User's Guide for the Emissions Modeling System for Hazardous Air Pollutants (EMS-HAP) Version 2.0

EPA 454/B-02-001
August 2002

User's Guide for the Emissions Modeling System for Hazardous Air Pollutants (EMS-HAP)
Version 2.0

By:

Madeleine Strum
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Emissions, Monitoring and Analysis Division
Research Triangle Park, NC

And, Under Contract to the U.S. Environmental Protection Agency,

Richard Mason, DynCorp Systems and Solutions LLC
Contract No. IAG47939482-01
Work Order No. 20.12

Diane Linderman, EC/R Incorporated
Contract No. 68D98006
Work Assignment No. 5-03

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Emissions, Monitoring and Analysis Division
Research Triangle Park, North Carolina

DISCLAIMER

The information in this document has been reviewed in accordance with the U.S. EPA administrative review policies and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for their use.

The following trademarks appear in this document:

UNIX is a registered trademark of AT&T Bell Laboratories.

SAS® is a registered trademark of SAS Institute.

SUN is a registered trademark of Sun Microsystems, Inc.

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

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 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
EPA	United States Environmental Protection Agency
ISCST3	Industrial Source Complex Short Term Model, Version 3
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

CHAPTER 1
Introduction

1.1 What is EMS-HAP?

The Emissions Modeling System for Hazardous Air Pollutants (EMS-HAP) Version 2.0 is a series of computer programs that process emission inventory data for toxic air pollutants for subsequent air quality modeling using either the Assessment System for Population Exposure Nationwide (ASPEN) dispersion model[1] or the Industrial Source Complex Short Term Version 3 (ISCST3) dispersion model.[2] In addition, EMS-HAP allows you to project base-year emissions to a future year for use in these air quality models.

☞*EMS-HAP Version 2.0 replaces EMS-HAP Version 1.0, and this User's Guide supercedes the Version 1.0 User's Guide (EPA-454/R-00-018). The key differences in Version 2 are the added functionality to process emissions for the ISCST3 air quality model and added flexibility in estimating future-year emissions.*

To process data for the ASPEN model, EMS-HAP:

- checks inventory location data, converts to latitude/longitude coordinates and defaults missing or out-of-range data where possible,
- checks inventory stack parameter data and defaults missing or out-of-range data,
- 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 stationary 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,
- assigns reactivity and particulate size classes to the pollutants to allow ASPEN to simulate decay and deposition, and,
- produces emission files formatted for direct input into the ASPEN model.

To process data for the ISCST3 model, EMS-HAP:

- converts inventory locations to UTM coordinates and removes inventory records where location data are missing,
- checks inventory stack parameter data and defaults missing or out-of-range data,
- identifies and processes point sources as one of three ISCST3 source types: (ISCST3 point, ISCST3 volume, and ISCST3 area),

- 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 stationary and mobile source emissions to grid cells using spatial surrogates such as population,
- allocates county-level aircraft emissions to airport locations and assigns dimensions and release parameters in order to process the aircraft emissions as ISCST3 area sources,
- temporally allocates annual emissions to seasonal and day-type specific hourly emission rates
- assigns particle size distribution, scavenging coefficients, gas deposition parameters, and elevation data, and
- produces the Source (SO) pathway section of an ISCST3 run stream.

For either the ASPEN or ISCST3 model, 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 or ISCST3 and to analyze emission reduction scenarios. The EMS-HAP/ASPEN system has been used to estimate annual average ambient air quality concentrations of multiple toxic pollutants emitted from a large number of sources at a large scale (i.e., nationwide) as part of a national scale air toxics assessment.[3] The EMS-HAP/ISCST3 system has been used to estimate annual ambient air quality concentrations of toxic pollutants emitted from a large number of sources on an urban scale.[4]

Although we tailored this version of EMS-HAP to process the July 2001 version of 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 site-specific estimates of hazardous air pollutants (HAPs).[5]

1.2 Who are the users of EMS-HAP?

This user's guide, and in particular Appendices D and E, are intended for members of the engineering or scientific community who would like to understand the technical issues that arise in the interface between a toxics emissions inventory with a multitude of emission sources and the ASPEN and ISCST3 air quality dispersion models that estimate air quality concentrations.

Potential users of EMS-HAP are: 1) EPA engineers or scientists conducting a national scale assessment for toxic air pollutants using the ASPEN model, 2) EPA/State/local engineers or scientists conducting an urban scale assessment of toxic air pollutants using the ISCST3 model, and 3) EPA/State/local engineers or scientists interested in projecting toxic emissions to future

years for planning purposes.

1.3 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: (1) point source data where emission sources are associated with specific geographic coordinates; (2) county-level "non-point" source data where stationary source emissions are reported at the county level; and (3) 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.

Note we use the term "non-point inventory" to describe what was formerly referred to as the area source inventory so as not to conflict with the regulatory term "area source" which we use to describe a type of stationary source based on its size as defined in the Clean Air Act. Non-point sources are stationary sources inventoried at the county-level. We are still, however, using the term "area" in the name of the EMS-HAP programs for processing the non-point inventory.

To process data for the ASPEN model, EMS-HAP consists of five point source programs, two non-point source programs, two mobile source programs, and one aircraft emissions program:

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

Non-point Source Programs
1. AreaPrep - The Area Source AMProc Preparation Program, Chapter 9
2. AMProc - The Area and Mobile Source Processor, Chapter 11

Mobile Source Programs
1. MobilePrep - The Mobile Source AMProc Preparation Program, Chapter 10
2. AMProc - The Area and Mobile Source Processor, Chapter 11

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

Note that AMProc is used for both non-point and mobile source emissions processing.

