500  01003  2  -87.7774 30.8902  21    0.0878112712975
01003010600  01003  2  -87.7749 30.8617  21    0.0550458715596
01003010701  01003  2  -87.8959 30.6742  21    0.000873743993
01003010702  01003  2  -87.8941 30.6402  21    0.0777632153779
01003010703  01003  2  -87.8382 30.6291  21    0.0419397116645
01003010800  01003  2  -87.9003 30.5946  21    0.0174748798602
01003010901  01003  2  -87.6802 30.589   21    0.0048055919616
01003010902  01003  2  -87.7264 30.5495  21    0.047619047619
01003011000  01003  2  -87.708  30.4906  21    0.0091743119266
01003011100  01003  2  -87.8475 30.5028  21    0.0275229357798
```

Figure 29. Spatial Allocation Factor File (SAFn)

***File Name:* am_grp.txt**

File Type: ASCII Text

Variables and File Structure

Name	Type*	Column	Length	Decimals	Description
SrceCatName	C	1	90		Category description
SrceCatCode	C	91	4		Source category identification code
Bin_U	C	96	1		Bin to be used for urban sources
Bin_R	C	98	1		Bin to be used for rural sources
*C = character, N = numeric.					

Sample of File Contents

```
Acrylic Fibers/Modacrylic Fiber Production                        9001 1 1
Adhesives and Sealants                                            9002 1 1
Aerospace Industries                                              9003 1 1
Agricultural Chemicals and Pesticides                             9004 1 1
Agricultural Production                                           9005 1 1
Air and Gas Compressors                                           9006 1 1
Air and Water Resource and Solid Waste Management                 9007 1 1
Alkalies And Chlorine                                             9008 1 1
Aluminum Die-Castings                                             9009 1 1
Aluminum Extruded Products                                        9010 1 1
Aluminum Foundries                                                9011 1 1
Aluminum Foundries (Castings)                                     9012 1 1
Aluminum Rolling and Drawing, nec                                 9013 1 1
Aluminum Sheet, Plate, and Foil manufacturing                     9014 1 1
Amino and Phenolic Resins Production                              9015 1 1
Ammunition, Except for Small Arms                                 9016 1 1
Analytical Instruments                                            9017 1 1
Animal And Marine Fats And Oils                                   9018 1 1
Animal Cremation                                                  9019 1 1
Apparel and Accessories, nec                                      9020 1 1
Architectural Metal Work                                          9021 1 1
Asbestos Products Manufacturing                                   9022 1 1
Asphalt Concrete Manufacturing                                    9023 1 1
Asphalt Paving: Cutback Asphalt                                   9024 1 1
Asphalt Paving: Cutback and Emulsified                            9025 1 1
```

Figure 30. Area and Mobile Source Group and Category Code Assignment File (am_grp.txt)

File Name: popflg96.txt

File Type: ASCII Text

Variables and Structure

Name	Type*	Column	Length	Description
STCTY	C	4	5	State/county FIPS code
CNTYNAME	C	13	42	County name
POPFLG96	C	56	2	Urban/Rural flag
STABBR	C	65	2	2-character state abbreviation
*C=character				

Sample of File Contents

```
STCTY    CNTYNAME                                 POPFLG96  STABBR
02068    Denali Borough                              R        AK
02232    Skagway-Hoonah-Angoon Census Area           R        AK
02282    Yakutat Borough                             R        AK
01007    Bibb                                        R        AL
01011    Bullock                                     R        AL
01013    Butler                                      R        AL
01019    Cherokee                                    R        AL
01021    Chilton                                     R        AL
01023    Choctaw                                     R        AL
01025    Clarke                                      R        AL
01027    Clay                                        R        AL
01029    Cleburne                                    R        AL
01035    Conecuh                                     R        AL
01037    Coosa                                       R        AL
01039    Covington                                   R        AL
01041    Crenshaw                                    R        AL
01043    Cullman                                     R        AL
01049    DeKalb                                      R        AL
01053    Escambia                                    R        AL
01057    Fayette                                     R        AL
01059    Franklin                                    R        AL
01061    Geneva                                      R        AL
```

Figure 31. County-level Urban/Rural Designations File (popflg96.txt)

File Name: **area_cntl.txt**

File Type: ASCII Text

Variables and File Structure

Name	Type*	Column	Length	Decimals	Description
SrceCatName	C	1	90		Category description
ExistEff	N	98	6	2	Control efficiency to be applied to existing emission sources
New_Eff	N	105	6	2	Control efficiency to be applied to new, modified, or reconstructed emission sources
NewRate	N	112	6	2	Percentage of future emissions attributed to new sources
App_Eff	C	120	1		Application control flag: set to 1 if controls are to be applied, set to 0 not to apply controls
*C = character, N = numeric.					

No sample file is currently provided as a part of EMS-HAP

Figure 32. Area and Mobile Source Reduction Information File (area_cntl.txt)

File Name: **area_sic.txt**

File Type: ASCII Text

Variables and File Structure

Name	Type*	Column	Length	Decimals	Description
SrceCatName	C	1	90		Category description
SIC	C	91	4		SIC code
SICdesc	C	96	50		SIC description
*C = character, N = numeric.					

Sample of File Contents (first two rows are headers)

```
* Area category and sic file:
*   Category description c(90), sic c(4), 1x, SIC description c(50)
Acrylic Fibers/Modacrylic Fiber Production                         28   Organic fibers, noncellulosic
Aerospace Industries                                               37   Aircraft

Agricultural Production                                            01   Agricultural production - crops

Agricultural Field Burning: Open, Propane, Stack Burning           01   Agricultural production - crops

Amino and Phenolic Resins Production                               28   Plastics materials and resins

Asphalt Concrete Manufacturing                                     29   Asphalt paving mixtures and blocks

Asphalt Paving: Cutback Asphalt                                    16   Highway and street construction

Asphalt Paving: Cutback and Emulsified                             16   Highway and street construction

Asphalt Roofing Manufacturing                                      29   Asphalt felts and coatings

Autobody Refinishing Paint Application                             75   Auto repair shops

Aviation Gas Distribution                                          45   Air transportation
```

Figure 33. Area Emission Source Category to SIC Cross-Reference File (area_sic.txt)

APPENDIX B: EMS-HAP Sample Batch Files

Table Of Contents

AirportProc program of EMSHAP

For this run, we do not concatenate the point source data set with the allocated aircraft emissions

Define all directories

path for the point source data set
setenv POINT /data/work14/ecr/EMSHAP/areamobile/newmobile/

path for the mobile source data set
setenv MOBILE /data/work14/ecr/EMSHAP/areamobile/newmobile/

path for reference data sets
setenv REFDIR /data/work14/ecr/EMSHAP/reffiles/

Define all input files

Point source inventory
setenv INPOINT AAAAA

Mobile source inventory
setenv INMOBIL mv030900

Airport allocation reference file
setenv AIRALLC apt_allc

Define output files

Point source inventory
setenv OUTPOINT pt0328ap

Mobile source inventory
setenv OUTMOBIL mv0328ap

Set add2pt to 1 in order to add allocated airport emission records to the point source inventory.
set it to 0 to create output file containing only airport emissions.
setenv ADD2PT 0

Set add2mb to 1 in order to add unallocated airport emission records to the mobile source inventory
without the allocated airport emission records.
Set it to 0 to create output file containing only unallocated airport emissions.
setenv ADD2MB 1

cp -p /data/work14/ecr/EMSHAP/point/Programs/AirportProc.sas AirportProc_032800.sas
sas AirportProc_032800.sas -work /data/work15/dyl/

Figure 1. Sample of AirportProc Batch File

```
# Point Source Processing: The Data Quality Assurance Program (PtDataProc)

# Defaults locations and stack parameters; windows file

# Provide directory paths:

#   path for the SAS output data set
setenv IN_DATA /data/work14/ecr/EMSHAP/point/nata4-point/

#   path for the SAS output data set
setenv OUTDATA /data/work14/ecr/EMSHAP/point/nata4-point/

#   path for reference SAS data sets
setenv REFFILE /data/work14/ecr/EMSHAP/reffiles/

#   path for reference text files
setenv REFTEXT /data/work14/ecr/EMSHAP/reffiles/

#   path for included program to determine the FIPS from lat/lon
setenv INC_DIR /data/work14/ecr/EMSHAP/point/Programs/

#   path for map files used by the program to determine the FIPS from lat/lon
#   this directory must contain three data sets named bound6 and counties and cntyctr2
setenv MAP_DIR /data/work14/ecr/EMSHAP/reffiles/

#   path for output text file of records without latitude/longitude data
setenv OUTTEXT /data/work14/ecr/EMSHAP/point/nata4-point/

# Provide input and output SAS data set names

#   input SAS data set name
setenv INSAS preprocc

#   output SAS data set name
setenv OUTSAS dataset

#   output SAS data set name created from Windowing portion of the data processing
setenv FINAL dataproc

# Select the procedures to be included in data processing
# Set value to 1 for yes and 0 for no
# Provide name of necessary reference files and other information

#   Default invalid or missing locations: set value of DoLocate to 1 for yes and 0 for no

setenv DOLOCATE 1
```

Figure 2. Sample of PtDataProc Batch File

If defaulting locations, provide the name of the include file used to determine
if the FIPS code on the inventory is valid or not
setenv VALIDFIP validFIP

Also provide names of the text files containing the
county centroids by zip code, county FIPS, and state FIPS and postal abbr.
setenv ZIP zipcodes
setenv CNTYCENT cty_cntr
setenv STCENT st_cntr

Also provide name of include program used to determine missing FIPS from lat/lon
This program requires three files, bound6, counties, and cntyctr2, located in the MAP_DIR directory
setenv FINDFIPS latlon2fip

Also provide name of SAS dataset containing the random array of tracts, with radius
greater than 0.5 miles, for each county to be used to assign default locations
setenv TRACTS trctarry

Also provide name of SAS dataset containing tract information,
specifically the location of the tract centroid
setenv TRCTINFO tractinf

Default stack parameters: set value of DoStack to 1 for yes and 0 for no
setenv DOSTACK 1

To default stack parameters by SCC: set value of DoSCC to 1 for yes and 0 for no
setenv DOSCCDEF 1

If defaulting stack parameters by SCC, provide the name of the SCC correspondence file
setenv SCCDEFLT def_scc

To default stack parameters by SIC: set value of DoSIC to 1 for yes and 0 for no
setenv DOSICDEF 1

If defaulting stack parameters by SIC, provide the name of SIC correspondence file
setenv SICDEFLT def_sic

If defaulting stack parameters, provide valid ranges and global defaults for each parameter

Stack Height range
setenv DLOWHT 0.003
setenv DHIHT 381

Figure 2. Sample of PtDataProc Batch File (Continued)

```
#        Stack Velocity range
setenv DLOWVEL 0.003
setenv DHIVEL 198

#        Stack Temperature Range
setenv DLOWTEMP 273
setenv DHITEMP 1505

#        Stack Diameter Range
setenv DLOWDIA 0.0762
setenv DHIDIA 15.24

# Set global defaults
setenv DFLTHT 10
setenv DFLTVEL 1
setenv DFLTTEMP 295
setenv DFLTDIA 1

#   Window inventory data set by selecting variables and removing records with zero emissions

#     To select variables: set value of DoSetVar to 1 for yes and 0 for no
setenv DOSETVAR 1

#     To select variables in addition to the required variables: set value of
#     UseList to 1 for yes and 0 for no and provide the name of the file
setenv USELIST 1
setenv VARLIST varlist2

#     To window by zero emissions and valid locations: set value of DoWindow to 1 for
#     yes  and 0 for no
setenv DOWINDOW 1

#     If windowing inventory, provide names of data sets to store the records with zero
#     emissions and the records without lat/lon values. Also provide the name of the
#     emissions variable to be used
setenv NOLOCATE nolatlon
setenv ZEROEMIS zeroemis
setenv EMISVAR emis

cp -p /data/work14/ecr/EMSHAP/point/Programs/ptdataproc.sas  ptdataproc_061600.sas
sas  ptdataproc_061600.sas  -work  /data/work15/dyl/
```

Figure 2. Sample of PtDataProc Batch File (Continued)

```
# Point Source Processing - The ASPEN Specific Program (PtAspenProc)

# Provide directory paths:

#   path for the SAS input data set
setenv IN_DATA /data/work14/ecr/EMSHAP/point/nata4-point/

#   path for the SAS output data set
setenv OUTDATA /data/work14/ecr/EMSHAP/point/nata4-point/

#   path for the reference SAS data sets
setenv REFSAS /data/work14/ecr/EMSHAP/reffiles/

#   path for the reference text files
setenv REFTEXT /data/work14/ecr/EMSHAP/reffiles/

# Provide input and output SAS data set names

#   input SAS data set name
setenv INSAS dataproc

#   output SAS data set name
setenv OUTSAS PtAspen

#   Provide name of the HAP TABLE text files
# These files contain the correspondance between the pollutant code used in the inventory
#   and  SAROAD code, the NTI HAP code, pollutant descriptions, keep flag and factor variable

#   File for nonroad emissions (that is, the airports that are being processed as point sources)
setenv MOBHAPS haptabl_nonroad

#   File for point emissions (all point sources other than airports)
setenv PTHAPS haptabl_point_area

#   name of the SAS data set containing the urban/rural flags by county (value is 1 or 0 if
#   all tracts within the county are the same and value is 9 for non-uniform counties)
setenv CTYFLAG ctyflag

#   name of the SAS data set containing the census tract information, including
#   urban/rural flags, state and county FIP codes, tract location, and tract radius
setenv TRCTINF  tractinf

# Provide the values for additional variables used in the program
#   Choose the variable in the input data set containing the emissions value
#   to be used to window the inventory to only those records with non-zero emission values
setenv EMISVAR  emis

cp -p PtAspenProc.sas PtAspenProc_011300.sas
sas PtAspenProc_011300.sas -work /data/work15/dyl/
```

Figure 3. Sample of PtAspenProc Batch File

```
# Point Source Processing - The Temporal Allocation Progam (PtTemporal)

# Provide directory paths:

#   path for the SAS input data set
setenv IN_DATA /data/work14/ecr/EMSHAP/point/nata4-point/

#   path for the SAS output data set
setenv OUTDATA /data/work14/ecr/EMSHAP/point/nata4-point/

#   path for the reference text files
setenv REFFILE /data/work14/ecr/EMSHAP/reffiles/


# Provide input and output SAS  data set names

#   input SAS  data set name
setenv INSAS PtAspen

#   output SAS® data set name
setenv OUTSAS Temporal

# Provide name of Temporal Allocation File (TAF)
setenv TAF taff_hourly

# Provide name of the SCC_AMS correspondance texts:

#   name of SCC to SCC_AMS correspondance file
setenv SCCLINK scc2ams

#   name of SIC to SCC_AMS correspondance file
setenv SICLINK sic2ams

#   name of MACT category code to SCC_AMS correspondance file
setenv MACTLINK mact2scc

# Provide the variable in the input data set containing the emissions value
setenv EMISVAR  emis


cp -p /data/work14/ecr/EMSHAP/Point/Programs/PtTemporal.sas PtTemporal_062000.sas
sas PtTemporal_062000.sas  -work   /data/work15/dyl/
```

Figure 4. Sample of PtTemporal Batch File

```
#Point Source Processing - The Growth and Control Program (PtGrowCntl)

#Provide directory paths:

# path for the SAS input datasets
setenv IN_DATA /data/work14/ecr/EMSHAP/point/JanPoint/

# path for the SAS output datasets
setenv OUTDATA /data/work14/ecr/EMSHAP/point/JanPoint/

# path for the SAS reference datasets
setenv REFSAS /data/work14/ecr/EMSHAP/reffiles/

# path for the reference text files
setenv REFTEXT /data/work14/ecr/EMSHAP/reffiles/

#Provide input and output SAS data set names:

# input SAS data set name
setenv INSAS pttemporal

# input SAS® data set name
setenv OUTSAS ptgrow

#Select functions of the program you want performed on the input file.
# Set value to 1 for yes (or true) and 0 for no (or false)

#Add growth factors: set value of DoGrow to 1 for yes (or true) and 0 for no (or false)
setenv DOGROW 1

# Assign missing SIC codes using the SCC to SIC correspondence file
#   set value of DoSCC to 1 for yes (or true) and 0 for no (or false)
setenv DOSCC 1

#   If assigning missing SIC codes, provide the name of the text SCC to SIC correspondence file
setenv SCC2SIC  ptscc2sic

#   If adding growth factors, provide name of SAS data set containing annual growth factors for one year
setenv GF gf07_96


#Add control efficiencies and calculate projected and controlled emissions:
#      set value of DoCntl to 1 for yes (or true) and 0 for no (or false)
setenv DOCNTL 1

#   Use general MACT reduction control information:
#      set value of GenCntl to 1 for yes (or true) and 0 for no (or false)
#      then provide the names of the general reduction control information text file
```

Figure 5. Sample of PtGrowCntl Batch File

```
setenv GENCNTL 1
setenv MACTGEN MACT_gen

#   Use process and/or pollutant specific MACT reduction control information:
#      set value of ProcChem to 1 for yes (or true) and 0 for no (or false)
#      then provide the name of the specific MACT control information text file
setenv PROCCHEM 1
setenv MACTSPEC MACT_spec

#   Use process and/or pollutant specific facility-level reduction control information:
#      set value of SiteChem to 1 for yes (or true) and 0 for no (or false)
#      then provide the name of the facility-level control information text file
setenv SITECHEM 1
setenv SITESPEC SITE_spec


#Specify the growth year corresponding to the growth factors used to project the emissions
setenv GROWYR 2007


cp -p ptgrowcntl.sas ptgrowcntl_011300.sas
sas ptgrowncntl_011300.sas -work /data/work15/dyl/
```

Figure 5. Sample of PtGrowCntl Batch File (Continued)

```
# Point Source Processing - The ASPEN Final Format Program (PtFinalFormat)
#      Assigns source groups for ASPEN
#      Produces ASPEN-formatted text files

# Provide directory paths:

#   path for the SAS input dataset
setenv IN_DATA /data/work14/ecr/EMSHAP/point/nata4-point/

#   path for the SAS output dataset
setenv OUTDATA /data/work14/ecr/EMSHAP/point/nata4-point/

#   path for the reference text files
setenv REFFILES /data/work14/ecr/EMSHAP/reffiles/

#   path for the output files for input into ASPEN
setenv OUTFILES /data/work14/ecr/EMSHAP/ASPENemis/nata4-point/

#   path for the single ASCII output file
setenv ASCIIFILE /data/work14/ecr/EMSHAP/ASPENemis/nata4-point/


# Provide input and output SAS data set names

#   input SAS data set name
setenv INSAS temporal

#   output SAS® dataset name
setenv OUTSAS pt062000

# Select the procedure to be used to assign source groups

#   Assign source groups by source type (major or area): set value of DoSource to 1 for yes
#   (or true) and 0 for no (or false)
setenv DOSOURCE 1


#   Assign source groups by MACT categories: set value of DoMACT to 1 for yes
#   (or true) and 0 for no (or false)
setenv DOMACT 0

#      If using MACT categories, provide name of the text file containing the group assignments
setenv MACTGRP MACT_grp


#   Assign source groups by SCCs: set value of DoSCC to 1 for yes (or true)
#   and 0 for no (or false)
setenv DOSCC 0
```

Figure 6. Sample of PtFinalFormat Batch File

Assign source groups by SIC: set value of DoSIC to 1 for yes (or true) and
0 for no (or false)
setenv DOSIC 0

If using SICs, provide the name of the text file containing the group assignments
setenv SICGRP SIC_grp

Provide a default group assignment (value between 0 and 9) for those source
not assignment by your selected procedure
setenv DFLTGRP 1

Select the creation of ASPEN-formatted text files
Set value of DoWrite to 1 for yes (or true) and 0 for no (or false)
setenv DOWRITE 1

Provide the file name of the text file containing the decay rates for each reactivity class, extention must be .txt
setenv DECAY indecay

Provide a file identifier to be included in the name of the ASPEN-formatted text files
and the ASPEN file header
A limit of 10 characters is recommended.
Additional characters will be truncated from the file header, not the file name
setenv OUTCODE PT.pt196.US.D062000

Specify the source type, set value of Itype to 0 for point sources and 3 for pseudo point sources
setenv ITYPE 0

Provide an identifying run name to be included in the ASPEN file header
A limit of 25 characters is recommended.
Additional characters will be truncated from the file header
setenv RUNID '06/20 run of 06/00 NTI'

Select the creation of the single ASCII-formatted file
Set value of DoASCII to 1 for yes (or true) and 0 for no (or false)
setenv DOASCII 1

Provide the file name of the output ASCII file
setenv ASCII PT.pt196.US.D062000

cp -p /data/work14/ecr/EMSHAP/point/Programs/PtFinalFormat.sas PtFinalFormat_062000.sas
sas PtFinalFormat_062000.sas -work /data/work15/dyl/

Figure 6. Sample of PtFinalFormat Batch File (Continued)