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

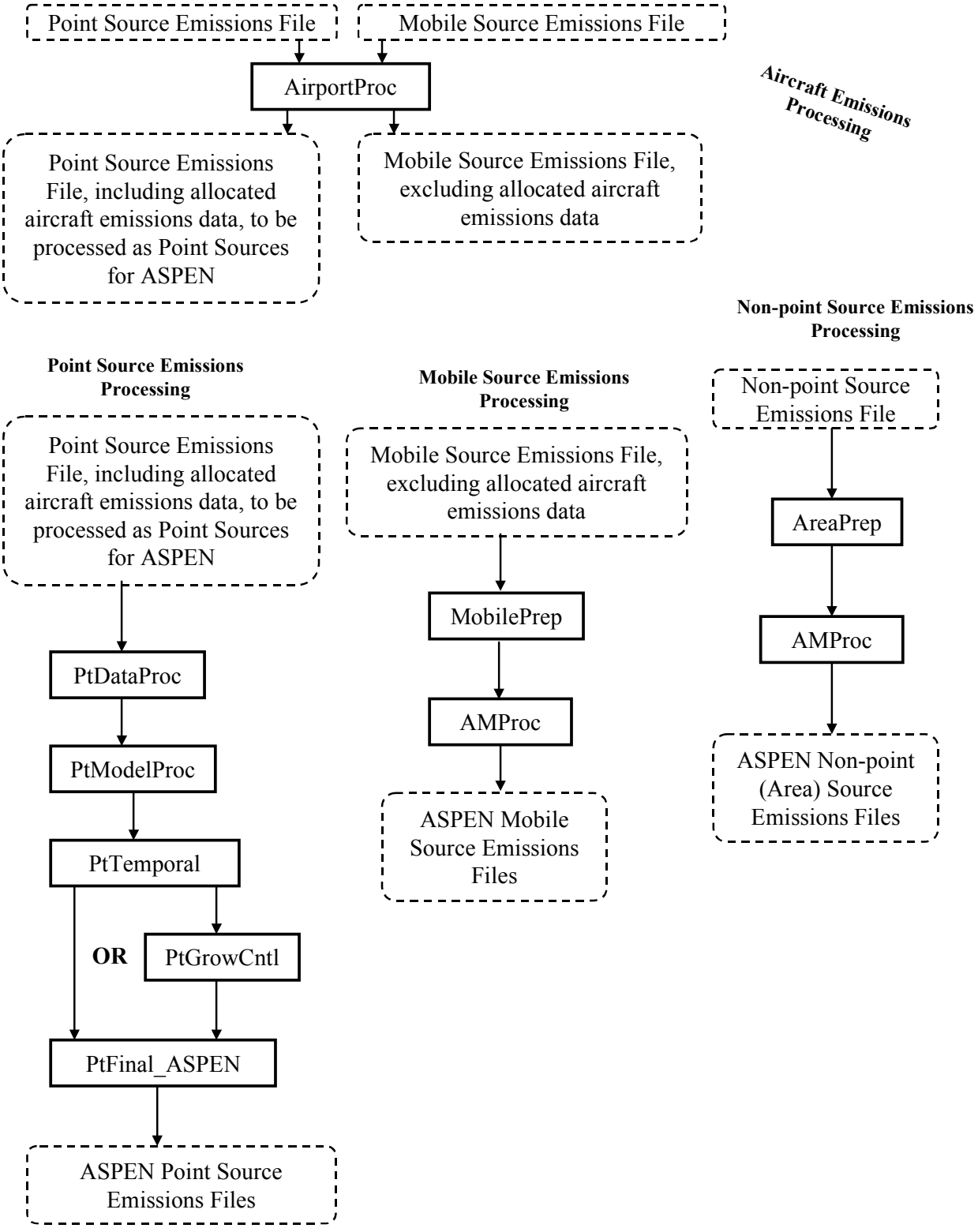


Figure 1-1. Overview of EMS-HAP Processing for ASPEN

To process data for the ISCST3 model, EMS-HAP utilizes many of the same programs it uses for ASPEN. These are five point source programs, three non-point source programs, three mobile source programs and one aircraft emissions program:

Point Source Programs (Note that these programs also process ISCST3 area and volume sources that are associated with specific geographic coordinates such as the allocated aircraft emission records that are produced by AirportProc).

1. PtDataProc – The Data Quality Assurance Program, Chapter 3
2. PtModelProc - The Model-Specific Program, Chapter 4
3. PtTemporal - The Temporal Allocation Program, Chapter 5
4. PtGrowCntl - The Growth and Control Program, Chapter 6
5. PtFinal_ISCST3 - The Final Format Program for ISCST3, Chapter 8

Non-Point Source Programs

1. AreaPrep - The Area Source AMProc Preparation Program, Chapter 9
2. AMProc - The Area and Mobile Source Processor, Chapter 11
3. AMFinalFormat - The Area and Mobile Final Format Program for ISCST3, Chapter 12

Mobile Source Programs

1. MobilePrep - The Mobile Source AMProc Preparation Program, Chapter 10
2. AMProc - The Area and Mobile Source Processor, Chapter 11
3. AMFinalFormat - The Area and Mobile Final Format Program for ISCST3, Chapter 12

Aircraft Program

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

Note that AMProc is used for both non-point and mobile source emissions processing.

Figure 1-2 provides a general overview of EMS-HAP data processing for the ISCST3 model. As you can see, the program PtGrowCntl is optional, used only when you want to project the point source inventory to a future year.

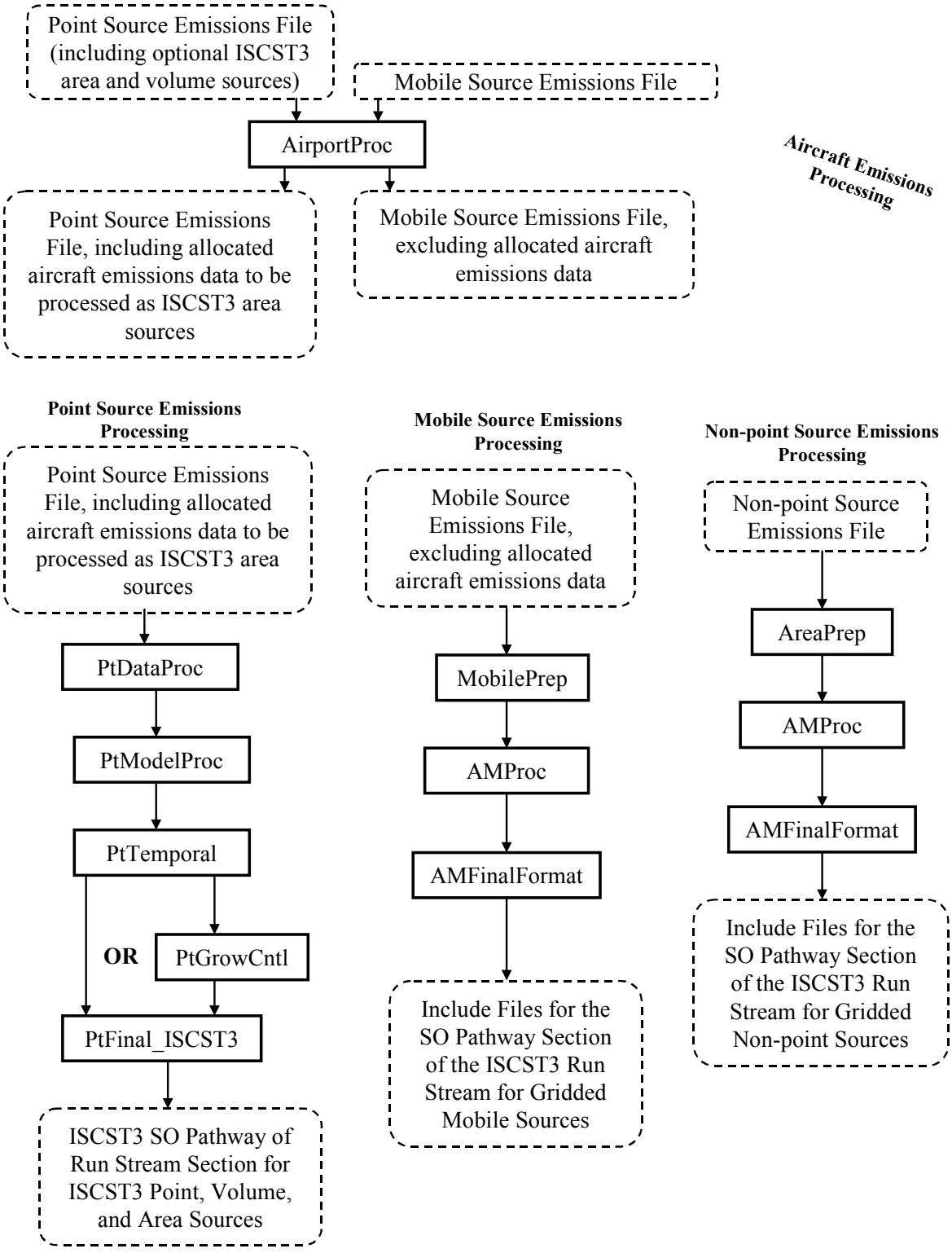


Figure 1-2. Overview of EMS-HAP Processing for ISCST3

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. Generally, 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 spatial allocation factor files are also in SAS® format. Note that you *would* need to change these every time you run a different domain (for an urban scale assessment). You would likely need to use a geographic information system (which is not part of EMS-HAP) to develop these files. The text ancillary files are those that you may choose to change in order to tailor the emission processing to your specific needs. For example, the HAP table file (ASCII text format) allows you to select the particular HAPs to model. You can model all of the HAPs in your inventory or any subset of HAPs by modifying this file.

1.4 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 or the SO pathway section of an ISCST3 run stream for base year or projected year inventories of your choice. See also Sections 1.5 and 1.6 for "quick start" instructions. This guide 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 we choose to use them. Chapter 2 describes the AirportProc program. Chapters 3 through 8 describe the point source processing programs. Chapters 9 through 12 describe the programs for non-point 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 and SAS® programs are 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 scale air toxics assessment. Appendix D also discusses how we developed the key ancillary input files, such as the spatial allocation factor files, used for the assessment. Appendix E presents the methodologies used to prepare the SO pathway section of the ISCST3 run stream used in a test model run for the Houston domain. Appendix E also discusses how we developed the ancillary input files unique for processing data for ISCST3, such as the temporal allocation factor file used in the test model run. We provide, with EMS-HAP, the ancillary files we used to produce the 1996 ASPEN modeling inventory based on the July 2001 version of the 1996 NTI and the 1996 SO pathway section of the ISCST3 run stream for the Houston domain.

Separate user's guides are available for the ASPEN model[1] and the ISCST3 model[2]. Users familiar with these models' input requirements will have a better understanding of EMS-HAP.

1.5 Quick-start for ASPEN: instructions for using EMS-HAP to prepare a toxics emissions inventory for the ASPEN model

***FOR ASPEN* STEP 0:** **SET UP DIRECTORIES**

EMS-HAP programs provide a great deal of flexibility for you to have numerous directories (input files, output files, ancillary SAS files, ancillary text files, etc.). Here's an optional directory structure for you to get started.

Programs directory

Put **all** EMS-HAP programs and "include" programs ("include" programs are only associated with PtDataProc) in this directory.

Ancillary files directory

Put **all** ancillary files for all programs in this directory. (Yes, it will be large!)

Mobile source processing directory*

Put batch files for AirportProc, MobilePrep and AMProc here.

Run AirportProc, MobilePrep and AMProc here. Put input file to AirportProc here.

Direct output files from AirportProc, MobilePrep here.

Mobile source outputs directory*

Put all output files (including the ASPEN-ready files) from AMProc here.

Point source processing directory*

Put all point source program batch files here. Run all point source programs here.

Direct output files from all point source programs **except** PtFinal_ASPEN here.

Point source outputs directory*

Put all output files from PtFinal_ASPEN here.

Non-point source processing directory*

Put input file toAreaPrep and batch files for AreaPrep and AMProc here.

Run AreaPrep and AMProc here.

Direct output from AreaPrep here.

Non-point source outputs directory*

Put all output files (including the ASPEN-ready files) from AMProc here.

*Make two separate directories: one for directly emitted HAPs, and one for precursor emissions.

Conduct below processing separately for HAPs and precursors to HAPs

****FOR ASPEN* STEP 1: PROCESS AIRCRAFT EMISSIONS**

Run AirportProc

This program creates point source aircraft emissions by allocating the county-level emissions to airport locations (Chapter 2)

1. Prepare mobile source inventory and (if concatenating point source emissions with allocated aircraft emissions) point source inventory (Section 2.2.1 and 2.2.2)
2. Prepare ancillary file (Section 2.2.3 and Appendix A Figure 1)
3. Prepare batch file (Section 2.2.4 and Appendix B Figure 1)
4. Execute batch file and check results (Sections 2.2.5 and 2.3)

****FOR ASPEN* STEP 2: PROCESS POINT SOURCE EMISSIONS**

-do this twice if you choose to process the point source aircraft emissions separately from the non-aircraft emissions -

Run PtdataProc

This program provides quality assurance and augmentation (if necessary) of point source locations and stack parameters and reduces the inventory size by removing unessential variables (Chapter 3)

1. Prepare point source inventory for input or use point source output inventory of PtAirportProc. (Section 3.2.1)
2. Prepare ancillary files (Section 3.2.2 and Appendix A Figures 3 thru 13)
3. Prepare batch file (Section 3.2.3 and Appendix B Figure 3)
4. Execute batch file and check results (Sections 3.2.4 and 3.3)