```
#    The Area Source AMProc Preparation Program (AreaPrep)

# Run Title
setenv RUNID       '1996 NTI Area Source Inventory June 2000'

# SAS input file containing area source inventory
setenv AREADATA  areadata

# SAS output file containing processed area source inventory
setenv OUTDATA   areaprep

# Input file directory
setenv INPFILES  /data/work14/ecr/EMSHAP/areamobile/nata4-area/

# Ancillary files directory
setenv REFFILES  /data/work14/ecr/EMSHAP/reffiles/

# Output file directory
setenv OUTFILES  /data/work14/ecr/EMSHAP/areamobile/nata4-area/

# Name of Temporal Allocation Factor File
setenv TAFFILE   taff_hourly

# Name of Spatial Surrogate reference file
setenv SURRXREF  surrxref

# Name of SIC to AMS cross-reference file
setenv SIC2AMS   sic2ams

# Name of SCC to AMS cross-reference file
setenv SCC2AMS   scc2ams

# Name of MACT to AMS cross-reference file
setenv MACT2AMS  mact2ams


cp -p /data/work14/ecr/EMSHAP/areamobile/programs/AreaPrep.sas AreaPrep_060900.sas
sas AreaPrep_060900.sas -work /data/home/mls
```

Figure 7. Sample of AreaPrep Batch File

```
# The Mobile Source AMProc Preparation Program (MobilePrep)

# Run identification for titles
setenv TITLE        '1996 NTI Mobile Inventory March 2000 version'

# Input files directory
setenv INPFILES     /data/work14/ecr/EMSHAP/areamobile/newmobile/

# Input emissions file name prefix
setenv INEMIS       mv0309ap

# Output files directory
setenv OUTFILES     /data/work14/ecr/EMSHAP/areamobile/newmobile/

# Output emissions file name prefix (limited to 6 characters if using SAS version 6)
setenv OUTEMIS      mv0309

# Temporary work directory
setenv WORKDIR  /data/work15


cp -p /data/EMSHAP/areamobile/programs/MobilePrep.sas MobilePrep030900.sas
sas MobilePrep030900.sas
```

Figure 8. Sample of MobilePrep Batch File

```
# The Area and Mobile Source Processor  (AMProc)
# This is for running file 1 of the onroad mobile  source inventory