Run PtModelProc

This program manages the list of pollutants, groups/partitions them, and prepares ASPEN specific parameters. (Chapter 4)

1. Use output inventory of PtdataProc for input (Section 4.2.1)
2. Prepare ancillary files (Sections 4.2.2 - 4.2.3 and Appendix A Figures 10, 13-15 and Tables 1-4)
3. Prepare batch file (Section 3.2.3 and Appendix B Figure 5)
4. Execute batch file and check results (Sections 4.2.5 and 4.3)

Run PtTemporal

This program temporally allocates annual emissions for use with ASPEN. (Chapter 5)

1. Use output inventory of PtASPENProc for input (Section 5.2.1)
2. Prepare ancillary files (Sections 5.2.2 - 5.2.4 and Appendix A Figures 16a, 17-19)
3. Prepare batch file (Section 5.2.5 and Appendix B Figure 7)
4. Execute batch file and check results (Sections 5.2.6 and 5.3)

Run PtGrowCntl *OPTIONAL*

This optional program will project the temporally allocated emissions to a future year. (Chapter 6)

1. Use output inventory of PtTemporal for input (Section 6.2.1)
2. Prepare ancillary files (Sections 6.2.2 - 6.2.6 and Appendix A Figures 20-24)
3. Prepare batch file (Section 6.2.7 and Appendix B Figure 9)
4. Execute batch file and check results (Sections 6.2.8 and 6.3)

Run PtFinal_ASPEN

This program assigns source groups and creates the ASPEN input files and other output text SAS files that contain the information in the ASPEN input files. (Chapter 7).

1. Use output inventory of PtTemporal or PtGrowCntl for input (Section 7.2.1)
2. Prepare ancillary files (Sections 7.2.2 - 7.2.3 and Appendix A Figures 25-28)
3. Prepare batch file (Section 7.2.4 and Appendix B Figure 11)
4. Execute batch file and check results (Sections 7.2.5 and 7.3)

***FOR ASPEN* STEP 3:** **PROCESS NON-POINT SOURCE EMISSIONS** (these are the stationary source emissions that are inventoried at the county level)

Run AreaPrep

This program matches spatial surrogates to non-point source categories. (Chapter 9)

1. Prepare non-point emission inventory for input (Section 9.2.1)
2. Prepare ancillary files (Sections 9.2.2 - 9.2.3 and Appendix A Figures 16a, 17-18, 33-34)
3. Prepare batch file (Section 9.2.4 and Appendix B Figure 13)
4. Execute batch file and check results (Sections 9.2.5 and 9.3

AMProc

This program performs pollutant grouping/partioning, prepares ASPEN-specific modeling parameters, spatially and temporally allocates emissions, performs projections (optional), and prepares ASPEN input files and other SAS and text files containing information in the ASPEN input files, and more detailed level information, if desired. (Chapter 11)

1. Prepare non-point emission inventory for input (Section 11.2.1)
2. Prepare ancillary files (Sections 11.2.2 - 11.2.7 and Appendix A Figures 14, 16a, 20, 22, 24, 28, 33, 35, 37)
3. Prepare batch file (Section 11.2.8 and Appendix B Figure 15)
4. Execute batch file and check results (Sections11.2.9 and 11.3)

***FOR ASPEN* STEP 4:** **PROCESS MOBILE SOURCE EMISSIONS**

Run MobilePrep

This program splits up the mobile inventory into onroad and nonroad inventories. Chapter 9)

1. Use output mobile inventory from AirportProc for input (Section 10.2.1)
2. Prepare batch file (Section 10.2.3 and Appendix B Figure 14)
3. Execute batch file and check results (Sections10.2.4 and 11.3)

Run AMProc - *NOTE: You will likely need to run this separately for nonroad and onroad inventories as discussed in 10.1.1 You will likely not run the projection option unless you develop the necessary input files.*

This program performs pollutant grouping/partioning, prepares ASPEN-specific modeling parameters, spatially and temporally allocates emissions, assigns source groups, performs projections (optional), and prepares ASPEN input files and other SAS and text files containing information in the ASPEN input files, and more detailed level information, if desired. (Chapter 11)

1. Use output onroad or nonroad or total mobile inventory from MobilePrep for input (Section 11.2.1)
2. Prepare ancillary files (Sections 11.2.2 - 11.2.7 and Appendix A Figures 14, 16a, 24,28,33, 35, 37)
3. Prepare batch file (Section 11.2.8 and Appendix B Figure 15)
4. Execute batch file and check results (Sections11.2.9 and 11.3)

1.6 Quick-start for ISCST3: instructions for using EMS-HAP to prepare a toxics emissions inventory for the ISCST3 model

***FOR ISCST3* STEP 0:** **SET UP DIRECTORIES**

EMS-HAP programs provide a great deal of flexibility for you to have numerous directories (input files, output files, ancillary SAS files, ancillary text files, etc.). Here's an optional directory structure for you to get started.

Programs directory

Put **all** EMS-HAP programs and "include" programs ("include" programs are only associated with PtDataProc) in this directory.

Ancillary files directory

Put **all** ancillary files for all programs in this directory. (Yes, it will be large!)

Mobile source processing directory

Put batch files for AirportProc, MobilePrep, AMProc and AMFinalFormat here.
Run AirportProc, MobilePrep, AMProc and AMFinalFormat here.
Put input file to AirportProc here.
Direct output files from AirportProc, MobilePrep and AMProc here.

Mobile source outputs directory

Put all output files (including the ISCST3 output files) from AMFinalFormat here.

Point source processing directory

Put all point source program batch files here. Run all point source programs here.
Direct output files from all point source programs **except** PtFinal_ISCST3 here.

Point source outputs directory

Put all output files from PtFinal_ISCST3 here.

Non-point source processing directory

Put input file toAreaPrep here.
Put batch files for AreaPrep, AMProc and AMFinalFormat here.
Run AreaPrep, AMProc and AMFinalFormat here.
Direct output files from AreaPrep and AMProc here.

Non-point source outputs directory

Put all output files (including the ASPEN-ready files) from AMFinalFormat here.

FOR ISCST3* STEP 1: **PROCESS AIRCRAFT EMISSION SOURCES**

AirportProc

This program creates point source aircraft emissions to be modeled as ISCST3-area sources by allocating the county-level emissions to airport locations and appending the appropriate dimensions and release parameters to these sources. (Chapter 2)

1. Prepare mobile source inventory and (if concatenating with allocated aircraft emissions) point source inventory (Section 2.2.1 and 2.2.2)
2. Prepare ancillary files (Section 2.2.3 and Appendix A Figures1and 2)
3. Prepare batch file (Section 2.2.4 and Appendix B Figure 2)
4. Execute program and check results (Section 2.3)

FOR ISCST3* STEP 2: **PROCESS POINT SOURCE EMISSIONS (do this twice if you choose to process the point source aircraft emissions separately from the non-aircraft emissions)**

PtdataProc

This program provides quality assurance of point source locations and stack parameters and augmentation (if necessary) of stack parameters. It also reduces the inventory size by removing unessential variables (Chapter 3)

1. Prepare point source inventory for input or use point source output inventory of PtAirportProc. (Section 3.2.1)
2. Prepare ancillary files (Section 3.2.2 and Appendix A Figures 6-8 and 11-13)
3. Prepare batch file (Section 3.2.3 and Appendix B Figure 4
4. Execute batch file and check results (Sections 3.2.4 and 3.3)

PtModelProc

This program manages the list of pollutants, groups/partitions them, and prepares ISCST3 specific parameters. (Chapter 4)

1. Use output inventory of PtdataProc for input (Section 4.2.1)
2. Prepare ancillary files (Sections 4.2.2 - 4.2.3 and Appendix A Figures 10, 13-15 and Tables 1-4)
3. Prepare batch file (Section 3.2.3 and Appendix B Figure 5)
4. Execute batch file and check results (Sections 4.2.5 and 4.3)

PtTemporal

This program temporally allocates annual emissions for use with ISCST3. (Chapter 5)

1. Use output inventory of PtASPENProc for input (Section 5.2.1)
2. Prepare ancillary files (Sections 5.2.2 - 5.2.4 and Appendix A Figures 16b, 17- 19)
3. Prepare batch file (Section 5.2.5 and Appendix B Figure 8)
4. Execute batch file and check results (Sections 5.2.6 and 5.3)

PtGrowCntl *OPTIONAL*

This optional program will project the temporally allocated emissions to a future year. (Chapter 6)

1. Use output SAS inventory of PtTemporal for input (Section 6.2.1)
2. Prepare ancillary files (Sections 6.2.2 - 6.2.6 and Appendix A Figures 20-24)
3. Prepare batch file (Section 6.2.7 and Appendix B Figure 10)
4. Execute batch file and check results (Sections 6.2.8 and 6.3)

PtFinal_ISCST3

This program assigns source groups and creates the SO Pathway section of the ISCST3 run stream and an output SAS files that contains the information in the SO Pathway section of the run stream. (Chapter 8).

1. Use output SAS inventory of PtTemporal or PtGrowCntl for input (Section 8.2.1)
2. Prepare ancillary files (Sections 8.2.2 - 8.2.4 and Appendix A Figures 25-27 and 29-31)
3. Prepare batch file (Section 8.2.5 and Appendix B Figure 12)
4. Execute batch file and check results (Sections 8.2.6 and 8.3)

***FOR ISCST3* STEP 3:* PROCESS NON-POINT SOURCE EMISSIONS** (these are the stationary source emissions that are inventoried at the county level)

AreaPrep

This program matches spatial surrogates to non-point source categories. (Chapter 9)

1. Prepare non-point emission inventory for input (Section 9.2.1)
2. Prepare ancillary files (Sections 9.2.2 - 9.2.3 and Appendix A Figures 16b, 17-18, 33- 34)
3. Prepare batch file (Section 9.2.4 and Appendix B Figure 13)
4. Execute batch file and check results (Sections 9.2.5 and 9.3)

AMProc

This program performs pollutant grouping/partioning, prepares ISCST3-specific modeling parameters, spatially and temporally allocates emissions, performs projections (optional), and and assigns source groups. (Chapter 11)

1. Prepare non-point emission inventory for input (Section 11.2.1)
2. Prepare ancillary files (Sections 11.2.2 - 11.2.7 and Appendix A Figures 14, 16b, 20, 22, 24, 28, 33, 36-37)
3. Prepare batch file (Section 11.2.8 and Appendix B Figure 16)
4. Execute batch file and check results (Sections11.2.9 and 11.3)

AMFinalFormat - *NOTE: You will need (after running this program) to create the SO Pathway Section of the ISCST3 run stream by using the output files from this program in conjunction with the SO Pathway Section created by PtFinal_ISCST3.*

This program prepares ISCST3-specific parameters and creates include files text files for use in creating the SO Pathway section of the ISCST3 run stream. (Chapter 12)

1. Use output SAS non-point inventory from AMProc for input (Section 12.2.1)
2. Prepare ancillary files (Sections 12.2.2 - 12.2.3 and Appendix A Figures 29, 31- 32)
3. Prepare batch file (Section 11.2.8 and Appendix B Figure 17)
4. Execute batch file and check results (Sections11.2.9 and 11.3)

***FOR ISCST3* STEP 4:* PROCESS MOBILE SOURCE EMISSIONS**

MobilePrep

This program splits up the mobile inventory into onroad and nonroad inventories. (Chapter 9)

1. Use output SAS mobile inventory from AirportProc for input (Section 10.2.1)
2. Prepare batch file (Section 10.2.3 and Appendix B Figure 14)
3. Execute batch file and check results (Sections10.2.4 and 11.3)

AMProc - *NOTE: You will likely need to run this separately for nonroad and onroad inventories as discussed in 10.1.1 You will likely not run the projection option unless you develop the necessary input files.*

This program performs pollutant grouping/partioning, prepares ASPEN-specific modeling parameters, spatially and temporally allocates emissions, performs projections (optional), and assigns source groups. (Chapter 11)

1. Use output SAS onroad or nonroad or total mobile inventory from MobilePrep for input (Section 11.2.1)
2. Prepare ancillary files (Sections 11.2.2 - 11.2.7 and Appendix A Figures 14, 16b, 24, 28, 33, 36-37)
3. Prepare batch file (Section 11.2.8 and Appendix B Figure 16)
4. Execute batch file and check results (Sections11.2.9 and 11.3)

AMFinalFormat- *NOTE: You will likely need to run this program separately for nonroad and onroad inventories. You will also need (after running this program) to create the SO Pathway Section of the ISCST3 run stream by using the output files from this program in conjunction with the SO Pathway Section created by PtFinal_ISCST3.*

This program prepares ISCST3-specific parameters and creates include files text files for use in creating the SO Pathway section of the ISCST3 run stream. (Chapter 12)

1. Use output SAS onroad or nonroad or total mobile inventory from AMProc for input (Section 12.2.1)
2. Prepare ancillary files (Sections 12.2.2 - 12.2.3 and Appendix A Figures 29, 31 32)
3. Prepare batch file (Section 11.2.8 and Appendix B Figure 17)
4. Execute batch file and check results (Sections11.2.9 and 11.3)

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

The flowcharts below (Figure 2-1) show how AirportProc fits into EMS-HAP. AirportProc is the first program you run in EMS-HAP, and the mobile source and point source inventories you input to AirportProc are your initial inventories. As seen in the figure (right hand side) you can run AirportProc for mobile sources only, without appending the point source inventory to the allocated aircraft emissions. You use the point source output inventory from AirportProc as the input to PtDataProc (Chapter 3) and the mobile source output inventory as the input to MobilePrep (Chapter 10).