# Run identification for titles
setenv RUNID       'AMProc- 1996 NTI onroad*1* mobile source processing  (5/09/00)'

# Description of emissions file
setenv EMISLABL    '1996 NATA  ONRoad*1* Mobile Source Emissions (May 2000)'

# Date this run is performed
setenv RUNDATE     050900

# Emissions type (AR or MV)
setenv EMISTYPE    MV

# Label for output files (limited to 6 characters if using SAS version 6)
setenv USRLABEL    onnt1

# Reference files directory
setenv INPFILES    /data/work14/ecr/EMSHAP/reffiles

# Input files directory
setenv INPEMISS    /data/work14/ecr/EMSHAP/areamobile/nata4-mob/

# Output files directory
setenv OUTFILES    /data/EMSHAP/ASPENemis/nata4-mob/

# Input emissions file name prefix
setenv EMISFILE    MVonne1

# SAF file name prefix
setenv SAFFILE     SAFc

# TAF file name prefix
setenv TAFFILE     taff_hourly

# Decay rates file name prefix
setenv INDECAY     indecay

# Pollutant xref file name prefix
setenv HAPTABLE    haptabl_onroad

# Spatial surrogate xref file name prefix
setenv SURRXREF    surrxref

# Name of file that contains the ASPEN source group assignments
setenv EMISBINS    am_grp.txt
```

Figure 9. Sample of AMProc Batch File

County urban/rural flag xref file name prefix
setenv CNTYUR popflg96

Select The growth and control option (1= perform growth and control calculations; 0= don't perform growth # and control calculations; 2=run growth and control only, using an existing temporally and spatially allocated # emissions file)
setenv GROWCNTL 0

If doing Growth and Control set the option to re-apply source group definitions (1=yes, 0=no)
setenv REBIN 0

Select which reduction information files to use (1= assigns and applies user-defined reduction control
information; 2= assigns and applies MACT reduction information; 0= applies no reduction control
information)
setenv CNTLFAG 1

Name of file containing general reduction information by source category
setenv SRCCNTL area_cntl

Select if pollutant-specific MACT reduction control information file will be used (1= Use pollutant-specific
MACT reduction information; 0= don't use)
setenv PROCCHEM 0

Name of file containing general reduction information by MACT
setenv MACTGEN MACT_gen

#Name of file containing specific (pollutant specific) information by MACT
setenv MACTSPEC MACT_spec

SaveFile = 1 to save large SAS emissions file
setenv SAVEFILE 1

Lsubsetp = 1 to subset to a pollutant
setenv LSUBSETP 0

The pollutant code for subsetting to
setenv SUBSETP 98

Lsubsetg = 1 to subset to a state
setenv LSUBSETG 0

The 2-character state abbreviation for subsetting to
setenv SUBSETG US

Lcptime = 1 to print out module run times
setenv LCPTIMES 1

Ldbg = 1 to turn on debugging prints

Figure 9. Sample of AMProc Batch File (Continued)

Appendix C: 1996 NTI Point Source Preprocessor

Table of Contents

C.1 Description of Point Sources Preprocessor

The Point Sources Preprocessor provided with EMS-HAP is designed primarily to read the modeler's version of the 1996 National Toxics Inventory (NTI), and produce a file suitable for processing through the first point source processing program (PtDataProc) of EMS-HAP. The preprocessor draws data from a number of NTI input files for point sources. Fields in the various NTI point source files are linked in accordance with the instructions in NTI documentation.

For convenience, the Point Sources Preprocessor is divided into two SAS® programs: PreprocA and PreprocB. PreprocA preforms two functions in addition to reading various NTI point source files and linking them together. Where the emissions for a stack are reported in more than one type, a single value for the stack is selected according to the following hierarchy: (1) actual annual (most preferred type), (2) actual hourly, (3) average, (4) average daily, (5) potential, (5) maximum annual, (6) maximum, (7) maximum allowable, (8) maximum hourly, (9) unknown (least preferred type). In addition, the emissions values are converted to tons/year based on the unit in which the emission values were reported in the NTI point source files. Furthermore, PreProcA reassigns the source type variable, SRC_TYPE, if the inventory SRC_TYPE is 'unknown '. The source type is reassigned to 'major' when the total emissions of any single pollutant from a facility (based on the Site_ID) is greater than 10 tons/year or if the total emissions of all pollutants from the facility is greater than 25 tons/year. For all other facilities, the source type is reassigned to 'area'.

PreprocB also performs several functions in addition to reading various NTI point source files and linking them together. Stack parameters are converted from English units, as reported in the NTI, to metric units. In addition, all emission records for sites located in Alaska and Hawaii are removed.

C.2 Emissions Inventory Input Files

The EMS-HAP Point Sources Preprocessor reads the following files from the NTI:

- activities.csv
- emissions.csv
- emission_processes.csv
- emission_units.csv
- sites.csv
- addresses.csv
- control_strategies.csv
- aggregate_controls.csv
- paths.csv
- emission_release_points.csv
- geographic_locations.csv
- geographic_coordinates.csv

The format of these files is detailed in the NTI documentation.

C.3 Output files Produced to Assist Quality Assurance

There are two ways you can monitor the quality of the data and the functioning of the Point Source Preprocessor. First, you can monitor the point source emissions, either by pollutant code or overall inventory total, and the number of records contained within the inventory. Three SAS® data sets are produced (EmisSum and ProcASum by PreprocA, and ProcBSum by PreprocB) that contain emission totals and record counts by pollutant code. In addition, these sums are printed to the list file produced when the programs are run. The EmisSum data set is produced immediately after the emissions data are read, emission records are selected by type, and emission values are converted to tons/year. The ProcASum and ProcBSum data sets are produced at the end of the PreprocA and PreprocB programs, respectively. The only changes you should observe in the emission totals or the record counts occur in the PreprocB program, because of the removal of emission records from Alaska and Hawaii. Both emission totals and record counts for Alaska and Hawaii emissions are provided in the PreprocB list file.

You can also evaluate the processing of data through PreprocA and PreprocB by monitoring the reading of the NTI data files and the linking of these files together. This information is provided in the list file produced when the program is run. When an error occurs in reading vital data from the data file, the data are printed to the list file. When data are merged with the emissions data, unmatched data records are also printed to the list file. Any unmatched emissions records are of particular importance.

C.4 Output Files Used in EMS-HAP Processing

The output file produced by the Point Source Preprocessor is a SAS® data set containing the data variables listed in Table C-1. This table includes the variable format and whether or not the data variable is mandatory for processing through the programs of EMS-HAP.

In addition to the required variable listed above, each record within the output data from the Point Source Preprocessor must be uniquely identified by the combination of the activity ID (ACT_ID), pollutant code (POLLCODE), and emission release point ID (EMRELPID). In addition, all stack parameters within a group of records identified by the FIPS code (FIPS), activity ID (ACT_ID), and emission release point ID (EMRELPID) must have the same stack parameters.

Table C-1. Description of Variables Contained in the Point Source Preprocessor Output File using the 1996 NTI

Variable Name	Data Description	Length	Format	Required
ACT_ID	unique identifier assigned in activities.csv file	25	Character	yes
ADDRTYPE	code for type of address provided	2	Character	no
AIRBASIN	name of state-designated air basin	40	Character	no
AIRSPLID	AIRS ID for facility	8	Character	no
AIRSPTID	AIRS point ID	6	Character	no
AMS_CODE	source category AMS code	5	Character	no
AQCR	air quality control region of source	8.	Numeric	no
CITY	name of nearest city	32	Character	no
CNTLSTRT	unque identifier assigned in control_strategies.csv file	25	Character	no
CNTL_EFF	total capture control efficiency	8	Numeric	yes
COOR_ID	unique identifier assigned in geographic_coordinates.csv file	20	Character	yes
COUNTRY	FIPS country code	5	Character	no
CTRLSTAT	control status indicator code	14	Character	no
CTY_FIPS	3-digit FIPS county code	3	Character	no
DB_NO	Dun & Bradstreet number of facility	12	Character	no
DESCRIPT	text description of emission release point	40	Character	no
DIAM_FLG	indicates if default stack diameter assigned	20	Character	no
D_HORIZ	nonstack horizontal dimension	8.	Numeric	no
D_UNITS	units used for nonstack dimensions	50	Character	no
D_VERT	nonstack vertical dimension	8.	Numeric	no
EMIS	pollutant emissions value (tons/year)	E10	Numeric	yes
EMISTYPE	code based on qualifier for emission estimate	2	Character	no
EMRELPID	unique identifier from paths.csv file	50	Character	yes

Table C-1. Description of Variables Contained in the Point Source Preprocessor Output File using the 1996 NTI (continued)

Variable Name	Data Description	Length	Format	Required
EMRELPTY	physical configuration code of release point	4	Character	yes
END	ending time for inventory year	8	Character	no
EPA_REG	EPA region in which source is located	2	Character	no
FACILITY	facility ID assigned to a group site Ids representing the same facility	20	Character	no
FED2DESC	coding system used to develop FED_ID2 value	30	Character	no
FED_ID	AIRS stack ID	5	Character	no
FED_ID2	ID corresponding to FED2DESC variable	16	Character	no
FENCEDIS	distance to nearest fenceline (feet)	8.	Numeric	no
FIPS	5-digit FIPS code (state and county combined)	5.	Numeric	yes
FLOWRATE	stack gas flow rate (standard cubic feet per second)	12.	Numeric	no
FLOW_FLG	indicates if default flow rate assigned	20	Character	no
GEO_ID	unique identifier assigned in geographic_locations.csv file	20	Character	no
HT_FLG	indicates if default stack height assigned	20	Character	no
IDDF_FLG	indicates if default value assigned within emission release point information file	20	Character	no
MACTCODE	MACT code based on process or site	7	Character	yes
MACTFLAG	indicates if MACT code is SCC-based default	12	Character	no
METHCODE	emission estimation method code	5	Character	no
NTI_CODE	[not currently used in NTI]	10	Character	no
N_STACKS	number of stacks for each process, unit, or site	8.	Numeric	no
PLUME_HT	calculated plume height of exhaust stream from stack (feet)	8.	Numeric	no
POLLCODE	unique NTI pollutant code number	10	Character	yes

Table C-1. Description of Variables Contained in the Point Source Preprocessor Output File using the 1996 NTI (continued)

Variable Name	Data Description	Length	Format	Required
PROC_ID	unique identifier from emission_processes.csv file	25	Character	no
SCC	EPA source category code	10	Character	yes
SEGMT_ID	AIRS segment ID	3	Character	no
SEQ_NO	order number of a sequence of coordinate points	2	Character	no
SIC	source category SIC code	4	Character	yes
SITENAME	facility name	65	Character	no
SITERULE	name of a control regulation or rule	200	Character	no
SITE_ID	unique identifier from sites.csv file	20	Character	yes
SITE_LOC	geographic location code assigned in sites.csv file	20	Character	no
SRC_TYPE	source category to which the emission source belongs	15	Character	yes
STACKDIA	diameter of stack (meters)	8.	Numeric	yes
STACKHT	height of stack (meters)	8.	Numeric	yes
STACKVEL	velocity of exhaust gas stream (meters per second)	8.	Numeric	yes
STACK_ID	state or local stack ID	20	Character	no
START	Beginning time for inventory year	8	Character	no
STCK_LOC	geographic location code assigned in emission_release_point.csv file	20	Character	no
STKTEMP	temperature of exhaust gas stream (Kelvin)	10.	Numeric	yes
STLOCUID	emission unit ID used at state or local level	35	Character	no
STLOC_ID	process ID used at state or local level	37	Character	no
ST_FIPS	2-digit FIPS state code	2	Character	no

Table C-1. Description of Variables Contained in the Point Source Preprocessor Output File using the 1996 NTI (continued)

Variable Name	Data Description	Length	Format	Required
TEMP_FLG	indicates if default stack temperature assigned	20	Character	no
THRUMETH	code for method of estimation of throughput	5	Character	no
THRUPUT	numeric value of process activity	8.	Numeric	no
TRANS_ID	unique identifier assigned in transmittals.csv file	15	Character	no
UNITS	dimensional units of pollutant emissions	12	Character	no
UNITTEXT	full-text specification dimensional units	40	Character	no
UNITTYPE	code for emission unit type	3	Character	no
UNIT_ID	unique identifier assigned in emission_units.csv file	25	Character	no
UNIT_LOC	geographic location code assigned in units.csv file	20	Character	no
UTM_Z	universal transverse mercator (UTM) zone	3.	Numeric	yes
VEL_FLG	indicates if default stack velocity assigned	20	Character	no
X	longitude or UTM easting	10.	Numeric	yes
XY_TYPE	type of coordinate system used (LAT/LON or UTM)	7	Character	yes
Y	latitude or UTM northing	10.	Numeric	yes
ZIP_CODE	zip code of source	12	Character	yes

APPENDIX D
Preparation of ASPEN-input Files for the 1996 Base Year Using EMS-HAP

Table of Contents

List of Tables

List of Figures

Appendix D
Preparation of ASPEN-input Files for the 1996 Base Year Using EMS-HAP

This appendix describes how we processed inventories containing 1996 emission data through EMS-HAP to create the ASPEN-input files for a national scale air toxics assessment.

We created ASPEN-input files for the direct emissions of hazardous air pollutants (HAPs), direct emissions of diesel particulate matter (PM), and pollutants that will react in the atmosphere to produce HAPs.

The 1990 Clean Air Act (Section 112) lists a number of HAPs and provides a process to add and delete pollutants from the list. There are currently 188 HAPs.[1] The pollutants that will produce HAPs are referred to as HAP precursors and the transformation as secondary HAP formation. The HAP precursors are volatile organic compounds (VOC's) which may or may not be HAPs themselves. We refer to those VOC's which are not HAPs as "non-HAP" VOC's.

Section D.1 discusses the emission inventories we used, and how we prepared them for EMS-HAP. Section D.2 describes the run stream for the EMS-HAP programs we ran. Sections D.3 through D.10 presents the ancillary input files we used, and discusses how we created the key ones for EMS-HAP (e.g., the spatial and temporal allocation factor files.) Section D.11 presents the program options we selected. Section D.12 lists the pollutants in the ASPEN-input files resulting from our run of EMS-HAP.

D.1 How We Prepared the Emission Inventories for Input Into EMS-HAP

We prepared two point, two area and three mobile source inventories for input into EMS-HAP, as shown below.

	Point Source Inventory	Area Source Inventory	Mobile Source Inventory
Directly emitted HAPs	X	X	X
HAP precursors	X	X	X
Diesel PM			X

The emission data for directly emitted HAPs were obtained from the February 2000 (mobile), June 2000 (point[a]) and August 2000 (area) versions of the 1996 National Toxics Inventory (NTI).[2] HAP precursor emission data were obtained from two separate sources: (1) non-HAP VOC's came from Version 3 of 1996 National Emissions Trends (NET)[3] inventory, speciated for specific organic compounds; (2) data for HAPs that are precursors to other HAPs came from the 1996 NTI (same versions as specified above). The diesel PM data came from two sources: (1) data for the continental U.S. were from inventories developed as part of the rulemaking for Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements; (2) data for Puerto Rico and Virgin Islands were derived from Version 3 of the NET's mobile source particulate matter (PM-10) inventory.

The next subsections provide more details on the sources of data we used and how we prepared the data for EMS-HAP.

D.1.1 We used the 1996 NTI

The emission data for directly emitted HAPs were obtained from the 1996 National Toxics Inventory (NTI).[2] We received point, area and mobile source files at different times throughout the year 2000, but the data we used are consistent with the August 2000 version of the 1996 NTI with a very few exceptions to the point source data.[a]

We received the 1996 NTI point source inventory modeler's version as 14 text files linked together through a variety of identification codes which serve as primary and secondary keys. We also received cross-reference files defining these codes. The 1996 NTI contains data from

[a]A small number of revisions to NTI point source estimates were made manually for purposes of ASPEN modeling without creating a corresponding version of the NTI itself, based on state requested revisions after June 2000. These revisions consisted of less than 20 facility deletions to the point source inventory.

the 50 States, the District of Columbia, Puerto Rico and the Virgin Islands. We developed two preprocessing programs to read these files and link them together according to the instructions in the NTI documentation. These preprocessing programs are described in Appendix C. The point source inventory file produced by executing our preprocessing programs met all of the data criteria required by EMS-HAP.

We received the 1996 NTI area and mobile source inventory modeler's versions as flat text files (i.e., they didn't need to be linked). We received the area source inventory as a single file containing data from the 50 States, the District of Columbia, Puerto Rico and the Virgin Islands. We received the mobile source inventory as 53 files, one for each State, the District of Columbia, Puerto Rico and the Virgin Islands. We developed preprocessing programs to read these area and mobile source text files and produce SAS® files that met the criteria required by EMS-HAP.

The 1996 NTI point, area and mobile source documentation is in six volumes[4]:

- Documentation for the 1996 Base Year National Toxics Inventory for Point Sources
- Documentation for the 1996 Base Year National Toxics Inventory for Aircraft Sources
- Documentation for the 1996 Base Year National Toxics Inventory for Area Sources
- Documentation for the 1996 Base Year National Toxics Inventory for Commercial Marine Vessel and Locomotive Mobile Sources
- Documentation for the 1996 Base Year National Toxics Inventory for Nonroad Vehicle and Equipment Mobile Sources
- Documentation for the 1996 Base Year National Toxics Inventory for Onroad Sources

These can be accessed on the EPA web site at http://www.epa.gov/ttn/chief/ei_guide.html#toxic.

D.1.2 We used the 1996 NET inventory, speciated for particular VOCs

We received point, area and mobile source emission data for 33 non-HAP VOC species resulting from a speciation of the Version 3 1996 NET inventory. Table D-1 provides a list of these and also shows which HAPs they form through secondary transformation. We received this data for the continental U.S. and the District of Columbia. The NET inventory does not contain data for Puerto Rico nor the Virgin Islands. Emissions for these territories were derived via extrapolation of emissions estimates from surrogate U.S. locations. This was the same approach as was used for the area and mobile source components of the 1996 NTI. No speciated point source VOC's were obtained for Puerto Rico and the Virgin Islands.

Table D-1. Non-HAP VOC Species Used for Modeling Secondary HAP Formation

	HAP Formed from VOC Species			
	formaldehyde	acetaldehyde	propionaldehyde	MEK
ethene	X			
propene	X	X		
1-butene	X		X	
1-pentene	X			
1-hexene	X			
1-heptene	X			
1-octene	X			
1-nonene	X			
1-decene	X			
isobutene (2methylpropene)	X			
2-methyl-1-butene	X			X
3-methyl-1-butene	X			
3-methyl-1-pentene	X			
2,3-dimethyl-1-butene	X			
isoprene	X			
2-ethyl-1-butene	X			
2-methyl-1-pentene	X			
4-methyl-1-pentene	X			
2,4,4-trimethyl-1-pentene	X			
2-butene		X		
2-pentene		X	X	
2-hexene		X		
2-heptene		X		
2-octene		X		
2-nonene		X		
2-methyl-2-butene		X		
3-methyl-2-pentene		X		
4-methyl-2-pentene		X		
ethanol		X		
3-hexene			X	
butane				X
isopentane				X
3-methylpentane				X

Except for a few mobile source categories, the VOC data were speciated using the SPECIATE database. Based on the 1990 inventory used for the Cumulative Exposure Project (CEP), most of the anthropogenic precursors come from mobile sources. Therefore, most of the efforts in this study to speciate anthropogenic emissions were for mobile sources. We asked staff from the Office of Transportation and Air Quality (OTAQ), formerly called the Office of Mobile Sources (OMS), for speciation data applicable to 1996 mobile source emissions. OTAQ staff indicated that there was a paucity of speciation data applicable to most 1996 mobile source emissions. They provided recommendations and/or data to use for speciating the various types of mobile sources. Table D-2 summarizes their recommendations.[5]

Table D-2. Source of Speciation Data for Mobile Source Categories

Mobile Source Category	AMS code	Speciation Profile to Obtain those non-HAP VOC species that are precursors to HAP formation
Light Duty Gasoline Vehicles (LDGV)	A2201001	EXHAUST PROFILE BASED ON SPECIATE 1313 NONEXHAUST PROFILE BASED ON SPECIATE 1305 Speciate exhaust and nonexhaust emissions separately by appling the above profiles directly to each of these rather than summing exhaust and nonexhaust emissions and applying a composite profile.
Light Duty Gasoline Trucks (LDGT)	A2201060	
Heavy Duty Gasoline Vehicles (HDGV)	A2201070	
Motorcycles (MC)	A2201080	
Light Duty Diesel Vehicles (LDDV)	A2230001	Use HDDV profile
Light Duty Diesel Trucks (LDDT)	A2230060	Use HDDV profile