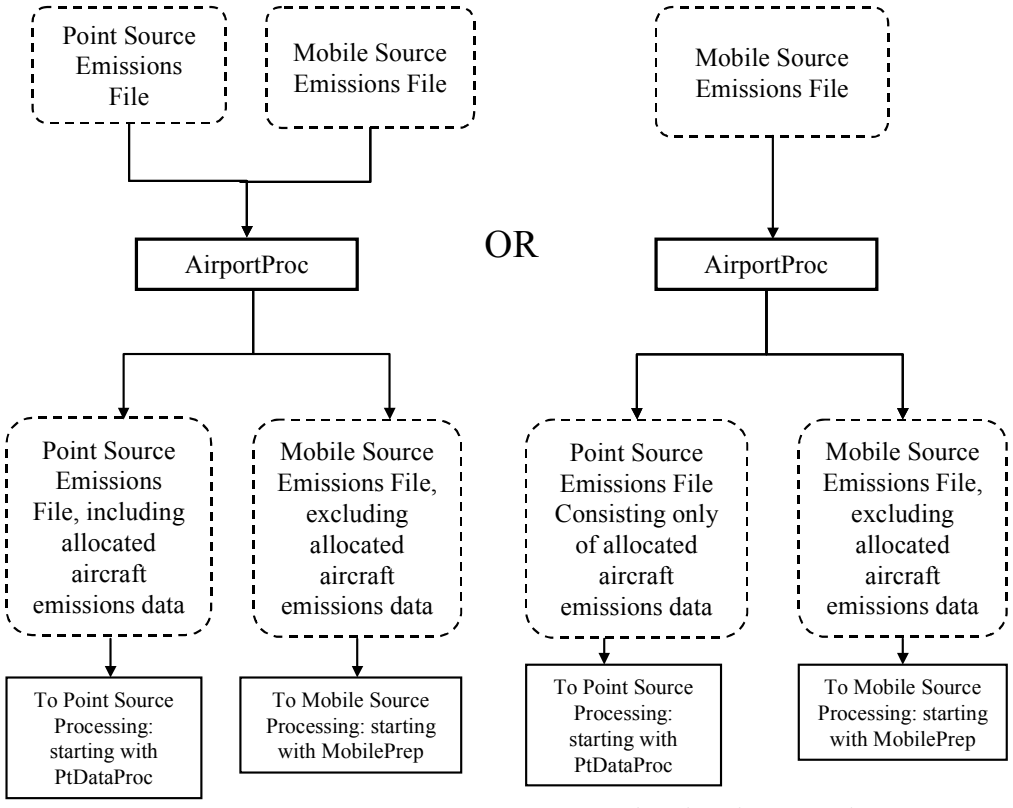


Figure 2-1. Overview of Aircraft Emissions Processing for ASPEN and ISCST3

2.1 What is the function of AirportProc?

The Aircraft Emissions Processing Program (AirportProc) provides you with a means to model aircraft emissions as discrete point sources located at airports instead of spatially allocated mobile sources. When processing data for the ISCST3 model, AirportProc prepares the aircraft emissions as discretely located (i.e., not gridded) ISCST3 area sources with the airport-specific release parameters you provide; if you don't provide these, then AirportProc uses the defaults you provide in the batch file (see Table 2-6 in Section 2.2.4). We built these capabilities into EMS-HAP 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 or grid cells, would result in better ambient concentration estimates from either of the models.

AirportProc performs the functions listed below:

- Allocates county-level aircraft emissions to specific airports
- Prepares allocated emissions for the point source processing programs
- Assigns the additional variables needed to process aircraft emissions as ISCST3 area sources when processing data for ISCST3 only
- Appends unallocated airport emissions back to the mobile source inventory

Figure 2-2 shows the flowchart of AirportProc when processing data for ASPEN, and Figure 2-3 shows the flowchart of AirportProc when processing data for ISCST3. The following sections describe the above bullets.