Heavy Duty Diesel Vehicles (HDDV)	A2230070	Create HDDV profile from emission data collected from the California Air Resources Board diesel exhaust toxicity test program.[6] Data supplied by Rich Cook, OTAQ, 9/29/99. Instructions: Develop a composite profile from the hot and cold start fractions by weighting cold start 1/7 and hot start 6/7.
All Off-highway Vehicle: Gasoline, 2-Stroke	A2260000	Create 2-stroke gasoline profile from unpublished test data on two types of two stroke engines from Peter Gabele, EPA Office of Research and Development, supplied by Rich Cook, OTAQ, 9/29/99
All Off-highway Vehicle: Gasoline, 4-Stroke	A2265000	Create 4-stroke gasoline profiles from emission data collected by EPA's Office of Research and Development on four stroke lawn mower engines.[7] Data supplied by Rich Cook, OTAQ 9/29/99.
All Off-highway Vehicle: Diesel	A2270000	Use HDDV profile
All Aircraft Types and Operations	A2275000	Use SPECIATE profile for commercial aircraft
Marine Vessels, Commercial	A2280000	Use HDDV profile
Railroads-Diesel	A2285002	Use HDDV profile

In some cases, the speciation data available in the SPECIATE database were not consistent with the species needed to model secondary HAP formation. We developed a protocol presented in Table D-3, to address these situations.

Table D-3. Summary Speciation Protocol for Non-HAP Precursor Species

If the speciation information	Then	For example
Specifically lists the desired precursor	Use that value	Use the value for 1-pentene
Contains the cis or trans isomers of the same compound listed	Use those values	Use the values for "cis-2-pentene and "trans-2-pentene" for 2-pentene (sum the cis and trans isomers)
Contains a group that is limited in scope and that has one or more precursors desired	Divide the value for the group by number of precursors in Table D-1 that are in the group, less the number of precursors that are already in the profile. Use the result for all precursors that belong in the group other than those that are already listed in the profile.	If the profile contains a group called "C-5 ene" and has no specific "C-5 enes" from Table D-1, then divide the "C-5 ene by five and use the resulting value for: 1-pentene, 2-pentene, 2-methyl-2-butene, 2-methyl-1-butene, and 3-methyl-1-butene.
Contains a broad group that can represent several precursors desired, but also a large number of chemicals that are not precursors	Do not use that value	Do not use "C5H10"

In order to prepare the speciated VOC emission data for processing through EMS-HAP, we developed and ran several preprocessing programs. These programs read the VOC data, create all the necessary variables, and ensure that the data meet the criteria required by EMS-HAP.

D.1.3 We used a rulemaking inventory and the 1996 NET inventory for diesel PM

The diesel PM emissions data for the continental United States were derived from 1996 base-year inventories developed as part of the rulemaking on Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements (June 2, 2000; 65 FR 35430). These inventories are based on Federal Highway estimates of vehicle operation, estimates of the distribution of fuel type and weight classes of vehicles from the EPA Office of Transportation and Air Quality (OTAQ), and adjusted MOBILE5b emission factors to simulate projected results from MOBILE6. The nonroad emissions, with the exception of aircraft, commercial marine, and locomotive emissions, were from OTAQ's June 2000 draft NONROAD model.[8]

Note that we did not use the final 1996 base-year inventory developed for the rulemaking. In addition to including only the exhaust (no brake and tire wear) component of the emissions, the inventory we used did not include OTAQ's latest information on adjustments to account for on-highway emissions modifications. Further, both the onroad and nonroad diesel PM inventories we used reflect changes in methods and data sources since the release of versions we used for the 1996 NET and 1996 NTI. Time did not allow for estimates of other HAP from diesel vehicles and equipment to be revised accordingly, but an exploratory analysis indicated that the effect on estimates of other HAP would not have been large.

We received the diesel PM data as two text files (one for onroad and one for nonroad), each containing of estimates diesel-fine PM (PM-2.5) and diesel-coarse PM (PM-2.5 to PM-10) by county and by source category.

The 1996 NET PM-10 data were used to estimate mobile source diesel PM emissions for Puerto Rico and Virgin Islands. As discussed earlier, the NET does not contain data for these territories. Thus, similar to the non-HAP precursors, diesel PM emissions were derived via extrapolation of emissions estimates from surrogate U.S. locations. We concatenated the U.S. data with the territorial data prior to running EMS-HAP. Because we received only diesel PM-10 estimates for Puerto Rico and the Virgin Islands, we used EMS-HAP to partition them into coarse and fine diesel PM (See D.5.1).

Note that the diesel PM inventories included estimates from only mobile sources. In addition, the diesel PM data for onroad vehicles for the continental U.S. and District of Columbia were restricted to their exhaust PM; NET estimates of PM from diesel vehicles include all PM attributable to the vehicles including brake and tire wear (but not road dust). Therefore, the PR/VI estimates included brake and tire wear.

D.2 How We Ran EMS-HAP

Section D.12 contains a list of the pollutants we modeled in EMS-HAP. The list includes the direct emissions of HAPs and diesel PM, and emissions of pollutants that are precursors to HAPs. Section D.2.1 describes the EMS-HAP run stream for the direct emissions of HAPs and diesel PM. Section D.2.2 describes it for the precursors.

D.2.1 We ran it for the direct emissions of HAPs and diesel PM

We used EMS-HAP to model direct emissions of pollutants on the list of 33 HAPs in the Urban Air Toxics Strategy.[9] We also modeled additional HAPs (not on the list) requested by EPA's Office of Transportation and Air Quality (OTAQ), and diesel PM. Note that diesel PM is not a listed HAP.

Aircraft Emissions Processing

We processed the 1996 NTI mobile source inventory through a preprocessing program to read in the mobile source emission data and format them as required by AirportProc. We then processed the mobile source emissions through the AirportProc program. We did not process any point source emissions through the AirportProc program since we chose not to append the aircraft point sources to the non-aircraft point sources. We ran the point source output file from

AirportProc (i.e., the point source aircraft inventory) through the point source processing programs in the following order: PtDataProc, PtAspenProc, PtTemporal, and PtFinalFormat.

Because aircraft emissions do not contain diesel PM, we did not process this inventory through AirportProc nor the subsequent point source programs.

Point Source Processing

We processed the 1996 NTI point source inventory through two preprocessing programs (discussed in Appendix C) to read in the point source emission data and format it as required by PtDataProc. We then processed the point source emissions through the point source processing programs in the following order: PtDataProc, PtAspenProc, PtTemporal, and PtFinalFormat.

We did not have diesel PM emissions from point sources.

Mobile Source Processing

We processed the mobile source output file from AirportProc through MobilePrep. We then separately processed the nonroad and onroad mobile source data through AMProc. Separate processing was necessary because the coarse-fine particulate matter splits for some of the metals in these two inventories are different, and therefore we had to use two different HAP tables (see Section D.5). Due of the size of the onroad mobile file, we split it into three parts and ran each part separately through AMProc.

We processed the diesel PM emissions inventory separately from the HAPs. We first processed this inventory through a preprocessing program (to prepare it for MobilePrep). We ran MobilePrep and then processed the total (onroad and nonroad together) mobile source output inventory through AMProc. We were able to process onroad and nonroad together because the same HAP table file (see Section D.5) applies to both onroad and nonroad diesel PM.

Area Source Processing

We processed the 1996 NTI area source inventory through a preprocessing program to read in the area source emission data and format it as required by AreaPrep. Due to the size of the area source file, we split it into two parts and then ran each part separately through AMProc.

D.2.2 We ran it for the HAP precursors

The EPA's Cumulative Exposure Project (CEP)[10] which selected the year 1990 as its focus, identified thirteen HAPs for which secondary formation may account for a significant portion of ambient concentrations. Of these HAPs, we modeled formaldehyde, acetaldehyde, propionaldehyde, and acrolein. The precursors to formaldehyde include both HAPs and non-HAP VOC's.

We used EMS-HAP to process data from two separate emission inventories in order to prepare

ASPEN input files for the HAP precursors. For the non-HAP VOC's, we used data from the 1996 NET inventory, speciated for the particular VOC's we needed (as discussed previously in Section D.1.2). For the precursors which are HAPs, we used the 1996 NTI. Table D-25, which lists all of the pollutants we modeled in EMS-HAP, also contains entries for the precursors we modeled. Note that because 1,3 butadiene, which was modeled as a directly emitted HAP, is the only precursor for acrolein, Table D-25 does not have a separate entry for "acrolein, precursor."

Aircraft Emissions Processing

We merged the mobile NTI emissions with the speciated mobile NET emissions in a pre-processor and ran that through AirportProc. We then fed the output precursor aircraft emissions inventory to the point source processing programs in the following order: PtDataProc, PtAspenProc, PtTemporal, and PtFinalFormat. We used the precursor HAP table (see D.6) in PtAspenProc.

Point Source Emissions Processing

We ran the speciated NET point source inventory through a preprocessing program and then ran it through PtDataProc and PtAspenProc, using the precursor HAP table file (see D.6). We ran the 1996 NTI through PtDataProc and PtAspenProc, also using the precursor HAP table file. We then merged the output of the two separate runs of PtAspenProc and ran the resulting precursor inventory through PtTemporal, and PtFinalFormat.

Mobile Source Processing

We processed the precursor output (containing both NET and NTI data) from AirportProc through MobilePrep. We processed the nonroad and onroad mobile precursor data together through AMProc. We were able to process onroad and nonroad together because both used the same HAP table file (the precursor HAP table).

Area Source Processing

We merged those area NTI emissions which are HAP precursors with the speciated area NET emissions and ran the resulting precursor inventory through AreaPrep. We then ran the output through AMProc.

D.3 The Ancillary Files We Used

Each EMS-HAP program (except for MobilePrep) requires a variety of ancillary input files. The ancillary files we used to prepare 1996 base year ASPEN input files are provided as a part of EMS-HAP. Table D-4 lists the ancillary input files for each program we ran. Some of the ancillary files used for area and mobile source processing are the same as those used for point source processing. File formats, descriptions, and sample data for each of these files are provided in Appendix A. This appendix (see Tables 1-4) also lists the contents of all of the HAP table files in their entirety.

Table D-4. Ancillary Files Used in EMS-HAP for the 1996 Base Year Run

EMS-HAP Program	Batch File Keyword	File Name (SAS files are shown without their extension)	Data Source and Appendix D section which provides more information
Aircraft Emissions Processing			
AirportProc			
	AIRALLC	apt_allc	based on data complied by Gregory Rigamer and Associates[11] and the FAA[12] See D.4
Point Source Processing			
PtDataProc and its "include" programs validFIP and latlon2fip			
	ZIP	zipcodes	developed from a SAS® map data set
	CNTYCENT	cty_cntr	developed from a geographic information systems (GIS) database
	STCENT	st_cntr	developed from a SAS® map data set
	N/A*	counties	SAS® map data set
	N/A*	bound6	developed from a SAS® map data set
	N/A*	cntyctr2	developed from a GIS database
	TRACTS	trctarry	developed by creating random arrays of the tracts within each county from tractinf file
	TRCTINFO	tractinf	urban/rural designations based on 1990 designations made in the CEP[13]; tract radius and centroid data based on 1990 Census data
	SCCDEFLT	def_scc.txt	developed from averaging stack parameter data for each SCC from June 2000 version of the 1996 point source NTI
	SICDEFLT	def_sic.txt	developed from averaging stack parameter data for each SIC from June 2000 version of the 1996 point source NTI
	VARLIST	varlist.txt	based on our preference

Table D-4. Ancillary Files Used in EMS-HAP for the 1996 Base Year Run (continued)

EMS-HAP Program	Batch File Keyword	File Name	Data Source and Appendix D section which provides more information
Point Source Processing.... continued			
PtAspenProc			
	MOBHAPS	haptabl_nonroad.txt (direct emissions) haptabl_precusor.txt (precursor emissions)	reactivity and particulate size class information based on the analytical framework developed in the CEP[14] See D.5 and D.6
	PTHAPS	haptabl_point_area.txt (direct emissions) haptabl_precusor.txt (precursor emissions)	reactivity and particulate size class information based on the analytical framework developed in the CEP[14] See D.5 and D.6
	CTYFLAG	ctyflag	developed from trctinf file
	TRCTINF	tractinf	same file as TRCTINFO under PtDataProc
PtTemporal			
	TAF	taff_hourly.txt	Primarily from temporal allocation database maintained by EPA's Office of Research and Development (ORD) See D.7
	SCCLINK	scc2ams.txt	based on EPA's FIRE database[15] See D.8 and D.9
	SICLINK	sic2ams.txt	based on SIC definitions published by the Office of Management and Budget[16] See D.8 and D.9
	MACTLINK	mact2scc.txt	based on MACT category definitions[17] See D.8 and D.9
PtFinalFormat			
	DECAY	indecay.txt	derived from the CEP[14]

Table D-4. Ancillary Files Used in EMS-HAP for the 1996 Base Year Run (continued)

EMS-HAP Program	Batch File Keyword	File Name	Data Source and Appendix D section which provides more information
Area Source Processing			
AreaPrep			
	TAFFILE	taff_hourly.txt	same as TAF in PtTemporal
	SCC2AMS	scc2ams.txt	same as SCCLINK in PtTemporal
	SIC2AMS	sic2ams.txt	same as SICLINK in PtTemporal
	MACT2AMS	mact2scc.txt	same as MACTLINK in PtTemporal
	SURRXREF	surrxref.txt	developed using CEP, EMS-95 and OTAQ recommendations, see D.8
Area and Mobile Source Processing			
AMProc			
	SAFFILE	saf1, saf2, ...	spatial allocation factors primarily from the CEP. Tract-level urban/rural dispersion parameters from the CEP. Urban/rural county designations from 1990 and 1996 census data[18] See D.10
	TAFFILE	taff_hourly.txt	same as TAF under PtTemporal
	SURRXREF	surrxref.txt	same as SURRXREF under AMProc
	HAPTABLE	haptabl_point_area.txt (direct emissions, area) , haptabl_onroad.txt (direct emissions, onroad), haptabl_nonroad.txt (direct emissions, nonroad), haptabl_precursor.txt (precursor emissions)	same as MOBHAPS and PTHAPS under PtAspenProc
	EMISBINS	am_grp.txt	based on our selection: we grouped all 'area and other sources'** into group 1, all nonroad mobile (including aircraft, commercial marine and locomotives) into group 3 and all onroad mobile into group 2.
	CNTYUR	popflg96.txt	based on 1990 and 1996 Census data[18]
	DECAY	indecay.txt	same as DECAY under PtFinalFormat

* not applicable because PtDataProc requires the filenames given for these ancillary files
** 'area and other' includes both area sources based on Clean Air Act definition. 'Other' stationary sources are sources that may be more appropriately addressed by other programs rather than through regulations developed under certain air toxics provisions (sections 112 or 129) in the Clean Air Act. Examples of other stationary sources include wildfires and prescribed burning whose

emissions are being addressed through the burning policy agreed to by EPA and USDA.

D.4 How We Developed the Airport Allocaiton Ancillary File (apt_allc)

The 1996 NTI and most other emissions inventories include emissions from airport takeoffs and landings as county-level totals in the mobile source inventory. EMS-HAP uses an airport allocation file (apt_allc) to apportion the county-level emissions to specific airport locations. This file provides detailed location data (latitude and longitude) for all known airports in the U.S., Puerto Rico and the Virgin Islands, as well as allocation factors for situations where more than one airport is located in a particular county.

D.4.1 We assembled airport location data

We used data compiled by Gregory Rigamer and Associates to provide latitudes and longitudes for about 18,000 airports in the U.S., Puerto Rico and the Virgin Islands.[11] This database includes both commercial and noncommercial airports. We made a few changes to this database to correct errors we discovered when we initially ran the location quality assurance routine in PtDataProc. The changes are listed below:

1. We changed the latitude and longitude of the Four Season's Airport in Reading, New York to be consistent with the range of coordinates in Shuler county (the original coordinates were not within Shuler county). The coordinates were changed from 42.40617750 latitude/ -77.96083611 longitude to 42.300278 latitude/ -76.876667 longitude.

2. We changed the county FIPS code of the Dahlgren Naval Surface Warfare Center from 199 (York County) to 099 (King George County) to be consistent with the locational coordinates.

D.4.2 We developed airport allocation factors

In developing allocation factors, we relied primarily on an FAA emplanement data set, which provides information on the number of passengers carried in 1996 at approximately 2000 commercial airports in the U.S., Puerto Rico and the Virgin Islands.[12]

We developed an allocation factor to address situations where there are multiple airports in a given county (since the inventory contains emission data at the county level). Where multiple commercial airports were located in the same county, we assumed that the fraction of emissions attributable to each airport in the county is the same as the fraction of passengers served by that airport:

$$\text{Allocation factor for airport A} = \frac{\text{Passengers served by airport A}}{\text{Total passengers served in the county}}$$

We did not identify a source of activity data for noncommercial airports. In cases where commercial and noncommercial airports were located in the same county, we assumed that all of the emissions emanated from the commercial airports. We assumed this because commercial airports tend to have both general aviation and commercial activity. For counties which contain no commercial airports and multiple noncommercial airports, we divided any emissions equally among the noncommercial airports.

We merged the location and emplanement databases using the common airport designation code.

D.5 How We Selected HAPs, Grouped/Partitioned Them, and Determined Their Characteristics (HAP Table for HAPs)

For modeling the direct emissions of HAPs, we used three separate versions of the HAP table pertaining to: (1) point and area sources, (2) onroad mobile sources, and (3) nonroad mobile sources. Appendix A contains a complete listing of each of these files (Tables 1, 3 and 4). These versions of the HAP table differ in two ways: 1) the apportionment of metal HAPs among the fine and coarse particulate size classes, and 2) the apportionment of mercury among fine particulate and non-reactive gas classes.

D.5.1 We assigned reactivity and particulate size classes

Reactivity and particulate size class information for each pollutant are assigned through the same variable (REACT). The versions of the HAP tables supplied in Appendix A contain the REACT variable and SAROAD codes for those HAPs selected for modeling and for a substantial number of other pollutants reported in the 1996 NTI but not selected. The treatment of HAP reactivity in EMS-HAP is based on the analytical framework developed in EPA's CEP.[15] The reactivity and particulate size class definitions and most assignments of chemical species to reactivity classes were also taken from the CEP project. Those assignments that were not taken from the CEP were because (1) the pollutant was not addressed in the CEP, (2) we had different degrees of inventory information for determining coarse/fine particulate size class allocation, or (3) we received recommendations from the EPA's Emission Measurement Center.[19]

Tables D-5 and D-6 show how we assigned particulate size class allocation factors to metal compound classes. Except for diesel PM and mercury compounds, we computed allocation factors for the metal compound classes based on averages from the CEP's 1990 emission inventory.[20] Diesel PM emissions splits were only used for Puerto Rico and Virgin Islands since we received the data already speciated into coarse and fine diesel for the continental U.S. The diesel PM splits in the onroad and nonroad HAP tables were based on recommendations from EPA's Office of Transportation Air Quality (OTAQ).[21, 22]

Table D-5. Average Particulate Size Class Allocation Factors

	Onroad		Nonroad		Point and Area	
	coarse %	fine %	coarse %	fine %	coarse %	fine %
Antimony	31	69	63	37	45	55
Arsenic	10	90	17	83	41	59
Beryllium	-----	-----	61	39	32	68
Cadmium	------	------	62	38	24	76
Chromium	14	86	20	80	29	71
Cobalt	19	81	10	90	20	80
Lead	24	76	12	88	26	74
Manganese	36	64	21	79	33	67
Nickel	17	83	51	49	41	59
Selenium	0	100	11	89	10	90
Diesel PM (Puerto Rico and Virgin Islands only)	8	92	8	92	------	------

Table D-6. Gas and Particulate Allocations for Mercury Compounds

Reported as...	Onroad			Nonroad			Point and Area		
	coarse %	fine %	gas %	coarse %	fine %	gas %	coarse %	fine %	gas %
Mercury & Compounds	0	100	0	0	100	0	0	0	100
Mercuric Chloride	_____	_____	_____	_____	_____	_____	0	100	0
Other Mercury Species (including "elemental" mercury)	_____	_____	_____	_____	_____	_____	0	0	100

As seen in Table D-6, we allocated mercury compound emissions to gaseous (reactivity class 1) and fine particulate classes (reactivity class 2). Elemental mercury emissions were assigned to the gaseous mercury group, because elemental mercury deposits relatively slowly, and mercuric chloride emissions were assigned to the fine particulate group, because this species deposits at a moderate rate.[23] All mercury emissions from mobile sources were assigned to particulate mercury group, since the EPA's OTAQ indicated that the factors used to estimate these emissions originated from particulate measurements. All other species of mercury in the point and area inventories, including the broad compound class 'mercury & compounds,' were assigned to the gaseous group.

Based on recommendations from EPA's Emission Measurement Center[19]:

- All dioxins were assigned to the fine particulate class (reactivity class 2).
- All species grouped into 7-PAH or total POM were assigned to the fine particulate class (class 2).
- Cyanide compounds were assigned to fine (class 2), coarse (class 3) and gaseous (class 1) groups in HAP table, depending on the particular cyanide species reported in the inventory.
- Naphthalene was split 50/50 among fine and reactivity class 1, although when assigned to total POM, it was modeled as all fine particulate.

D.5.2 We grouped HAP species belonging to HAP compound classes

The 1996 NTI contains approximately 400 different individual species representing the 188 HAPs. Many of the species (e.g., lead oxide) belong to compound classes. Grouping of these species is necessary for many reasons. One reason is that the species belonging to HAP groups may not be geographically consistent. For example, individual lead oxide emissions may have been reported in some counties, whereas other counties aggregated their lead oxide emissions into a group called "lead & compounds." Grouping allows for pollutants with similar characteristics to be modeled together for purposes of efficiency. Proper grouping is essential for assuring that the most accurate deposition and decay characteristics are assigned to HAPs provided in the emission inventory.

The following subsections describe how we grouped pollutants in the 1996 NTI.

HAPs listed with their isomers

All HAPs that are listed in Section 112 of the Clean Air Act as both individual species and compound classes including their isomers (e.g., xylenes, cresols) were modeled as a group that included all individual isomers. For example, we aggregated emissions of o-xylene, p-xylene, and m-xylene into the "xylene, including all isomers" group.

Grouping of Metal HAPs

With the exception of mercury compounds (discussed later), each metal HAP class was prepared and modeled as two HAP groups: a fine particulate group of the metal HAP class (e.g., chromium compounds, fine particulate) and a coarse particulate group of the metal HAP class (e.g., chromium compounds, coarse particulate). Because the inventory did not contain information on the particulate size class of the metal species, we used the particulate size class allocation factors shown in Table D-5, which were discussed earlier in Section D.5.1. Note that these allocation factors are specific to the type of source (e.g., nonroad, onroad, and point and area). Fine and coarse HAP groups account for differences in deposition characteristics between fine and coarse particulate HAPs. However, they do not necessarily account for the differences in toxicological characteristics among individual species in the metal group. Such differences generally could not be accounted for due to the lack of speciated data for a great number of sources. Because metals consisted of a fine and a coarse particulate group, the resulting modeled concentrations were summed subsequent to ASPEN modeling to provide a single concentration for each metal group.

We also applied a mass reduction factor, computed as the mass ratio of the moles of the metal in the chemical compound to the entire chemical compound. We applied this factor to each specific metal compound reported to adjust the mass emissions to the metal portion of the compound. Such an adjustment is desirable in allowing comparison of the modeled concentrations to monitored concentrations, because monitors generally measure only the metal portion of metal compounds. In addition, the health data are often associated only with the absorbed mass of the metal. For metals reported as diverse groups or compound classes, such as "alkylated lead," it was assumed that the reported mass of the pollutant included only the metal portion; therefore, a factor of 1.0 was used.

The compound class "mercury compounds" was also prepared and modeled as two different HAP groups, and summed up to a single ambient mercury concentration after ASPEN modeling. However, unlike the other metal compound classes grouped into fine and coarse particulate groups, the two different HAP groups were gaseous mercury and fine particulate mercury, with the splits described in Section D.5.1 (Table D-6).

Grouping of Polycyclic Organic Matter (POM)

The grouping of POM provided a challenge due to the general lack of speciated data, the large number of POM congeners and groups of congeners reported, and the uncertainty in the definitions used. For example, the reported groups include 7-PAH, 16-PAH, "PAH, total" and "total POM". The well-defined subgroups 7-PAH and 16-PAH, as shown in the first two columns of Table D-7, have been used by EPA in the CAA 112(c)(6) emission inventory.[24] The groups "PAH, total" and "total POM" are less defined.

Table D-7. 7-PAH and 16-PAH Subgroups, and Additional Individual POM Compounds with Available Health Data

7-PAH	16-PAH	POM Compounds (in addition to 7 and 16-PAH) for which we have cancer assessments
Benz(a)anthracene	Benz(a)anthracene	Carbazole
Benzo(a)pyrene	Benzo(a)pyrene	Dibenz[a,h]acridine
Benzo(b)fluoranthene	Benzo(b)fluoranthene	Dibenz[a,j]acridine
Benzo(k)fluoranthene	Benzo(k)fluoranthene	7H-Dibenzo[c,g]carbazole
Chrysene	Chrysene	Dibenzo[a,e]pyrene
Dibenz(a, h)anthracene	Dibenz(a, h)anthracene	Dibenzo[a,i]pyrene
Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pyrene	Dibenzo[a,l]pyrene
	Acenaphthene	7,12-Dimethylbenz[a]anthracene
	Acenaphthylene	1,6-Dinitropyrene
	Anthracene	1,8-Dinitropyrene
	Benzo(ghi)perylene	3-Methylcholanthrene
	Fluoranthene	5-Methylchrysene
	Fluorene	5-Nitroacenaphthene
	Naphthalene	6-Nitrochrysene
	Phenanthrene	2-Nitrofluorene
	Pyrene	2-Nitrofluorene
		1-Nitropyrene
		4-Nitropyrene

For processing the 1996 NTI, we chose to group POM species in two ways: (1) as 7-PAH, and (2) as total POM. Modeling POM using these two groups allows us to bound the health risks for POM. Table D-8 shows the HAP species reported in the inventory that were grouped as total POM. As shown in the second column of this table, we excluded 7-PAH. This is because all 16-PAH estimates already included the 7-PAH. If it had been included, it would have been double-counted. We also excluded the dioxin/chlorinated furan species and subgroups because these were grouped under the dioxins pollutant grouping (discussed later). Furthermore, we excluded the individual species that are listed separately as HAPs other than naphthalene. Although they structurally fit within the POM group, they are generally not reported or assessed as POM. This is because they are typically emitted separately rather than as part of POM mixtures and have health benchmarks that are distinct from POM mixture components.

Table D-8. Grouping Scheme for Total POM

Included in the Total POM group	Excluded from the total POM group
¢ 16-PAH ¢ Individual POM species (e.g., benzo-a-pyrene, 1-methylnaphthalene, chrysene) ¢ Naphthalene ¢ "PAH, total" ¢ Total POM	¢ 7-PAH ¢ Individual POM species that are listed separately as HAP (e.g., 2-acetylaminofluorene) other than naphthalene ¢ Dioxin/ chlorinated furan species and subgroups (e.g., pentachlorodibenzofuran)

Note that if the same stack contained emission estimates from more than one item in the first column of the above table, then emissions from these items were summed together. For example, if the same stack contained a "PAH, total" "POM," and naphthalene emissions, all three were summed together.

The limitations resulting from the POM grouping scheme can be qualified based on the assumptions made. For 7-PAH, the assumption was that if only "PAH, total" or "POM" were reported from the stack, none of those groups contained any species that are part of 7-PAH. Thus modeled 7-PAH concentrations may underestimate the actual concentrations/exposure estimates in those cases where species in the 7-PAH group were included in the reported group. For total POM, the modeling could overestimate the ambient concentration exposure estimates where all species of POM are not mutually exclusive.

Grouping of dioxins and chlorinated furans

Dioxin and chlorinated furan congeners (typically denoted by the single term “dioxin” or “dioxins”) are included in the CAA HAP list as 2,3,7,8 TCDD, and as part of the group “POM,” but tend to be reported as dioxins. Individual congeners can have greatly varying toxicities. To address this, an additional pollutant group that reflects the toxic equivalent quantity (TEQ) of the individual species of dioxins and chlorinated furans is often used.[25] This group is called 2,3,7,8-TCDD TEQ. For risk characterization purposes, the ideal way to group the dioxins and chlorinated furans would be to use this 2,3,7,8-TCDD TEQ convention.

We used the FACTOR variable in the HAP table to convert individual species of dioxins and chlorinated furans into 2,3,7,8-TCDD TEQ. We set this variable to the appropriate toxic equivalency factor (TEF) to the emissions of the individual species. We used the I-TEFs from the early 90's because these are the factors built into the 1996 NTI for estimating TEQ. EMS-HAP multiplies the emissions by the TEF, thereby converting them to 2,3,7,8-TCDD TEQ.

Difficulties arise in handling those pollutant subgroups that cannot be directly converted to TEQ because the amount of the individual species they contain is not known. Table D-9 shows the specific subgroups in the NTI that cannot be directly converted into 2,3,7,8-TCDD TEQ. To address the uncertainty resulting from the unspeciated reporting of dioxin and chlorinated furan HAP groups in the inventory, we chose to create two separate pollutant groups to model dioxins. One group reflects an upper bound estimate of TEQ, and the second reflects a lower bound estimate. Where specific congeners in the NTI were known, we used the appropriate TEF, and included the congener in both the upper and lower bound TEQ group. Where specific congener identities were not known we used the maximum value of the TEF for the mixture for the upper bound group, and zero for the lower bound group.

Table D-9. Species, Groups and Subgroups of Dioxins Reported in the 1996 NTI

Could be converted to TEQ (or is already TEQ)	Could not be converted to TEQ
• 2,3,7,8-Tetrachlorodibenzo-p-dioxin • 1,2,3,7,8,9-hexachlorodibenzo-p-dioxin • Pentachlorodibenzo-p-dioxin (estimates by EPA's Emission Measurement Center that 1,2,3,7,8-Pentachlorodibenzo dioxin constitutes ~ 10% of total Pentachlorodibenzo dioxins[26]) • Pentachlorodibenzofuran (estimates by EPA's Emission Measurement Center that 1,2,3,7,8-pentachlorodibenzofuran constitutes ~9% of total Pentachlorodibenzo furans and that 2,3,4,7,8-pentachlorodibenzofuran constitutes ~9% of total Pentachlorodibenzo furans[26]) • Octachlorodibenzo-p-dioxin • Octachlorodibenzo furan • 1,2,3,4,7,8-hexachlorodibenzo-p-dioxin • 1,2,3,7,8-Pentachlorodibenzo-p-dioxin • 2,3,7,8-Tetrachlorodibenzo furan • 1,2,3,4,7,8,9-heptachlorodibenzofuran • 2,3,4,7,8-pentachlorodibenzofuran • 1,2,3,7,8-pentachlorodibenzofuran • 1,2,3,6,7,8-hexachlorodibenzo furan • 1,2,3,6,7,8-hexachlorodibenzo-p-dioxin • 2,3,7,8-TCDD TEQ • 2,3,4,6,7,8-hexachlorodibenzo furan • 1,2,3,4,6,7,8-heptachlorodibenzofuran • 1,2,3,4,7,8-hexachlorodibenzo furan • 1,2,3,7,8,9-hexachlorodibenzo furan • Dioxins/Furans as TEQ	• Dioxins • 1,2,3,4,6,7,8-heptachlorodibenzo-p-diox in • Dibenzofurans (chlorinated) {PCDFs} • Dioxins, total, w/o individual. isomers reported • Hexachlorodibenzo-p-dioxin • Polychlorinated dibenzo-p-dioxin, total • Polychlorinated dibenzofurans, total

D.6 How We Selected the HAP Precursors, Grouped/Partitioned Them, and Determined Their Characteristics (HAP Table for Precursors)

The CEP identified HAPs for which secondary formation may account for a significant portion of ambient concentrations. We've prepared the HAP table for ASPEN modeling of the secondary formation of formaldehyde, acetaldehyde, propionaldehyde, acrolein, methyl ethyl ketone, phosgene and cresol. Table D-10 shows the precursors for these HAPs. Appendix A, Table 2, shows a complete listing of the precursor HAP table we used for preparing the ASPEN input files for the 1996 national assessment. You will see (by looking at the KEEP variable) that we modeled formaldehyde, acetaldehyde, propionaldehyde, and acrolein in this assessment.

The treatment of secondary HAP formation in EMS-HAP is based on the analytical framework developed in EPA's CEP.[27] The approach makes use of pollutant decay calculations performed in ASPEN. Each precursor species is modeled in ASPEN with and without reactive decay. The difference between the precursor concentrations modeled with no decay and with reactive decay reflects the amount of the precursor species converted to secondary pollutants and other products, such as carbon dioxide. Because any given pollutant may transform into a number of other species, some of which are HAPs and some of which are not, a molar yield factor is applied to the difference to account for the typical HAP yield when a molecule of precursor degrades. Because of the proportional relationship between emissions and modeled concentrations, the molar yield factor, adjusted by a molecular weight factor to convert from moles to mass, can be applied to precursor mass emissions in EMS-HAP.

We can also apply a reaction rate factor to adjust the reactivities of species which are precursors to the same HAP to the same reactivity class. This allows us to group a large number of species that are precursors to the same HAP into a single precursor group. We developed the precursor HAP table to perform this grouping process for all precursors except for phosgene and acrolein, since they do not have a large number of precursors. Note that in Table D-10 the reaction rate factor for these species is 1.

Table D-10 shows the molar yield factor, the molecular weight adjustment factor and the reaction rate factor for each species. The molar yields and reaction rates were those used in the CEP.[27] The overall scaling factor (the three factors multiplied together) is the FACTOR variable in the precursor HAP table.

Table D-10. Scaling Factors for HAP Precursors

HAP	Precursors	Molar yield	Reaction rate factor	Molecular weight factor	Overall scaling factor
Formaldehyde	Ethene	1.6	0.3	1.07	0.51
	Propene	1	1	0.71	0.71
	1-butene	1	1	0.54	0.54
	1-pentene	1	1	0.43	0.43
	1-hexene	1	1	0.36	0.36
	1-heptene	1	1	0.31	0.31
	1-octene	1	1	0.27	0.27
	1-nonene	1	1	0.24	0.24
	1-decene	1	1	0.21	0.21
	Isobutene (or 2-methylpropene)	1	1.6	0.54	0.86
	2-methyl-1-butene	1	1.6	0.43	0.69
	1,3-butadiene	1	2	0.56	1.11
	3-methyl-1-butene	1	1	0.43	0.43
	3-methyl-1-pentene	1	1	0.36	0.36
	2,3-dimethyl-1-butene	1	1.6	0.36	0.57
	Isoprene	0.67	3	0.44	0.89
	2-ethyl-1-butene	1	1.6	0.36	0.57
	2-methyl-1-pentene	1	1.6	0.36	0.57
	4-methyl-1-pentene	1	1	0.36	0.36
	2,4,4-trimethyl-1-pentene	1	1.6	0.27	0.43
	Acetaldehyde	1	0.5	0.68	0.34
	Methyl-t-butyl ether	0.42	0.1	0.34	0.01
	Methanol	1	0.03	0.94	0.03
Acetaldehyde	Propene	1	0.5	1.05	0.52
	2-butene	2	1	0.79	1.57
	2-pentene	1	1	0.63	0.63
	2-hexene	1	1	0.52	0.52
	2-heptene	1	1	0.45	0.45
	2-octene	1	1	0.39	0.39
	2-nonene	1	1	0.63	0.63
	2-methyl-2-butene	1	1.5	0.63	0.94
	3-methyl-2-pentene	1	1.5	0.52	0.79
	4-methyl-2-pentene	1	1	0.52	0.52
	Ethanol	1	0.05	0.96	0.05
Propionaldehyde	1-butene	1	0.5	1.04	0.52
	2-pentene	1	1	0.83	0.83
	3-hexene	2	1	0.69	1.38
Methyl ethyl ketone	2-methyl-1-butene	1	1	0.86	0.86
	Butane	1	0.03	1.03	0.03
	Isopentane	1	0.03	0.83	0.03
	3-methylpentane	1	0.03	0.71	0.02
Acrolein	1,3-butadiene	1	1	1.04	1.04
Cresol	Toluene	1	1	1.20	1.20
Phosgene	Methylene chloride	1	1	1.16	1.16
	Trichloroethylene	1	1	0.83	0.83
	Tetrachloroethylene	1	1	0.64	0.64
	Vinylidene chloride	1	1	1.02	1.02

The structure of the precursor HAP table used in processing both point and area precursor inventories is the same as the point and area HAP table discussed in Section D.5 and in Section 4.2.3. A full listing of the precursor HAP table is provided in Appendix A, Table 2. The precursor HAP table includes two sets of records for each precursor to be modeled. One set reflects the reactivity class that is appropriate to the precursor, and the other reflects the reactivity class of 1 (non-reactive or inert). The only exception to this is the precursor for acrolein, which is 1,3 butadiene. Because 1,3 butadiene is already in the HAP tables for the direct emissions of HAPs, the precursor HAP table contains only non-reactive 1,3 butadiene.

Note that the reactive and non-reactive precursor species have separate SAROAD codes. For example, for formaldehyde precursor there is a set of records for formaldehyde precursor reactive (reactivity class 6, SAROAD=80180), and a set for formaldehyde precursor, inert (reactivity class 1, SAROAD=80303). The number of records in the set depends on how many specific VOCs or HAPs having the same reactivity class are involved in the formation of the HAP. For formaldehyde precursor, for example, there are twenty-two species. As stated earlier, the FACTOR variable for each species was set to the overall scaling factor in Table D-10.

Where one pollutant is a precursor of two HAPs, as in the case of 1-butene (which is a precursor of formaldehyde and propionaldehyde), four records are needed in HAP table, two for each HAP that the precursor produces.

D.7 How We Developed the Temporal Allocation Factors File (taff_hourly.txt)

EMS-HAP uses the same ancillary input file, taff_hourly.txt, to temporally allocate point, area and mobile sources. This file contains temporal allocation factors (TAFs) that provide the hourly variation of emissions in an annually-averaged day based on the source category. Local time zones are used. For each source category, there are 24 TAFs; each TAF represents an activity level for each hour in the day. These activities sum to 1. In developing the temporal profiles for EMS-HAP, we reviewed available temporal allocation data developed under previous modeling efforts. These included:

- A temporal allocation database maintained by EPA's Office of Research and Development (ORD). This database was originally developed for regional emission modeling studies under the National Acid Precipitation Assessment Program (NAPAP),[28] and was updated to improve allocation factors for point sources in 1995.[29]

- Temporal allocation profiles used in EMS-95 for regional and local ozone modeling.[30]

C Temporal allocation profiles used in the emission processing system (EPS) for the Urban Airshed Model (UAM) of ozone.[31] These factors were also used in the CEP.

We used the database developed by ORD as a starting point, because it is the most complete database and its development is documented in an EPA report.[28]

We made some changes and additions to the data as follows:

1. The ORD temporal database actually contains hourly temporal allocation factors for specific seasons and day-of-week classes (weekday, Saturday, and Sunday). In the EMS-HAP TAF file, we consolidated the seasonal and day-of-week information to produce a set of factors that reflect hourly emissions activity on an *annual average.* To do this, we averaged the hourly activity factors for different days and seasons, weighted by weekly and seasonal activity patterns. Equation D-1 was used:

$$HF_n = 13 \times \sum_{i=1-4} [(WHF_{n/i} \times WDF_i \times 5) + (SaHF_{n/i} \times SaDF_i) + (SuHF_{n/i} \times SuDF_i)] \times SF_i$$

where (eq. D-1)

HF_n =	*average* fraction of daily emissions occurring in hour "n"
subscript i	ranges from 1 to 4, denoting the season
$WHF_{n/i}$ =	fraction of daily emissions in hour "n" on *weekdays* in season "i"
WDF_i =	fraction of emissions in season "i" occurring on a typical weekday
$SaHF_{n/i}$ =	fraction of daily emissions in hour "n" on *Saturdays* in season "i"
$SaDF_i$ =	fraction of emissions in season "i" occurring on a typical Saturday
$SuHF_{n/i}$ =	fraction of daily emissions in hour "n" on *Sundays* in season "i"
$SuDF_i$ =	fraction of emissions in season "i" occurring on a typical Sunday
SF_i =	fraction of annual emissions occurring in season "i"
5 =	5 weekdays per week
13 =	13 weeks per average season

2. For highway gasoline vehicles, the NTI emissions inventory provides aggregated emissions estimates for the entire category, while the ORD database treats different road classes separately. In order to handle the aggregated highway vehicle category in the NTI, we developed a composite temporal profile by taking the average of three separate ORD profiles for rural, urban, and interstate roadways. The following equation was used:

$$HF_{n/composite} = (HF_{n\,/\,interstate} + HF_{n\,/\,urban} + HF_{n\,/\,rural}) / 3 \qquad \text{(eq. D-2)}$$

where

n = hour of the day

HF_n = fraction of daily emissions occurring in hour n