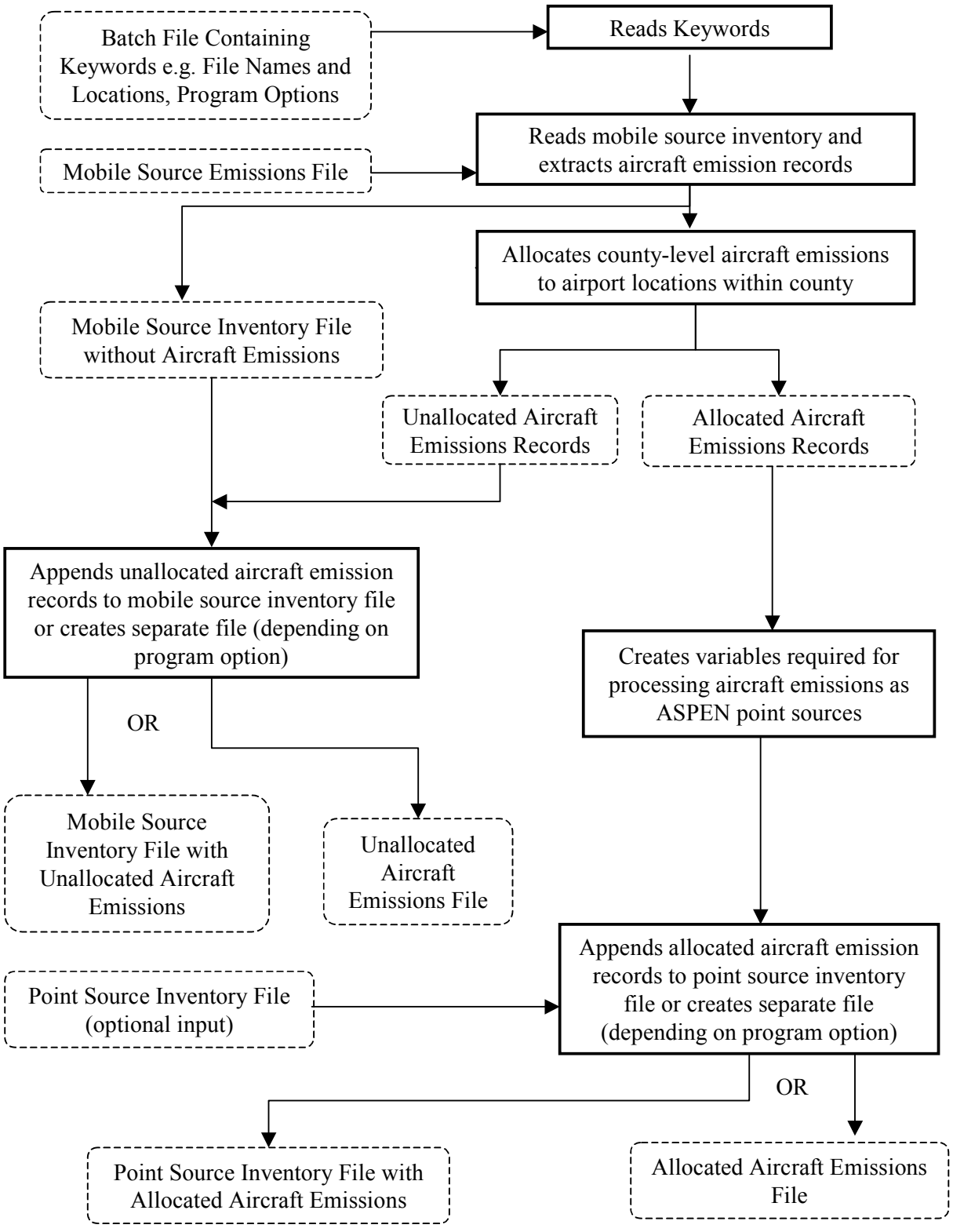


Figure 2-2. AirportProc Flowchart when Processing Data for ASPEN

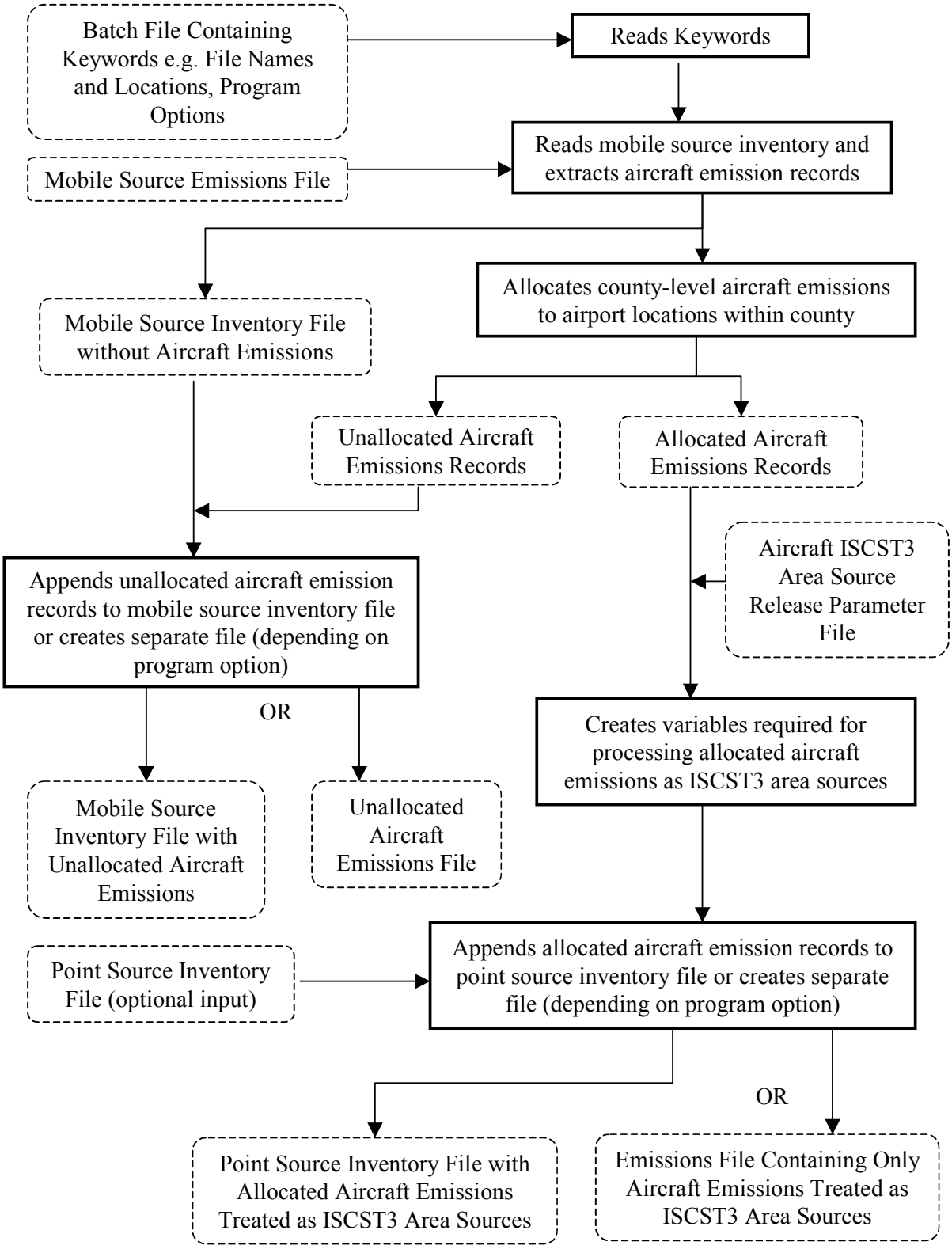


Figure 2-3. AirportProc Flowchart when Processing Data for ISCST3

2.1.1 Allocates county-level aircraft emissions to specific airports

AirportProc first extracts aircraft emissions records from the mobile source inventory. AirportProc 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, (see Section 2.2.3), containing data on airport locations and allocation factors. The name of the file supplied with EMS-HAP is apt_allc. 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.

We designed the allocation factors in apt_allc to allocate the aircraft emissions as follows:

- 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 passenger data for 1996 (for more detail on the data source, see Section D.4 in Appendix D).
- If a county has multiple noncommercial airports, then emissions are divided equally among them.