3. Light duty diesel vehicles were not specifically addressed in the ORD temporal database. We assumed that they have a similar profile to heavy-duty diesels. (A second option would have been to use the gasoline vehicle profile. However, the diesel and gasoline profiles were believed to be fundamentally different because of increased evaporative emissions from gasoline vehicles in the afternoon.)

4. EPA's Office of Transportation and Air Quality (OTAQ) provided new information that we used to develop a new temporal profile for commercial aircraft landings and takeoffs.[32]

5. For source categories in the emissions inventories processed which are not in the ORD database, but were in the speciated NET inventory, we assigned profiles from similar categories. Table D-11 shows the new profiles we assigned. Note that we chose not to assign a profile for Industrial Equipment, Other Oil Field Equipment. As a result, AMProc assigned this source category a uniform temporal profile (the default).

All highway and nonroad profiles were reviewed with OTAQ prior to the selection of temporal profiles for EMS-HAP. A few of the area and all of the mobile source profiles selected for EMS-HAP are summarized in Tables D-12 and D-13 respectively. Figure D-1 shows the ORD temporal profiles for the three separate roadway classes, and the composite profile developed for gasoline highway vehicles in EMS-HAP. Figure D-2 shows temporal profiles used in EMS-HAP for diesel highway vehicles and nonroad vehicles.

Table D-11. Additions to the ORD Temporal Profile Database

New AMS code	Description	Existing AMS w/ TAF	Existing Description
2260004016	2-stroke, Lawn and Garden Equipment, Rotary Tillers < 6 HP (Commercial)	2260004015	(Commercial)
2260004021	2-stroke, Lawn and Garden Equipment, Chain Saws < 6 HP (Commercial)	2260004020	(Commercial)
2260004026	2-stroke, Lawn and Garden Equipment,Trimmers/Edgers/Brush Cutters (Commercial)	2260004025	(Commercial)
2260004031	2-stroke, Lawn and Garden Equipment, Leafblowers/Vacuums (Commercial)	2260004030	(Commercial)
2260004071	2-stroke, Lawn and Garden Equipment, Turf Equipment (Commercial)	2260004070	(Commercial)
2265003070	4-stroke, industrial equipment, (AC/Refrigerator)	2265003060	(Terminal Tractors)
2265004011	4-stroke, lawn & garden equipment, Lawn Mowers (Commercial)	2265004010	(Commercial)
2265004016	4-stroke, lawn & garden equipment, Rotary Tillers < 6 HP (Commercial)	2265004015	(Commercial)
2265004026	4-stroke, lawn & garden equipment, Trimmers/Edgers/Brush Cutters (Commercial)	2265004025	(Commercial)
2265004031	4-stroke, lawn & garden equipment Leafblowers/Vacuums (Commercial)	2265004030	(Commercial)
2265004041	4-stroke, lawn & garden equipment, Rear Engine Riding Mowers (Commercial)	2265004040	(Commercial)
2265004046	4-stroke, lawn & garden equipment, Front Mowers (Commercial)	2265004045	(Commercial)
2265004051	4-stroke, lawn & garden equipment, Shredders < 6 HP (Commercial)	2265004050	(Commercial)
2265004056	4-stroke, lawn & garden equipment, Lawn and Garden Tractors (Commercial)	2265004055	(Commercial)
2265004066	4-stroke, lawn & garden equipment, Chippers/Stump Grinders (Commercial)	2265004065	(Commercial)
2265004071	4-stroke, lawn & garden equipment, Turf Equipment (Commercial)	2265004070	(Commercial)
2265004076	4-stroke, lawn & garden equipment, Other Lawn and Garden Equipment (Commercial)	2265004075	(Commercial)
2265005060	4-Stroke, Farm Equipment (Irrigation Sets)	2265005050	(Hydro-power Units)
2265010010	4-stroke, industrial equipment, other oil field equipment	No data on this AMS code added to database	
2270003070	industrial equipment (AC/Refrigeration)	2270003060	(Terminal Tractors)
2270004036	lawn & garden equipment, Snowblowers (Commercial)	2270004035	(Commercial)
2270004041	lawn & garden equipment, Rear Engine Riding Mowers (Commercial)	2270004040	(Commercial)
2270004046	lawn & garden equipment, Front Mowers (Commercial)	2270004045	(Commercial)
2270004056	lawn & garden equipment, Lawn and Garden Tractors (Commercial)	2270004055	(Commercial)
2270004066	lawn & garden equipment, Chippers/Stump Grinders (Commercial)	2270004065	(Commercial)
2270004071	lawn & garden equipment, Turf Equipment (Commercial)	2270004070	(Commercial)
2270005060	Agricultural equipment (Other Agricultural Equipment)	2270005055	(Irrigation Sets)
2270010010	Industrial Equipment, Other Oil Field Equipment	No data on this AMS code added to database	

Table D-12. Temporal Allocation of Some Area Source Categories in EMS-HAP

NTI Area Source Category	AMS code	EMS-95 Hourly Profile		CEP Hourly Profile		NAPAP Temporal Profile	EMS-HAP
		Code	Brief description	Code	Brief description		
Instl/Comm. Heating: Distillate Oil	21-03-004	25	8-hour day, with ramped beginning and end	37	very low 3-6a, moderate 6-9a and 6-9p, peak 9a-6p	~2.5%/hr 11pm-7am, 5.5%/hr 7am-4pm, 4.4%/hr 4-11pm	NAPAP
Instl/Comm. Heating: Residual Oil	21-03-005						
Instl/Comm. Heating: Natural Gas	21-03-006						
Residential Heating: Anthracite Coal	21-04-001	25	see above	33	bimodal - morning/evening	Roughly sinusoidal, peaking at ~6.3%/hr at 6am, lowest at ~2%/hr at 5pm	NAPAP
Residential Heat.: Bituminous/Lignite	21-04-002						
Residential Heating: Distillate Oil	21-04-004						
Residential Heating: Natural Gas	21-04-006						
Res. Heat.: Wood/Wood Residue	21-04-008						
Surface Coatings: Architectural	24-01-001	25	see above	12	flat 6a to 6p	flat 6a-8p, 0 at night	NAPAP
Autobody Refinishing Painting	24-01-005	25	see above	12	see above	flat 7a-4p, 0 at night	NAPAP
Surface Coatings: Traffic Markings	24-01-008	25	see above	12	see above	uniform 24 hours	NAPAP
Industrial Maintenance Coatings	24-01-100	25	see above	16	low 6-9a, high 9a-midnight	~6.9%/hr 7am-6pm, ~1.9%/hr at night	NAPAP
Dry Cleaning (Petroleum Solvent)	24-20-000	25	see above	16	see above	flat 7a-6p, 0 at night	NAPAP
Asphalt Paving: Cutback Asphalt	24-61-021	25	see above	12	see above	same as industrial maintenance coatings	NAPAP
Pesticide Application	24-61-000	25	see above	40	3a-6p, peak 6a-noon		NAPAP
Consumer Products Usage	24-60-000	25	see above	16	see above		NAPAP
Aviation Gas Distribution: Stage I&II	25-61-000	24	uniform 24-hour	24	uniform 24-hour	uniform 24-hour	NAPAP
Gasoline Distribution Stage II	25-01-060-100	na	na	na	na	na	16 hour day
Open Burning: Scrap Tires	28-30-000	25	see above	54	6a-midnight, peak 9a-9p	flat 5a-8p, 0 at night	NAPAP
Landfills, all types	26-20-000	24	uniform 24-hour	54	see above	uniform 24-hour	NAPAP
Structure Fires	28-10-030	24	uniform 24-hour	24	uniform 24-hour	uniform 24-hour	NAPAP
Hospital Sterilizers	28-50-000-100	25	see above	na	na	uniform 24-hour	NAPAP
Human Cremation	na	na	na	na	na	na	8 hour day
Animal Cremation	na	na	na	na	na	na	8 hour day
Food & Agricultural: Cotton Ginning	na	na	na	na	na	na	8 hour day

na - not available

Table D-13. Temporal Allocation of Mobile Source Categories in EMS-HAP

NTI Mobile Source Category	Subcategories, where applicable[a]	AMS code	EMS-95 Hourly Profile		CEP Hourly Profile		NAPAP Temporal Allocation File	EMS-HAP
			Code	Description	Code	Description		
Light Duty Gasoline Vehicles (LDGV)		A2201001	not appl.	VMT and emission factor both undergo allocation, with the combined result reflected in the final emission file	not appl.	Exhaust and evaporative are allocated separately	Composite of evaporative and exhaust (varies depending on road-type)	Average of the NAPAP composite profiles for various road-types
Light Duty Gasoline Trucks (LDGT)		A2201060						
Heavy Duty Gasoline Vehicles (HDGV)		A2201070						
Motorcycles (MC)		A2201080						
Light Duty Diesel Vehicles (LDDV)		A2230001					not addressed	NAPAP HDDV profile
Light Duty Diesel Trucks (LDDT)		A2230060					not addressed	same as above
Heavy Duty Diesel Vehicles (HDDV)		A2230070					Near uniform 6am-6pm, with break at noon, low at night	same as above
All Off-highway Vehicle: Gasoline, 2-Stroke	All	A2260000	25	8-hour day, with ramped start and end	See detailed list below		Ramps up 6-9am, uniform from 9-am-6pm	NAPAP profile
	Recreational	A2260001			37	very low 3-6am, moderate 6-9am & 6-9pm, peak 9am-6pm		
	Construction	A2260002			61	24 hours, higher activity 6-9am & 6-9pm, highest 6am-6pm		
	Industrial	A2260003			62	Similar to profile 61, less pronounced peak		
	Lawn & garden	A2260004			63	Highest 9am-6pm, less 6-9pm		
	Farm equipment	A2260005			64	Highest 9am-9pm, less 6-9am, very little 9pm-midnight		
	Light commercial	A2260006			24	Uniform 24 hours		
	Logging	A2260007			63	Highest 9am-6pm, less 6-9pm		

	Airport service	A2260008			24	Uniform 24 hours		

Table D-13. Temporal Allocation of Mobile Source Categories in EMS-HAP (continued)

NTI Mobile Source Category	Subcategories, where applicable[b]	AMS code	EMS-95 Hourly Profile		CEP Hourly Profile		NAPAP Temporal Allocation File	EMS-HAP
			Code	Description	Code	Description		
All Off-highway Vehicle: Gasoline, 4-Stroke	Same as for 2-stroke engines	A2265000	25	See above	Same as for 2-stroke engines		Same as for 2-stroke engines	Same as above
All Off-highway Vehicle: Diesel	Same as for 2-stroke engines	A2270000	25	See above	Same as for 2-stroke engines		High activity 6am-6pm, low activity 6pm-midnight	NAPAP profile
All Aircraft Types and Operations		A2275000	25	See above	24	Uniform 24 hours	Varies depending on aircraft type, commercial is uniformly high 6am-midnight with very low activity midnight-6am	Newly derived profile based on take-off and landing data on major airports
Marine Vessels, Commercial		A2280	24	Uniform 24 hours	not appl.	CEP included pleasure craft, only	Varies depending on fuel, diesel is uniformly high 6am-6pm, dropping to 1/3 that level from 6pm-6am	NAPAP diesel profile
Railroads-Diesel		A2285002	20	Uniform 3am-11pm	65	Similar to profile 62, less pronounced peak	Roughly the same as diesel ships	NAPAP profile

[a]For some of the NTI emission categories, the temporal allocation factors used in EMS-95 and the CEP varied among different subcategories. Where this occurs, the subcategories are listed individually.

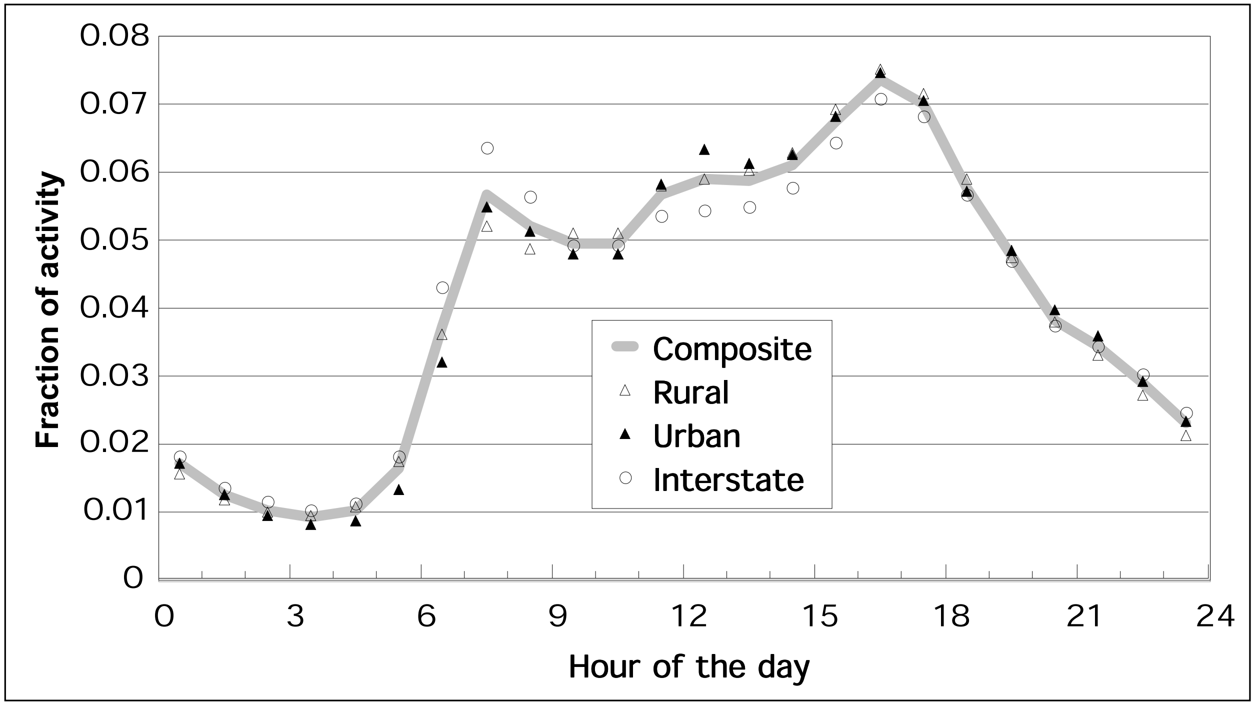

Figure D-1. Composite temporal emission profile for on-road motor vehicles

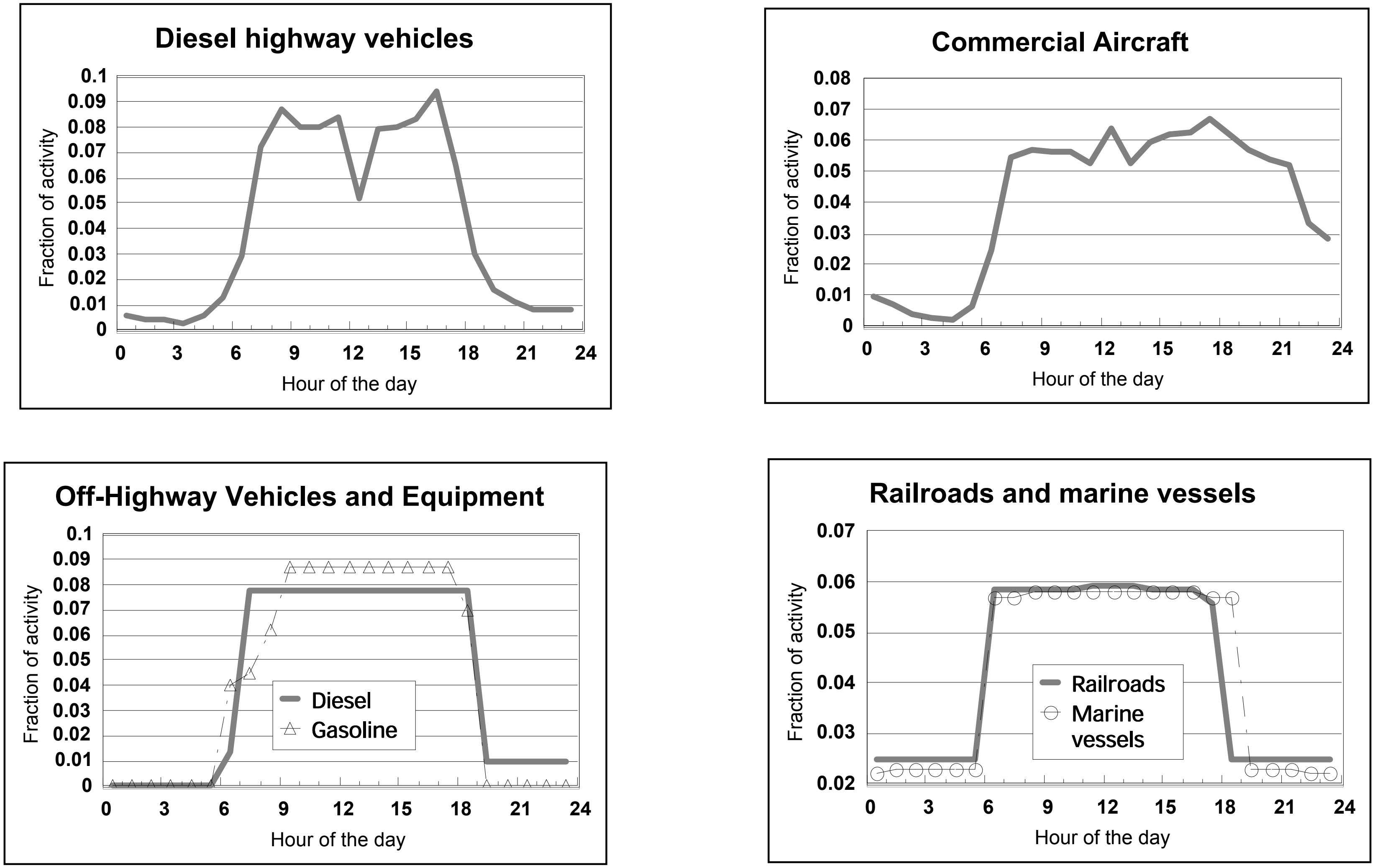

Figure D-2. Temporal profiles for diesel highway vehicles and non-road engines

D.8 How We Assigned Spatial Surrogates for Area and Mobile Source Categories

This section discusses how we selected spatial surrogates. We selected from the list of available surrogates presented in 8.1.1 and again in Table D-17. We discuss the availability of surrogate data in D.10. This section discusses our selections within the available choices.

As discussed in Chapters 8 and 10, EMS-HAP uses four files for spatial surrogate assignment. In addition to the three cross-reference files, scc2ams.txt, sic2ams.txt and mact2scc.txt, EMS-HAP uses a file named surrxref.text, which links AMS codes to surrogate assignments. For mobile sources, this is the only file used to assign surrogates. For area sources, surrxref.txt is used only when a surrogate was not already assigned by MACT, SIC, or SCC codes. (AMS is at the bottom of the assignment hierarchy for area sources.)

To select spatial surrogates for the various emission categories in the area source component of the 1996 NTI, we drew on spatial surrogate assignments used in previous modeling efforts. In particular, we reviewed the assignments used in the CEP and in the EMS-95 emission modeling system. The assignments used in CEP are generally the same as those used in the Emission Processing System (EPS) for the Urban Airshed Model (UAM-V). EMS-95 is also used with UAM-V, and has been used extensively in regional ozone modeling. We also examined the development of the area source estimates in the 1996 NTI. Where they included county-level estimates allocated from national and state level estimates, we examined the methodology used to allocate to the county level. In addition, we drew upon our own judgement.

For mobile source emissions categories, we obtained recommendations on spatial allocation from EPA's Office of Transportation and Air Quality (OTAQ).

Table D-14 compares the spatial surrogates used in EMS-HAP, the CEP, and EMS-95 for some of the area source categories in the NTI. Table D-15 shows the surrogates we chose for all of the area sources in the 1996 NTI, and the code by which they were matched to surrogates. Table D-16 shows the surrogates we chose for the sources in the 1996 diesel PM inventory. Table D-17 compares spatial surrogates used in EMS-HAP, the CEP, and EMS-95 for onroad and nonroad mobile source categories in the 1996 NTI.

Table D-14. Spatial Allocation of Some Area Source Categories in EMS-HAP as Compared to Other Emission Models

NTI Area Source Category	AMS code	EMS-95 Spatial Profile		CEP Spatial Profile		EMS-HAP	
		Code	Description	Code	Description	Code	
Institutional/Commercial Heating: Distillate Oil Combustion	21-03-004	8	Population	2	Commercial land	2	Commercial land
Institutional/Commercial Heating:: Residual Oil Combustion	21-03-005	8	Population	2	Commercial land	2	Commercial land
Institutional/Commercial Heating:: Natural Gas Combustion	21-03-006	8	Population	2	Commercial land	2	Commercial land
Residential Heating: Anthracite Coal	21-04-001	4	Housing	20	Population	20	Population
Residential Heating: Bituminous and Lignite Coal	21-04-002	4	Housing	20	Population	20	Population
Residential Heating: Distillate Oil	21-04-004	4	Housing	20	Population	20	Population
Residential Heating: Natural Gas	21-04-006	4	Housing	20	Population	20	Population
Residential Heating: Wood/Wood Residue	21-04-008	8	Population	20	Population	20	Population
Surface Coatings: Architectural	24-01-001	8	Population	20	Population	20	Population
Surface Coatings: Traffic Markings	24-01-008	8	Population	3	Industrial land	22	Roadway miles
Industrial Maintenance Coatings	24-01-100	8	Population	3	Industrial land	3	Industrial land
Dry Cleaning (Petroleum Solvent)	24-20-000	8	Population	3	Industrial land	20	Population
Asphalt Paving: Cutback Asphalt	24-61-021	8	Population	22	All roadways	22	Roadway miles
Consumer Products Usage	24-60-000	8	Population	20	Population	20	Population
Aviation Gasoline Distribution: Stage I & II	25-61-000	8	Population	22	Roadway miles	20	Population
Gasoline Distribution Stage II	25-01-060	na	na	na	na	20	Population
Open Burning: Scrap Tires	28-30-000	5	Inverse housing	19	Inverse population density	19	Inverse population density
Landfills, all types	26-20-000	5	Inverse housing or Population	19	Inverse population density	19	Inverse population density
Structure Fires	28-10-030	4	Housing	20	Population	20	Population
Hospital Sterilizers	28-50-000	8	Population	na	na	2	Commercial land
Human Cremation	na	na	na	na	na	2	Commercial land
Animal Cremation	na	na	na	na	na	19	Inverse population density
Food and Agricultural Products: Cotton Ginning	na	na	na	na	na	7	Farmland

na = not available

Table D-15. Surrogates Used for Spatial Allocation of the 1996 NTI Area Source Inventory

Surrogate name (and code)	Definition	Emissions inventory categories
Population (20)	U.S. Census category: 1990 residential population	Business Services (SIC), Consumer Products Usage (AMS), Fuel Use (AMS), Grocery Stores (SIC), Investors (SIC), Lamp Breakage (AMS), Paper Hanging (SIC), Perchloroethylene Dry Cleaning (AMS), Residential Heating (AMS), Structure Fires (AMS), Surface Coatings: Architectural (AMS), Swimming Pools (AMS), Water Supply (SIC)
Residential land (1)	USGS land use categories: Residential, plus one-third of mixed urban and built-up land plus one-third of other urban and built-up land	Residential Open Burning (AMS)
Inverse population density (18)	Inverse of: census tract population (category 20) divided by census tract area. Tracts with zero population assigned a SAF of zero.	Construction (AMS)
Inverse population density (19)	Inverse of: census tract population (category 20) divided by census tract area. Tracts with zero population assigned tract population of one.	Air and Water Resource and Solid Waste Mgmt. (SIC), Correctional Institutions (SIC), Crude Petroleum and Natural Gas (SIC), Geothermal Power (SCC), Hazardous TSDF (SCC), Hazardous Waste Incineration (SCC), Institutional/Commercial Heating: POTW Gas (AMS), Landfills (excluding Gas Flares) (AMS), Medical Waste Incineration (SCC), Municipal Landfills (AMS), Municipal Waste Combustors (MACT), Oil and Natural Gas Production (MACT), Open Burning: Scrap Tires (AMS), Publicly Owned Treatment Works (POTWs) (AMS), Refuse Systems (SIC), Sewerage Systems (AMS), Space Research and Technology (SIC), Treatment, Storage, Disposal Facilities (AMS),
Roadway miles (22)	Total miles of all roadway types in each census tract, as reported in TIGER/Line	Asphalt Paving: Cutback and Emulsified (AMS), Motor Vehicle Fires (AMS), Surface Coatings: Traffic Markings (AMS)
Farm land (7)	USGS land use category: cropland and pasture	Food and Agricultural Products: Cotton Gin (SCC)
Farmland plus orchard land (29)	USGS land use categories: cropland and pasture, plus orchards, groves, vineyards, nurseries, and ornamental horticultural areas	Agricultural Field Burning: Open, propane, (AMS), Agricultural Production (AMS), Paved Road Dust (AMS), Pesticide Application (AMS), Soil Dust (AMS), Unpaved Road Dust (AMS)
Forest land (13)	USGS land use categories: deciduous forest plus evergreen forest plus mixed forest land	Open Burning: Forest and Wildfires (AMS), Open Burning: Prescribed Burnings (AMS)
Utility land (4)	USGS land use category: transportation, communications, and utilities	Aviation Gas Distribution (AMS)
Commercial land plus industrial land (6)	Sum of commercial land and industrial land, as defined below	Blankbooks and Looseleaf Binders (SIC), Book Printing (SIC), Bookbinding And Related Work (SIC), Cold Cleaning (Misc.) (AMS), Commercial Printing (SIC), Commercial Sterilization Facilities (MACT), Graphic Arts (AMS), Halogenated Solvent Cleaners (SCC), Jewelers' Materials & Lapidary Work (SIC), Non-halogenated solvent cleaning (AMS), Paint Stripping Operations (SCC), Platemaking Services (SIC), Printing/Publishing (Surface Coating) (SCC), Roasted Coffee (SIC), Stationary Internal Combustion Engines - D (MACT)
Commercial land (2)	USGS land use categories: Commercial and services, plus one-half of industrial and commercial complexes, plus one-third of mixed urban and built-up land plus one-third of other urban and built-up land	Animal Cremation (SCC), Autobody Refinishing Paint Application (AMS), Commercial Physical Research (SIC), Commercial: Asphalt Roofing (AMS), Dental Equipment and Supplies (SIC), Dental Preparation and Use (SCC), Dry Cleaning (Petroleum Solvent) (SCC), Engineering Services (SIC), Gas Dispensing (MACT), Gasoline Distribution Stage I (MACT), Gasoline Distribution Stage II (AMS), Gasoline Trucks in Transit (SIC), General Laboratory Activities (SCC), Hospital Sterilizers (AMS), Human Cremation (SCC), Institutional/Commercial Heating (AMS), National Security (SIC), Noncommercial Research Organizations (SIC), Top & Body Repair & Paint Shops (SIC)

Table D-15. Surrogates Used for Spatial Allocation of the 1996 NTI Area Source Inventory (continued)

Surrogate name (and code)	Definition	Emissions inventory categories
Industrial land (3)	USGS land use categories: industrial, plus one-half of industrial and commercial complexes, plus one-third of mixed urban and built-up land, plus one-third of other urban and built-up land	Adhesives and Sealants (SIC), Aerospace Industries (AMS), Agricultural Chemicals and Pesticides (SIC), Air and Gas Compressors (SIC), Alkalies And Chlorine (SIC), Aluminum (SIC), Analytical Instruments (SIC), Animal And Marine Fats And Oils (SIC), Apparel and Accessories (SIC), Appliances & Heat Equipment Coating (SIC), Architectural Metal Work (SIC), Asbestos Products Mfg. (SIC), Asphalt Concrete Mfg. (SCC), Asphalt Roofing Mfg. (SCC), Automatic Vending Machines (SIC), Automotive and Apparel Trimmings (SIC), Automotive stampings (SIC), Ball and Roller Bearings Mfg. (SIC), Beet Sugar (SIC), Biological Products (SIC), Blowers and Fans (SIC), Boat Building and Repairing (SIC), Boat Mfg. (SCC), Bolts, Nuts, Rivets and Washers (SIC), Bottled and Canned Soft Drinks (SIC), Brass, Bronze, Copper, Copper Base Alloy (SIC), Brick and Structural Clay Tile (SIC), Brooms and Brushes (SIC), Building Paper and Building Board Mills (SIC), Burial Caskets (SIC), Cane Sugar Refining (SIC), Canned Fruits and Vegetables (SIC), Carbon Black (SIC), Carbon and Graphite Products (SIC), Carburetors, Pistons, Rings and Valves Mfg. (SIC), Cathode Ray Television Picture Tubes Mfg. (SIC), Cement, Hydraulic (SIC), Ceramic Wall and Floor Tile Mfg. (SIC), Cereal Breakfast Foods (SIC), Cheese, Natural and Processed (SIC), Chemical Preparations (SIC), Chemicals and Allied Products (SIC), Chocolate And Cocoa Products (SIC), Chromium Metal Plating (AMS), Cigarettes (SIC), Clay Refractories (not subject to Refracto (SIC), Cold Finishing of Steel Shapes (SIC), Commercial Laundry Equipment (SIC), Commercial Lighting Fixtures (SIC), Communications Equipment (SIC), Concrete, Gypsum, And Plaster Products (SIC), Condensed and Evaporated milk (SIC), Construction Machinery Mfg. (SIC), Conveyors and Conveying Equipment Mfg. (SIC), Copper Foundries (SIC), Copper Rolling and Drawing (SIC), Cultured Marble Mfg. (AMS), Custom Compound Purchased Resins (SIC), Cutlery (SIC), Cut Stone and Stone Products (SIC), Cutlery (SIC), Cyclic Crude and Intermediate Production (SIC), Dehydrated Fruits, Vegetables, and Soups (SIC), Diagnostic Substances (SIC), Distilled and Blended Liquors Production (SIC), Drapery Hardware and Blinds and Shades (SIC), Edible Fats and Oils (SIC), Electric Lamps (SIC), Electrical Equipment and Supplies (SIC), Electrical Housewares and Fans (SIC), Electrical Industrial Apparatus (SIC), Cyanide Chemicals Production (AMS), Dehydrated Fruits, Vegetables, and Soups (SIC), Diagnostic Substances (SIC), Distilled and Blended Liquors Production (SIC), Dog and Cat Food (SIC), Drapery Hardware and Blinds and Shades (SIC), Drum and Barrel Reclamation (AMS), Edible Fats and Oils (SIC), Electric Lamps (SIC), Electromedical Equipment Mfg. (SIC), Electrometallurgical Products Mfg. (SIC), Electronic & Other Electric Equipment (SIC), Elevators and Moving Stairways (SIC), Engine Electric Equipment (SIC), Environmental Controls Mfg. (SIC), Explosives & Blasting Agents (SIC), Extraction Solvent (AMS), Fabricated Metal Products Mfg. (SIC), Fabricated Pipe and Fittings (SIC), Fabricated Plate Work (Boiler Shops) (SIC), Fabricated Rubber Products (SIC), Fabricated Textile Products (SIC), Farm Machinery and Equipment Mfg. (SIC), Fasteners, Buttons, Needles, and Pins (SIC), Fertilizers, Mixing only (SIC), Fiber Cans, Drums, and Similar Products (SIC), Flat Glass (SIC), Flavoring Extracts and Syrups Production (SIC), Flexible Polyurethane Foam Fabrication (AMS), Flour and Other Grain Mill Products (SIC), Fluid Meters and Counting Devices (SIC),

Table D-15. Surrogates Used for Spatial Allocation of the 1996 NTI Area Source Inventory (continued)

Surrogate name (and code)	Definition	Emissions inventory categories
Industrial land (3)	USGS land use categories: industrial, plus one-half of industrial and commercial complexes, plus one-third of mixed urban and built-up land, plus one-third of other urban and built-up land	Fluid Power Pumps and Motors (SIC), Fluorescent Lamp Recycling (SCC), Food Preparations Production (SIC), Food Products Machinery Mfg. (SIC), Footwear Cut Stock (SIC), Friction Products (MACT), Frozen Specialties (SIC), Frozen fruits, Fruit Juices and Vegetables (SIC), Fumed Silica Production (SCC), Furniture and Fixtures Mfg. (SIC), Gaskets, Packing and Sealing Devices Mfg. (SIC), General Industrial Machinery Mfg. (SIC), Glass Containers (SIC), Gray and Ductile Iron Foundries (SIC), Gum and Wood Chemical Mfg. (SIC), Gypsum Products (SIC), Hand and Edge Tools Mfg. (SIC), Hard Chromium Electroplating (AMS), Hardware Mfg. (SIC), Hardwood (SIC), Hats, Caps, And Millinery (SIC), Heating Equipment, Except Electric (SIC), Hoists, Cranes, and Monorails (SIC), Hose and Belting and Gaskets and Packing (SIC), Household Equipment (SIC), Household Furniture (SIC), Hydrochloric Acid Production (AMS), Hydrogen Fluoride Production (AMS), Industrial Boilers (AMS), Industrial Gases Mfg. (SIC), Industrial Inorganic Chemicals (SIC), Industrial Machinery (SIC), Industrial Organic Chemicals Mfg. (SIC), Industrial Sand (SIC), Inorganic Pigments Mfg. (SIC), Instruments to Measure Electricity (SIC), Internal Combustion Engine Mfg. (SIC), Iron and Steel (SIC), Lawn and Garden Equipment (SIC), Lead Pencils, Art Goods Mfg. (SIC), Leather Tanning and Finishing (not subject (SIC), Lighting Equipment (SIC), Lime Mfg. (SIC), Lubricating Oils and Greases (SIC), Macaroni And Spaghetti (SIC), Machine Tools, Metal Forming Types (SIC), Magnetic and Optical Recording Media Mfg. (SIC), Malleable Iron Foundries (SIC), Malt Beverages (SIC), Mfg. Industries Mfg. (SIC), Marine Cargo Handling (SIC), Marking Devices (SIC), Measuring and Controlling Devices (SIC), Meat Packing Plants (SIC), Mechanical Rubber Goods Mfg. (SIC), Medical, Dental, and Hospital Equipment, S (SIC), Medicinals and Botanicals Mfg. (SIC), Men's Footwear, Except Athletic (SIC), Men's and Boys' Shirts (SIC), Metal Barrels, Drums, and Pails Mfg. (SIC), Metal Doors, Sash, and Trim (SIC), Metal Forgings and Stampings (SIC), Metal Heat Treating Mfg. (SIC), Metal Household Furniture (SIC), Metal Sanitary Ware Mfg. (SIC), Metal Stampings Mfg. (SIC), Metal Valves (SIC), Metal cans (3411) (SIC), Metal Cans (Surface Coating) (AMS), Metal coating and allied services (3479) (SIC), Metalworking Machinery (SIC), Millwork (SIC), Mineral Wool (SIC), Mineral Wool Mfg. (SCC), Minerals, Ground or Treated Production (SIC), Mining Machinery Mfg. (SIC), Misc. Fabricated Metal Products (SIC), Misc. Foods and Kindred Products (SIC), Misc. Mfg. (3990) (SIC), Misc. Mfg. Coating (SIC), Misc. Metal Work (SIC), Misc. Organic Chemical Processes (AMS), Misc. Plastics Products (SIC), Misc. Primary Metal Products (SIC), Mobile Homes (SIC), Motor and Generators Mfg. (SIC), Natural Gas Transmissions and Storage (AMS), Nitrogenous Fertilizers (SIC), Nonclay Refractories (SIC), Noncurrent-Carrying Wiring Devices (SIC), Nonferrous Metals (SIC) Nonmetallic Mineral Products Mfg. (SIC), Office Furniture, Except Wood (SIC), Oil and Gas Field Machinery Mfg. (SIC), Oil and Gas Support (SCC), On-Site Waste Incineration (AMS), Ophthalmic Goods (SIC), Optical Instruments and Lenses (SIC), Ordnance and Accessories Mfg. (SIC), Organic Fibers, Non-cellulosic (SIC), Paints, Coatings, and Adhesives (SIC), Paper Coating (AMS), Paper Industries Machinery (SIC), Paper Mills (SIC), Paper and Other Webs (Surface Coating) (AMS), Partitions and Fixtures, Except Wood (SIC), Pens and Mechanical Pencils (SIC), Petroleum Refining (SIC), Pharmaceutical Preparations Manufacturing (SIC), Pharmaceuticals Production (AMS), Phosphatic Fertilizers (SIC), Photographic Equipment and Supplies Manufa (SIC), Pickles, Sauces, And Salad Dressings (SIC), Plastic Parts and Products (Surface Coatin (AMS), Plastics Products (SIC), Plumbing Fixture Fittings and Trim (SIC), Plywood/Particle Board Manufacturing (SCC), Polishes and Sanitation Goods Manufacturin (SIC), Polysulfide Rubber Production (AMS), Polyvinyl Chloride and Copolymers (SCC), Porcelain Electrical Supplies (SIC), Pottery Products, nec (SIC), Poultry Slaughtering and Processing (SIC), Power Driven Handtools (SIC), Power Transmission Equipment (SIC), Pre-recorded Records and Tapes (SIC), Prefabricated Metal Buildings (SIC), Prefabricated Wood Buildings and Component (SIC), Prepared Feeds Manufacturing (SIC), Prepared Flour Mixes And Doughs (SIC), Pressed and Blown Glass and Glassware (SIC), Primary Aluminum Production (SCC), Primary Batteries (SIC), Primary Metal Products Manufacturing (SIC), Primary Nonferrous Metals Production (SIC), Printing Ink (SIC), Printing, Coating, and Dyeing of Fabrics (SCC), Printing Trades Machinery Manufacturing (SIC), Process Control Instruments (SIC), Products of Purchased Glass (SIC),

Table D-15. Surrogates Used for Spatial Allocation of the 1996 NTI Area Source Inventory (continued)

Surrogate name (and code)	Definition	Emissions inventory categories
Industrial land (3)	USGS land use categories: industrial, plus one-half of industrial and commercial complexes, plus one-third of mixed urban and built-up land, plus one-third of other urban and built-up land	Public Building and Related Furniture (SIC), Pulp mills (2611) (SIC), Pumps and Pumping Equipment Manufacturing (SIC), Radio and Television Communications Equip. (SIC), Railroad Equipment Manufacturing (SIC),Raw Cane Sugar (SIC), Reconstituted Wood Products (SIC), Refractories Manufacturing (MACT), Refrigeration and Heating Equipment (SIC), Reinforced Plastic Composites Production (AMS), Relays and Industrial Controls (SIC), Residential lighting fixtures (SIC), Rice Milling (SIC), Rolling Mill Machinery (SIC), Rubber and Plastic Footwear (SIC), Rubber and Plastic Hose and Belting (SIC),Sanitary Food Containers (SIC), Sausages And Other Prepared Meats (SIC), Saw Blades and Handsaws (SIC), Sawmills and Planing Mills, general (SIC), Scales and Balances, excluding Laboratory (SIC), Screw Machine Products Mfg. (SIC), Search and Navigation Equipment (SIC), Secondary Lead Smelting (SCC), Secondary Nonferrous Metals Production (SIC), Semiconductors and Related Devices (SIC), Service Industry Machinery (SIC), Sheet Metal Work (SIC), Ship Building And Repairing (SIC), Silverware and Plated Ware (SIC), Small Arms (SIC), Small Arms Ammunition (SIC), Soaps, Cleaners, and Toilet Goods (SIC), Softwood Drying Kilns (AMS), Softwood Veneer and Plywood (SIC), Soil and Groundwater Remediation (AMS), Special Dies, Tools, Jigs and Fixtures (SIC), Special Industry Machinery Mfg. (SIC), Speed Changers, Drives, and Gears (SIC), Spills, Dumping, MSW Handling (AMS), Stationary Turbines (MACT), Steel Pickling HCl Process (AMS), Steel Pipe and Tubes Mfg. (SIC), Steel Springs, Except Wire (SIC), Steel Wire and Related Products Mfg. (SIC), Storage Batteries Mfg. (SIC), Structural Wood Members (SIC), Surface Active Agents Mfg. (SIC), Surface Coatings: Industrial Maintenance (AMS), Surgical Appliances and Supplies (SIC), Switchgear and Switchboard Apparatus (SIC), Synthetic Rubber Mfg. (SIC), Taconite Iron Ore Processing (SCC), Tank Transit (AMS), Tanks and Tank Components Mfg. (SIC), Telephone and Telegraph Apparatus (SIC), Textile Machinery (SIC), Textile Products (AMS), Tire Cord and Fabric (SIC), Tires and Inner Tubes (SIC), Toilet Preparations Mfg. (SIC), Toys and Sporting Goods (SIC), Transformers, Except Electronic (SIC), Travel Trailers and Campers Mfg. (SIC), Turbines And Turbine Generator Sets (SIC), Typewriters Computer Storage Devices (SIC), Unsupported Plastics (SIC), Upholstered Household Furniture (SIC), Valves And Pipe Fittings (SIC), Vitreous China Table & Kitchenware (SIC), Vitreous Plumbing Fixtures (SIC), Waste Disposal: Open Burning (AMS), Welding Apparatus (SIC), Wet Corn Milling (SIC), Wire Springs (SIC), Women's Footwear, Except Athletic (SIC), Women's, Misses', and Juniors' Suits, Skir (SIC), Wood Preserving (SIC), Wood Products (SIC), Woodworking Machinery (SIC), X-ray Apparatus And Tubes (SIC)

Table D-16. Surrogates Used for Spatial Allocation of the 1996 Diesel PM Inventory

Surrogate name (and code)	Definition	Diesel PM inventory source categories
Industrial land (3)	USGS land use categories: industrial, plus one-half of industrial and commercial complexes, plus one-third of mixed urban and built-up land, plus one-third of other urban and built-up land	Industrial Equipment
Commercial land plus industrial land (6)	Sum of commercial land and industrial land, as defined below	Lawn and Garden Equipment, Commercial Equipment
Forest land (13)	USGS land use categories: deciduous forest plus evergreen forest plus mixed forest land	Logging Equipment
Water (15)	US Census category: water area	Commercial Marine Vessels, Pleasure Craft
Mining and quarry land (17)	USGS land use categories: strip mines, quarries, and gravel pits	Underground Mining Equipment
Inverse population density (18)	Inverse of: census tract population (category 20) divided by census tract area. Tracts with zero population assigned a SAF of zero.	Construction and Mining Equipment, Airport Ground Support Equipment
Railway miles (21)	Total railway miles, as reported in TIGER/Line	Railroads, Railway Maintenance
Roadway miles (22)	Total miles of all roadway types in each census tract, as reported in TIGER/Line	HDDV Rural Total: Interstate, Other Principal Arterial, Minor Arterial, Major Collector, Minor Collector, Local; HDDV Urban Total: Interstate, Other Freeways and Expressways, Other Principal Arterial, Minor Arterial, Collector, Local
25% Population & 75% roadway miles (25)	Surrogate based on population fraction and roadway mile fractions, respectively weighted by 25% and 75%, for each of four roadway types	LDDT & LDDV Rural Total: Interstate, Other Principal Arterial, Minor Arterial, Major Collector, Minor Collector, Local; LDDT & LDDV Urban Total: Interstate, Other Freeways and Expressways, Other Principal Arterial, Minor Arterial, Collector, Local
Tract area (26)	The area of census tracts (including land and water)	Recreational Equipment
Urban – Inverse population density Rural – farmland (27)	Inverse population density (18) for urban counties; farmland (7) for rural counties	All Off-highway Diesel
Sum of farmland and orchard land (29)	Sum of farmland and orchard land, as defined above	Agricultural Equipment

Table D-17. Spatial Allocation of Mobile Source Categories in EMS-HAP as Compared to Other Emission Models

NTI Mobile Source Category	Subcategories, where applicable[b]	AMS code	EMS-95 Spatial Profile		CEP Spatial Profile		EMS-HAP
			Code	Description	Code	Description	
Light Duty Gasoline Vehicles (LDGV)		A2201001	not appl.	Roadway links (vehicle-miles-traveled)	30	½ Roadway miles + ½ Population	(3/4) Roadway miles + (1/4) Population
Light Duty Gasoline Trucks (LDGT)		A2201060					(3/4) Roadway miles + (1/4) Population
Heavy Duty Gasoline Vehicles (HDGV)		A2201070					(3/4) Roadway miles + (1/4) Population
Motorcycles (MC)		A2201080					(3/4) Roadway miles + (1/4) Population
Light Duty Diesel Vehicles (LDDV)		A2230001					(3/4) Roadway miles + (1/4) Population
Light Duty Diesel Trucks (LDDT)		A2230060					(3/4) Roadway miles + (1/4) Population
Heavy Duty Diesel Vehicles (HDDV)		A2230070					Roadway miles
Nonroad: Gasoline, 2-stroke	All	A2260000	8	Population	19	Inverse population density	census tract area
	Recreational	A2260001	8	Population	19	Inverse population density	
	Construction	A2260002	8	Population	18	Inverse population density	
	Industrial	A2260003	8	Population	3	Industrial land	
	Lawn & garden	A2260004	4	Housing	1	Residential land	
	Light commercial	A2260006	8	Population	2	Commercial land	
	Logging	A2260007	6	1/Population	13	Forest land	
	Airport service	A2260008	2	Airports	19	Inverse population density	

Table D-17. Spatial Allocation of Mobile Source Categories in EMS-HAP as Compared to Other Emission Models (continued)

NTI Mobile Source Category	Subcategories, where applicable[a]	AMS code	EMS-95 Spatial Profile		CEP Spatial Profile		EMS-HAP
			Code	Description	Code	Description	
All Off-highway Vehicle: Gasoline, 4-Stroke	All	A2265000	8	Population	19	Inverse population density	Rural Counties: tract area Urban Counties: population
	Recreational	A2265001	8	Population	19	Inverse population density	
	Construction	A2265002	8	Population	18	Inverse population density	
	Industrial	A2265003	8	Population	3	Industrial land	
	Lawn & garden	A2265004	4	Housing	1	Residential land	
	Farm equipment	A2265005	8	Population	7	Crop land	
	Light commercial	A2265006	8	Population	2	Commercial land	
	Logging	A2265007	6	1/Population	13	Forest land	
	Airport service	A2265008	2	Airports	19	Inverse population density	
All Off-highway Vehicle: Diesel	All	A2270000	8	Population	19	Inverse population density	Rural Counties: farmland, as used in CEP Urban Counties: Inverse population density
	Recreational	A2270001	8	Population	19	Inverse population density	
	Construction	A2270002	8	Population	18	Inverse population density	
	Industrial	A2270003	8	Population	3	Industrial land	
	Lawn & garden	A2270004	4	Housing	1	Residential land	
	Farm equipment	A2270005	8	Population	7	Crop land	
	Light commercial	A2270006	8	Population	2	Commercial land	
	Logging	A2270007	6	1/Population	13	Forest land	
	Airport service	A2270008	2	Airports	19	Inverse population density	
All Aircraft Types and Operations		A2275000	2	Airports	18	Inverse population density	treat as point sources, located at major airports in each county
Marine Vessels, Commercial		A2280000	9	Ports	15	Water	Water
Railroads-Diesel		A2285002	10	Railroads	21	Railway miles	Railway miles

[a]For some of the NTI emission categories, the spatial allocation surrogates used in EMS-95 and the CEP varied among different subcategories. Where this occurs, the subcategories are listed individually.

D.9 How We Developed the Surrogate Assignment/ Temporal Allocation Cross-Reference Files (scc2ams.txt, sic2ams.txt, and mact2scc.txt)

EMS-HAP uses the above-mentioned cross-reference files for assigning spatial surrogates to area sources and for assigning temporal profiles to both point and area sources. They are not used for mobile source categories because these categories are indexed only by AMS codes which can be linked directly to spatial surrogate and temporal profile data. EMS-HAP uses these cross-reference files to assign temporal profiles for point source records when they don't have a standard 8-digit SCC, but rather have an alternative code such as a shortened SCC, SIC or MACT (see 5.1.1 for details). They are also used to assign temporal profiles (see 8.1.3) and spatial surrogates (see 8.1.2) for area sources when emissions are indexed by MACT, SIC or SCC codes.

The cross-reference file named scc2ams.txt links generic 1-digit, 3-digit, and 6-digit SCCs to the 8-digit SCC and 10-digit AMS codes used in the TAF file. It also contains a spatial surrogate assignment which is used to assign surrogates for area sources not having a MACT or SIC code (SCC follows the MACT and SIC codes in the hierarchy of spatial surrogate assignments). To produce this file, we reviewed the definition of the shortened SCC, as given in EPA's Factor Information Retrieval (FIRE) data base.[15] For area sources, we also reviewed the definition of the emission category in documentation for the 1996 NTI. We then selected the most appropriate 8-digit SCC to represent the category using SCC definitions from FIRE. We also used the SCC definitions to select the most appropriate spatial surrogate to represent the category (see D.8).

The cross-reference file named sic2ams.txt links SIC codes to SCC and AMS codes (sic2ams.txt). It also contains a spatial surrogate assignment which is used to assign surrogates for area sources with an SIC code but not having a MACT code (SIC follows the MACT code in the hierarchy of spatial surrogate assignments). To produce this file, we drew on detailed SIC definitions published by the Office of Management and Budget.[16] We also used the SIC definition to select the most appropriate spatial surrogate to represent the category (See D.8).

The cross-reference named mact2scc.txt links MACT codes to SCC and AMS codes (mact2scc.txt). It also contains a spatial surrogate assignment which is used to assign surrogates for area sources having this code. We produced this file by reviewing MACT category definitions from the EPA source category listing document. The MACT category definitions[17] were compared with SCC and AMS category definitions from FIRE. We also used the MACT category definition to select the most appropriate spatial allocation surrogate (see D.8).

D.10 How We Developed the Spatial Allocation Factors

The spatial allocation factors (SAFs) in EMS-HAP for allocating county level emissions to the census tract were primarily obtained from the developers of the CEP. They computed SAFs from tract-level land use and population data. We denote land use and population as "spatial surrogates." We assume that the spatial distribution of county-level emissions categories within a county's census tracts is proportional to the spatial distribution of these land use and population surrogates within the county's census tracts. The developers of the CEP used population data from the 1990 U.S. census (see www.census.gov),[33] roadway data from the 1990 Topologically Integrated Geographic Encoding and Referencing (TIGER®/Line) files[34] and land use data compiled by the United States Geological Survey between the middle of the 1970's through the middle of the 1980's.[35] They calculated SAFs from this data using the following equation:

$$SAF_{county, i, j} = A_{i, j} / A_{county, j} \quad \text{(eq. D-3)}$$

where

$SAF_{county, i, j}$ = the spatial allocation factor for surrogate j and census tract i within a county. (For any spatial surrogate, the values for all of the tracts in a given county will add to 1.0.)

$A_{i, j}$ = land use, population, or other activity data for surrogate j in tract i

$A_{county, j}$ = total land use, population, or other activity data for surrogate j in the county that contains tract i

Table D-18 shows the surrogates and corresponding sets of SAFs we developed for EMS-HAP. Note that we did not use all of the surrogates listed in the table for preparing the 1996 ASPEN-input files. We did not use SAF8, SAF9, SAF12, SAF14, SAF17 or SAF24. The assignment of surrogates to area and mobile source categories in the 1996 NTI is discussed in Section D.8.

As you can see, most of the SAFs developed for EMS-HAP came directly from the CEP. We did, however, make some changes to their SAFs. These changes are discussed below the table.

Table D-18. Spatial Allocation Factors Developed for EMS-HAP

Code for set of SAFs	Surrogate	Definition	Origin of Data	How we developed the set of SAFs
SAF1	Residential land	USGS land use categories: Residential, plus one-third of mixed urban and built-up land plus one-third of other urban and built-up land	mid-70's to 80's	from CEP[a,b]
SAF2	Commercial land	USGS land use categories: Commercial and services, plus one-half of industrial and commercial complexes, plus one-third of mixed urban and built-up land plus one-third of other urban and built-up land	mid-70's to 80's	from CEP[a,b]
SAF3	Industrial land	USGS land use categories: industrial, plus one-half of industrial and commercial complexes, plus one-third of mixed urban and built-up land, plus one-third of other urban and built-up land	mid-70's to 80's	from CEP[a,b]
SAF4	Utility land	USGS land use category: "transportation, communications, and utilities"	mid-70's to 80's	from CEP[a,b]
SAF6	Sum of commercial land and industrial land	Sum of commercial land and industrial land, as defined above	mid-70's to 80's	land use data from developers of CEP[a,b], SAF computed from equation D-3
SAF7	Farm land	USGS land use category: "cropland and pasture"	mid-70's to 80's	from CEP[a,b]
SAF8	Orchard land	USGS land use category: "orchards, groves, vineyards, nurseries, and ornamental horticultural areas"	mid-70's to 80's	from CEP[a,b]
SAF9	Confined feeding	USGS land use category "confined feeding"	mid-70's to 80's	from CEP[a,b]
SAF10	Farm land & confined feeding	USGS land use categories "cropland and pasture" plus "confined feeding"	mid-70's to 80's	from CEP[a,b]
SAF12	Rangeland	USGS land use categories: "herbaceous rangeland" plus "scrub and brush" plus "mixed rangeland"	mid-70's to 80's	from CEP[a,b]
SAF13	Forest land	USGS land use categories: "deciduous forest" plus "evergreen forest" plus "mixed forest land"	mid-70's to 80's	from CEP[a,b]
SAF14	Rangeland & forest land	Sum of rangeland and forest land, as defined above	mid-70's to 80's	from CEP[a,b]
SAF15	Water	US Census category: water area	1990	from CEP[a,b]
SAF17	Mining & quarry land	USGS land use category: "strip mines, quarries, and gravel pits"	mid-70's to 80's	from CEP[a,b]
SAF18	Inverse population density	Inverse of: census tract population (defined above) divided by census tract area. Tracts with zero population assigned spatial factors of zero.	1990	from CEP[a,b]
SAF19	Inverse population density	Inverse of: census tract population (as defined above) divided by census tract land area. Tracts with zero population assigned tract population of one.	1990	population and land area data from CEP[b], SAF computed from D-3 (see item 5, below)

Table D-18. Spatial Allocation Factors Developed for EMS-HAP (continued)

Code for set of SAFs	Surrogate	Definition	Origin of Data	How we developed the set of SAFs
SAF20	Population	U.S. Census category: 1990 residential population	1990	from CEP[a,b]
SAF21	Railway miles	Total railway miles, as reported in TIGER/Line	1993	from CEP[a,b]
SAF22	Roadway miles	Total miles of all roadway types in each census tract, as reported in TIGER/Line	1993	from CEP[a,b]
SAF24	50% Population & 50% roadway miles	Surrogate based equally on population fraction and on roadway mile fractions for each of four roadway types	1990-93	0.5*SAF20 + 0.5*SAF22
SAF25	25% Population & 75% roadway miles	Surrogate based on population fraction and roadway mile fractions, respectively weighted by 25% and 75%, for each of four roadway types	1990-93	0.25*SAF20 + 0.75*SAF22
SAF26	Tract area	The area of census tracts (including land and water)	1990	tract areas computed from CEP tract radii[b] data SAF computed from D-3
SAF27	Urban – Inverse population density Rural – farmland	Inverse population density (18) for urban[c] counties; farmland (7) for rural[c] counties	1990, mid-70's to 80's	SAF 18 from CEP, SAF 7 from CEP, urban/rural county designations from 1990 and 1996 census data
SAF28	Urban – population Rural – tract area	Population (20) for urban[c] counties; tract area for (26) rural[c] counties	1990	SAF 20 from CEP, SAF 26 from CEP, urban/rural county designations from 1990 and 1996 census data
SAF29	Sum of farmland and orchard land	Sum of farmland and orchard land, as defined above	mid-70's to 80's	land use data from developers of CEP[a,b], SAF computed from equation D-3

[a] except that we made changes to SAFs in Halifax and South Boston, Virginia counties, see item 4, below

[b] except for census tracts in the Virgin Islands and Puerto Rico (these areas were not modeled in the CEP) see item 3 below

[c] county-level urban rural designation was made using 1990 and 1996 census tract data[18]

The following list discusses the additional surrogates (and resulting SAFs) we added and the changes we made to the those SAFs used in the CEP.

1. <u>We added spatial allocation factors based on a tract area spatial surrogate (SAF26).</u>

We computed the tract area for each census tract based on the tract radius. These radii were originally computed from tract area values supplied by the developers of the CEP. We used equation D-3, using tract area as the activity.

We developed the tract area SAFs to implement the recommendations of the EPA's Office of Transportation and Air Quality(OTAQ)[36,37] They suggested (as shown in Table D-16) we use this surrogate for allocating the mobile source category of nonroad gasoline, 2-stroke engines and nonroad gasoline 4-stroke engines (rural counties only).

2. <u>We added "composite" spatial allocation factors which use more than type of land use or population data.</u>

SAF6, SAF10, SAF24, SAF25, SAF27 and SAF28 combine more than one type of data. Of these SAFs, we developed SAF6, SAF24, SAF25, SAF27 and SAF28. SAF6, for example, combines commercial and industrial land data. SAF27 uses inverse population density data for urban counties and farmland for rural counties. We used 1990 and 1996 census data to establish the county-level urban/rural designation.[18]

We developed the SAFs for the composite surrogates because we felt that the composite surrogates provided a better approach for allocating some of our area and mobile source categories, and the data was readily available. For example, we felt that halogenated solvents were used at both industrial and commercial facilities. To develop a set of industrial and commercial land SAFs (SAF6) we added industrial and commercial land data for each tract, and used equation D-3. The EPA's OTAQ recommended two composite surrogates (see SAF27 and SAF28) that use different types of data depending on whether the tract is an urban or rural county.[36,37] They recommended (as shown in Table D-16) SAF27 for nonroad diesel engines and SAF28 for nonroad gasoline 4-stroke engines.

3. <u>We added Puerto Rico and Virgin Islands spatial allocation factors since these areas were not modeled in the CEP.</u>

We developed Puerto Rico and Virgin Islands land use and population data by processing geographic information system (GIS) coverages obtained from the Region 2 web site at www.epa.gov/region2/gis/atlas. Table D-19 lists the data we obtained from the website. We used equation D-3 for developing SAFs from the land use and population data.

Some land use categories we used for the continental U.S. (forest land, for example) were not available for these islands. Therefore, we derived spatial allocation factors from the most closely-matched available data. Table D-20 shows the SAFs we used in this situation.

Table D-19. Surrogate Data Available for Puerto Rico and the Virgin Islands

Puerto Rico	Virgin Islands
Population	Population
Roadway miles	Roadway miles
Tract area	Tract area
Commercial land	
Farm land	
Industrial land	
Residential land	
Railroad miles	
Water	

Table D-20. Methodology for Puerto Rico/Virgin Islands Spatial Allocation Factors

When the continental U.S. used .....(surrogate code in parenthesis)	Puerto Rico used.....	Virgin Island used ....
residential land (1)	residential land	population
commercial land (2)	commercial land	population
industrial land (3)	industrial land	population
utility land (4)	inverse population density	inverse population density
commercial and industrial land (6)	commercial and industrial land	population
farm land (7)	farm land	tract area
water (15)	water	population
urban counties: inverse population density	urban counties: inverse population density	urban counties: inverse population density
rural counties: farmland (27)	rural counties: farmland	rural counties: tract area
farm land and orchard land (29)	farmland	tract area

In addition, For Puerto Rico and the Virgin Islands surrogates 18 and 19 used tract area (based on the radius of the tract) rather than land area in the calculation of inverse population density. The difference between the two is that land area does not include water area.

4. In 1993, the census no longer treated South Boston as a county, and therefore we had to make adjustments to the CEP SAFs

The single tract formerly in South Boston City, Virginia was, in 1996, considered part of Halifax county, Virginia. Because South Boston was no longer a county, there were no area source or mobile source emission estimates for it from the 1996 NTI or NET inventories. In order to make sure that EMS-HAP allocated Halifax county emissions to the South Boston tract we needed to change the SAFs supplied to us by the CEP. The change was to associate the South Boston tract with Halifax county. Note that this recalculation only affected Halifax county and South Boston SAFs.

5. We changed the way zero population tracts were treated using the inverse population density surrogate 19

As seen in Table D-18, there are two inverse population density surrogates (SAF18 and SAF19) in EMS-HAP. They differ in how they treat zero population tracts. There are nearly 10,000 zero population census tracts, and they vary in size. (In fact, about 300 of these have zero tract areas). We changed the treatment of zero population tracts only for the SAFs associated with surrogate 19. We refer to these SAFs as "SAF19." In the former SAF19 used for the CEP, zero population tracts were given the maximum inverse population density of all tracts in the county. Note that this value was assigned to these zero population tracts regardless of their size.

We changed the use of the maximum inverse population density for zero population tracts because we noticed that in some areas, particularly in Denver County, Colorado, there are a large number of zero population tracts. Denver County, for example, has 30 out of a total of 182 tracts. The use of former SAF19 results in high SAF values for these tracts, which in turn produces high emission densities for these tracts. These tracts were also located near one another so that even though the ASPEN model does not account for the impact of these emissions for the resident tract[38], the small tracts nearby were affected.

We chose to recompute the inverse population density using a population of one person for zero population tracts rather than assign them the maximum inverse population density. We refer to this treatment as "new SAF19." We tested the effect of new SAF19 by choosing a particular pollutant in which emissions are dominated by a single source category. The pollutant is diesel PM, and the category is nonroad diesel engines. We modeled this pollutant through EMS-HAP and ASPEN (using a draft diesel PM inventory based on the 1996 NET). We also tested a variation of new SAF19 which we call "tract area SAF19." For this tract area SAF19 we used the tract area of each tract rather than the land area of each tract to calculate inverse population density. Note that the developers of the CEP used land area for former SAF19. The difference in the two areas is that water area is not included in land area, but it is included in tract area. We tested tract area SAF19 for two reasons. First was to show the effect of changes in 19 on modeling results. Second was that we actually used this tract area SAF19 for allocating those categories matched to surrogate 19 for Puerto Rico and Virgin Islands (see item 3 in this section).

For the purposes of the test we allocated county-level diesel PM emissions from nonroad diesel engines to the three different treatments (former, new, tract area) of SAF19. Note that this category normally uses 27 (see Table D-16); we used 19 only for the test. We kept all other mobile source categories allocated as in Table D-16.

Figure D-3 shows the differences in tract-level emission densities (emissions per tract area) resulting from the two approaches. Note that the tracts with zero tract area are not included in this figure because the emission density is infinite for these tracts. As seen in the figure, the new SAF19 resulted in substantially lower emission densities for a large number of tracts.

We also ran the ASPEN model to see the effect on ambient concentrations. We looked at the State mean, because this statistic is sensitive to outliers. Figure D-4 shows the results. In Colorado, the mean concentration was reduced using new SAF19, which alleviates the concerns mentioned earlier raised from the former SAF19.

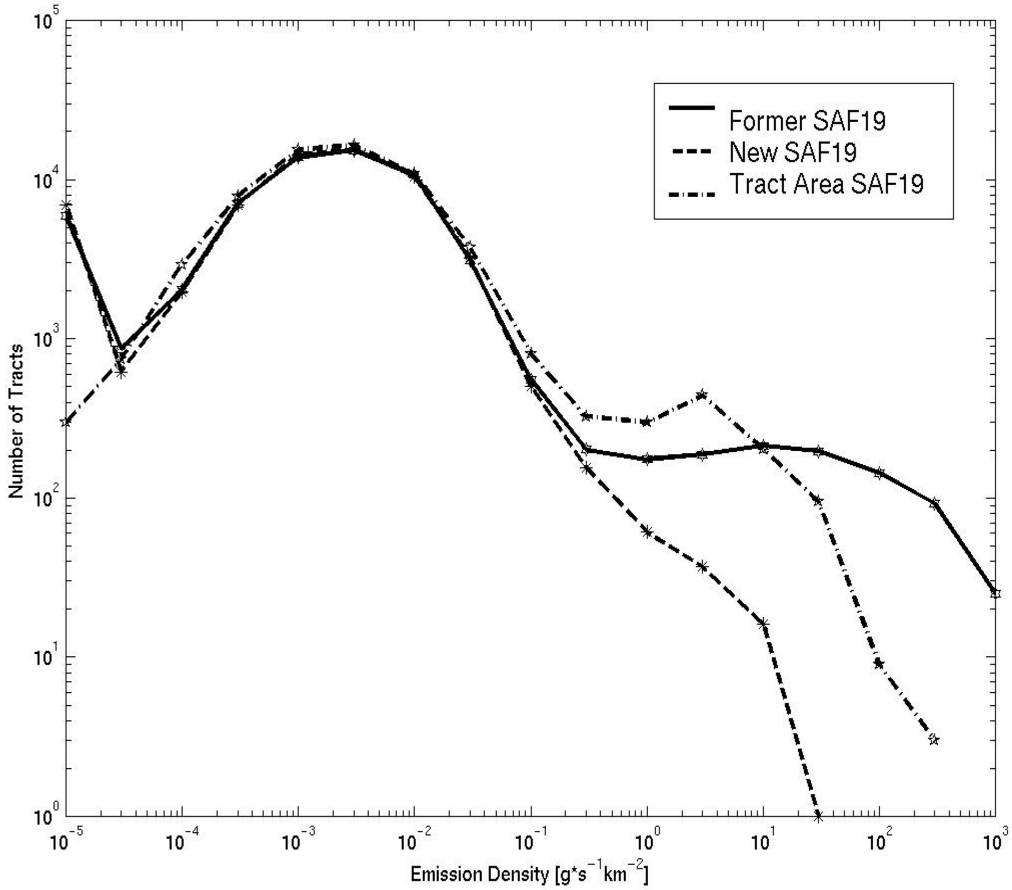

Figure D-3. Nationwide Tract-level Emission Densities Using Three Different Treatments of SAF19.

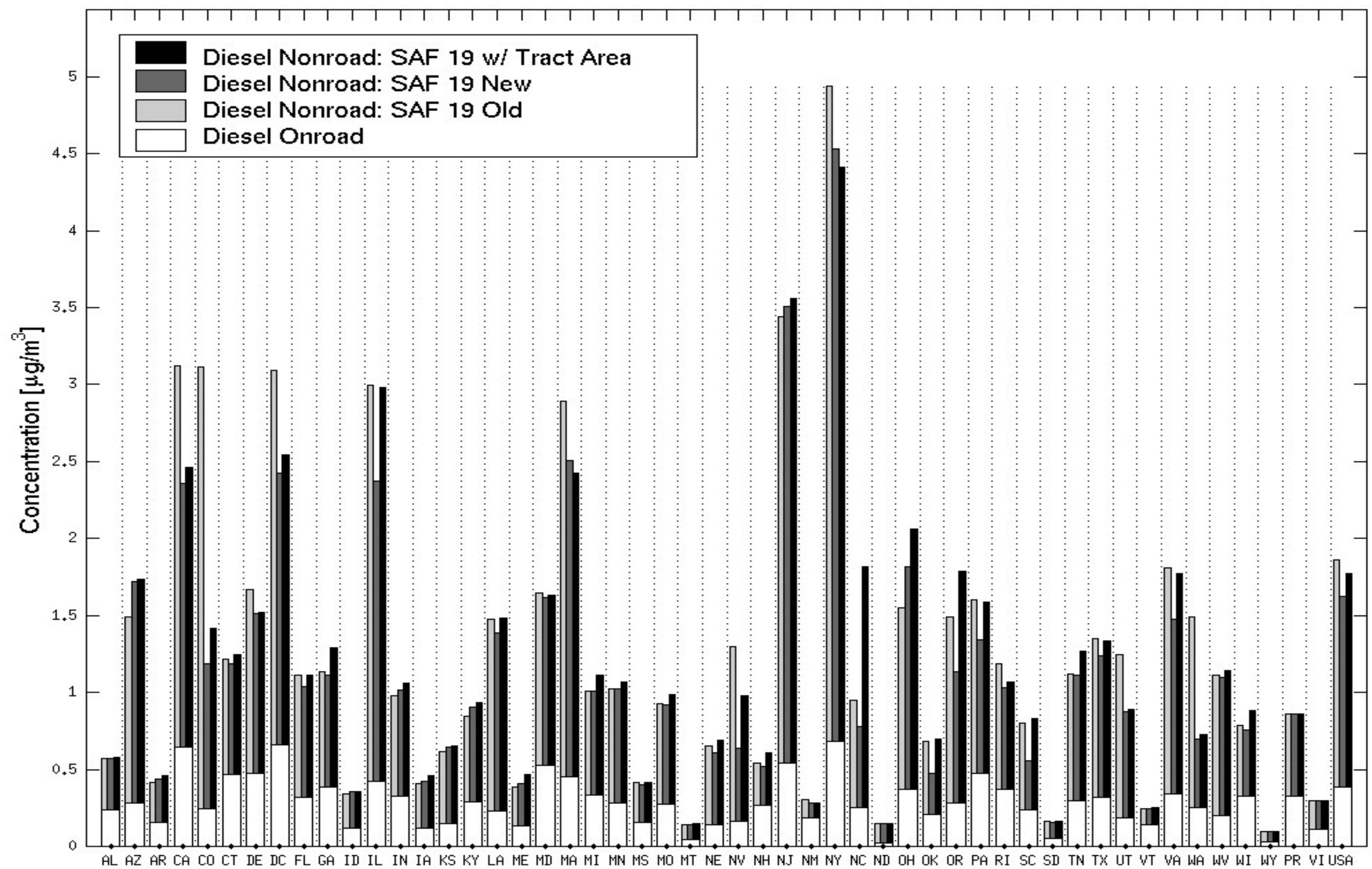

Figure D-4. The Effect of the Three Different Treatments of SAF19 on State-level Mean Concentrations Estimates

D.11 Program Options and Parameters

This section presents the options used to run EMS-HAP for the base year 1996 run. Several of the EMS-HAP programs contain options for determining which specific functions to run and choices of how to run them. In addition, the data quality assurance program, PtDataProc requires you to enter parameters for the default stack parameter assignments. This section summarizes the options and parameters we selected for the 1996 base year ASPEN input files. We only present programs we ran that have options.

D.11.1 AirportProc program options

Aircraft emissions were extracted from the mobile source inventory and stored in a file separate from the point source inventory as indicated by the setting of the program options given in Table D-21. The allocated aircraft emissions inventory was then processed through the remaining EMS-HAP programs independent of the rest of the point source inventory.

Table D-21. Program Options Used to Execute AirportProc

Keyword	Description	Value
ADD2PT	1=append records to ouput point source inventory file and 0=create an output file containing only allocated aircraft emission records	0
ADD2MB	1=append records to output mobile source inventory file and 0=create an output file containing only unallocated aircraft emission records	1

D.11.2 PtDataProc program options and parameters

Location Data Quality Assurance

When the 1996 NTI and the 1996 NET speciated point source inventories were processed through PtDataProc, point source locations were converted to latitude and longitude in decimal degrees and all location quality checks and defaulting procedures were performed.

Quality Assurance of Stack Parameters

Missing or out-of-range stack parameters were defaulted using SCC and SIC defaults. We defined the out-of-range boundaries for each parameter as shown in Table D-22. Any out-of-range stack parameters that could not be defaulted by SCC or SIC defaults (i.e., if there was no SCC or SIC code on the record, or the code did not match those in the SCC/SIC default files) were defaulted to the range maximum or minimum value, depending on the value of the stack parameter. For example, a stack height greater than 381 meters was defaulted to 381 meters. Any missing stack parameters that could not be defaulted by SCC or SIC were defaulted to the global default values in Table D-22. Because we did not use SCC-based defaults for aircraft emissions, these were defaulted using the global defaults.

Table D-22. Program Options and Parameters Used for PtDataProc

Keyword	Description	Value
DOLOCATE	1= quality assure location data; 0 = don't quality assure them	1
DOSTACK	1= quality assure stack parameters; 0 = don't quality assure them.	1
SCCDEFLT	SCC to default stack parameters correspondence text file prefix (def_scc.txt)	1
SICDEFLT	SIC to default stack parameters correspondence text file prefix (def_sic.txt)	1
DOSETVAR	1=retain only those non-essential variables from inventory specified by the user, based on the value of USELIST and VARLIST 0=retain all variables	1
USELIST	1= use ancillary file (keyword VARLIST) to provide additional non-essential variables to retain in inventory 0=don't retain any non-essential variables from the inventory	1
DOWINDOW	1=remove all records with zero emissions values or records without latitude and longitude values 0= don't remove records with zero emissions or without latitude and longitude values (note that values without latitude and longitude values will still be removed if you perform the data quality assurance of location data function)	1
DLOWHT	Minimum range value for valid stack height (in meters)	0.003
DHIHT	Maximum range value for valid stack height (in meters)	381
DLOWDIA	Minimum range value for valid stack diameter (in meters)	0.0762
DHIDIA	Maximum range value for valid stack diameter (in meters)	15.24
DLOWVEL	Minimum range value for valid stack velocity (in meters/second)	0.003
DHIVEL	Maximum range value for valid stack velocity (in meters/second)	198
DLOWTEMP	Minimum range value for valid stack temperatures (in Kelvin)	273
DHITTEMP	Maximum range value for valid stack temperatures (in Kelvin)	1505
DFLTHT	Default stack height (in meters)	10
DELTVEL	Default stack exit gas velocity (in meters/second)	1
DFLTTEMP	Default stack exit gas temperature (in Kelvin)	295
DEFLTDIA	Default stack diameter (in meters)	1

D.11.3 PtFinalFormat program options and parameters

When the 1996 NTI and the 1996 NET speciated point source inventories were processed through PtFinalFormat, ASPEN source groups were assigned by the source type only (See Table 7-1). Assignments were not made by MACT category, 6-digit SCC, or SIC. The default ASPEN source group was group 1, although no records contained a missing source type and, therefore, the default ASPEN source group was not used. The ASPEN source type designation (ITYPE) was set to 0. The ASPEN input emission files were created and the data were also written to an ASCII text file. Table D-23 summarizes the program options and parameters we specified in the PtFinalFormat batch file.

Table D-23. Program Options and Parameters Used for PtFinalFormat

Keyword	Description	Value
DOSOURCE	1= assign source group by source type	1
DOMACT	1=assign source group by MACT category code	0
DOSCC	1=assign source group by SCC code	0
DOSIC	1=assign source group by SIC code	0
DOWRITE	1=create ASPEN input emission files	1
DOASCII	1=create single ASCII text output file	1
DFLTGRP	Default source group (0 through 9)	1
ITYPE	Source type (0 for point sources and 3 for pseudo point sources)	0

D.11.4 AMProc program options

When the 1996 NTI and the 1996 NET speciated area and mobile source inventories were processed through AMProc, the program options in Table D-24 were specified.

Table D-24. Program Options Used to Execute AMProc

Keyword	Description	Value
SAVEFILE	1=save large SAS®-formatted file with all emissions information on a source category level basis for each	1
GROWCNTL	1= perform growth and control calculations; 0= don't perform growth and control calculations; 2=run growth and control only, using an existing temporally	0
REBIN	1=Reassign emission groups during growth and	0
LSUBSETP	1= process only one pollutant; 0=don't process only	0
SUBSETP	The NTI pollutant code to be subset to	
LSUBSETG	1= process only one state; 0=don't process only one	0
SUBSETG	State 2-character postal code abbreviation of the state	US
LCPTIMES	1=print component CPU times; 0=don't print	1
LDBG	1=printout of diagnostic information; 0=don't	0
LONECELL	1=printout diagnostics for a selected single cell	0
ONECELL	The selected single cell	

D.12 Pollutants in the ASPEN-Input Files for the 1996 Base Year EMS-HAP Run

Using the methodology discussed in D.1 through D.11, we created point, area and mobile source ASPEN emission files containing the pollutants listed in Table D-25 below. Pollutants in the same reactivity class within the same point, area or mobile source run were written to the same ASPEN emission file. For example, nonroad mobile source direct HAP emissions for all fine metals (e.g., arsenic compounds, fine; beryllium compounds, fine; cadmium compounds, fine; etc.) are contained in the file MV.ofnat.US.D050900.r2.inp, which represents reactivity class 2.

Table D-25. List of Pollutants in ASPEN-ready input files

Pollutant	SAROAD in EMS-HAP	Pollutant	SAROAD in EMS-HAP	Pollutant	SAROAD in EMS-HAP
acetaldehyde	43503	diesel PM, fine {for mobile sources only}	80400	methyl tert-butyl ether	43376
acetaldehyde, precursor	80100	diesel PM, coarse {for mobile sources only}	80401	methylene chloride	43802
acetaldehyde precursor, inert	80301	dioxins/chlorinated furans, lower bound	80412	nickel compounds, fine	80216
acrolein	43505	dioxins/chlorinated furans, upper bound	80245	nickel compounds, coarse	80316
acrylonitrile	43704	ethyl benzene	45203	polychlorinated biphenyls	80231
arsenic compounds, fine	80112	ethylene dibromide	43837	polycylic organic matter	80230
arsenic compounds, coarse	80312	ethylene dichloride	43815	7-PAH	80233
benzene	45201	ethylene oxide	43601	propionaldehyde	43504
beryllium compounds, fine	80118	formaldehyde	43502	propionaldehyde, precursor	80234
beryllium compounds, coarse	80318	formaldehyde, precursor	80180	propionaldehyde, precursor, inert	80305
1,3 butadiene	43218	formaldehyde, precursor, inert	80303	propylene dichloride	43838
1,3 butadiene, inert	80302	hexachlorobenzene	80183	quinoline	80239
cadmium compounds, fine	80124	hexane	43231	styrene	45220
cadmium compounds, coarse	80324	hydrazine	80188	1,1,2,2-tetrachloroethane	80246
carbon tetrachloride	43804	lead compounds, fine	80193	tetrachloroethylene (perc.)	43817
chloroform	43803	lead compounds, coarse	80393	toluene	45202
chromium compounds, fine	80141	manganese compounds, fine	80196	trichloroethylene	43824
chromium compounds, coarse	80341	manganese compounds, coarse	80396	vinyl chloride	43860
coke oven emissions	80411	mercury compounds, fine	80197	xylenes	45102
1,3-dichloropropene	80152	mercury compounds, gas	80405		

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16. ABSTRACT
This user's guide provides documentation for the Emissions Modeling System for Hazardous Air Pollutants (EMS-HAP, Version 1.1), also referred to as EMS-HAP. It describes the EMS-HAP program functions and ancillary files, and it provides the user instructions for running the model. In addition, Appendix D discusses how the EMS-HAP ancillary files were developed, and how EMS-HAP was run to process the 1996 National Toxics Inventory for a national air toxics assessment. The Emissions Modeling System for Hazardous Air Pollutants is an emissions processor for the Assessment System for Population Exposure Nationwide (ASPEN, Version 1.1) model. It performs the steps needed to process an emission inventory for input into ASPEN, Version 1.1. These steps include: spatial allocation of area and mobile source emissions from the county level to the census tract level, and temporal allocation of annual emission rates to annually averaged (i.e., same rate for every day of the year) 3-hour emission rates. In addition, EMS-HAP can project future emissions, by adjusting point, area and mobile emission data to account for growth and emission reductions resulting from emission reduction scenarios such as the implementation of the Maximum Achievable Control Technology (MACT) standards.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution Emission Models Emission Processing Hazardous Air Pollutants National Toxics Inventory National Air Toxics Assessment Air Toxics		

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