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. In ASPEN, these will be modeled as point sources, and in ISCST3 as distinctly located (as opposed to gridded) ISCST3 area 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 2-4) and sets their values to missing. EMS-HAP's 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, for allocated aircraft emissions, is the AMS code, or by global defaults when you run the first point source processing program, PtDataProc (Chapter 3). When processing aircraft emissions for the ISCST3 model, stack parameters are assigned but not used; instead, because all aircraft emissions are ISCST3 area sources (see Section 2.1.3), area source release parameters are used. EMS-HAP assigns stack parameters to aircraft emissions for the ASPEN model because ASPEN

requires stack parameters for all point source emission records. Note that when processing data for ASPEN in PtModelProc (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.

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
EMIS	pollutant emissions value (tons/year)	based on mobile source inventory EMIS variable and allocation factor from airport allocation ancillary file
EMRELPID	code identifying a unique combination of airport site and airport AMS	concatenation of SITE_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	concatenation of 'AP,' FIPS variable, and number assigned consecutively to each airport within county
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

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. Appending them with the point source inventory will reduce the amount of programs you'll need to run, since you'll only have to run the point source processing programs one time (for all point sources together). When running for ISCST3, we recommend that you append these sources in order to reduce the number of "include" files (see Chapter 8) created by PtFinal_ISCST3, and to avoid having to modify the SO Pathway section of the ISCST3 run stream file to account for two point source runs. You select the option to use by specifying a value for keyword ADD2PT in the batch file (see Table 2-6 in Section 2.2.4).

2.1.3 Assigns the additional variables needed to process aircraft emissions as ISCST3 area sources when processing data for ISCST3 only

When processing data for the ISCST3 model, AirportProc prepares aircraft emissions as ISCST3 area sources as opposed to ISCST3 point sources (which are basically stacks). In EMS-HAP, however, they are still considered as point sources because they are associated with specific geographic coordinates. An ISCST3 area source is used to model a low level or ground level emission release with no plume rise. The source is described as a rectangular area located by the coordinates of the southwest corner and a rational angle relative to that vertex. To model these sources as ISCST3 area sources, the ISCST3 model requires the additional variables listed in Table 2-2. These parameters include ISCST3 area source dimensions and release parameter data. You provide the values of these variables, except for the ISCTYPE variable (AirportProc assigns this variable to "iscarea") in the ancillary file called ISC_airport_parameters.txt (see Section 2.2.3). If you do not provide airport-specific dimensions or release parameters, then they will be assigned the default values you provide in the batch file (see Table 2-6 in Section 2.2.4).

Table 2-2. Additional Variables Required to Process Aircraft Emissions as ISCST3 Area Sources

Variable Name	Data Description (units or values are in parentheses)	Source of Data or Value Assigned
AANGLE	orientation angle of rectangle for ISCST3 area sources (degrees from North)	ISC_airport_parameters.txt ancillary file
AINPLUM	initial vertical dimension of plume for ISCST3 area source (meters)	ISC_airport_parameters.txt ancillary file (We used 2 meters in the example presented in Appendix E)
ARELHGT	release height above ground for ISCST3 area sources (meters)	ISC_airport_parameters.txt ancillary file (We used 2 meters in the example presented in Appendix E)
AXLEN	length of X side of rectangle for ISCST3 area sources (meters)	ISC_airport_parameters.txt ancillary file
AYLEN	length of Y side of rectangle for ISCST3 area sources (meters)	ISC_airport_parameters.txt ancillary file
ISCTYPE	ISCST3 source type (iscpoint, iscvolume, or iscarea)	iscarea

2.1.4 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 through the point source processing programs as sources with discrete locations. AirportProc identifies these records and then either appends them back into the mobile

source inventory, or puts them in a separate file which is output by AirportProc in place of the mobile source inventory. You select the option by specifying a value for keyword ADD2MB in the batch file (see Table 2.6 in Section 2.2.4). AirportProc names the output mobile inventory by keyword OUTMOBIL (see Table 2.6 in Section 2.2.4). Depending on the keyword ADD2MB, this file contains either the mobile source inventory with unallocated aircraft emissions or the unallocated aircraft emissions by themselves. If you choose AirportProc to output the unallocated aircraft emissions by themselves (ADD2MB=0), you cannot use this output for mobile source processing, because it is missing the rest of the mobile inventory, so you'll eventually need to rerun AirportProc with ADD2MB=1.

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 2-3, 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 unless you add Alaska and Hawaii data to the appropriate ancillary files.

Table 2-3. 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 2-6 of Section 2.2.4); otherwise you can skip to Section 2.2.3. Appendix C describes how we prepared the point source inventory input file from a modeling file containing the point source portion of the July 2001 version of the 1996 NTI.

When processing data for ISCST3, please note the following:

- You have the option of including ISCST3 volume sources and ISCST3 area sources in your point source inventory. An ISCST3 volume source is used to model emission releases from various industrial sources, such as building roof monitors, multiple vents, and conveyor belts. An ISCST3 area source is used to model low level or ground level emission releases with no plume rise, such as storage piles, slag dumps, lagoons, landfills, or airports. An ISCST3 area source can also be used to model onroad mobile emissions by assigning the emissions to rectangular road segments.
- You can also include building parameters in your point source inventory.

See the last three bullets below on how to include these when processing for ISCST3.

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 2-4 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 site ID (SITE_ID), pollutant code (POLLCODE), and emission release point ID (EMRELPID).
- All stack parameters within a group of records identified by the site ID (SITE_ID), and emission release point ID (EMRELPID) must be the same.
- It shouldn't contain Alaska and Hawaii emission records unless you add Alaska and Hawaii data to the appropriate ancillary files.
- When processing data for ISCST3, if you choose to model some of your sources as ISCST3 volume sources (as discussed above), your inventory must include the ISCST3 source type variable ISCTYPE (which must be 'iscvolume'), and release parameter variables VOLHGT, SIGMAX, and SIGMAY as listed in Table 2-5.
- When processing data for ISCST3, if you choose to model some of your sources as ISCST3 area sources (as discussed earlier in this section), your inventory must include the ISCST3 source type variable ISCTYPE (which must be 'iscarea'), and release parameter variables ARELHGT and AXLEN as listed in Table 2-5. Release parameter variables AYLEN, AANGLE, and AINPLUM are optional. The locational coordinates in your inventory should represent the center of the area source.

- When processing data for ISCST3, if you choose to include building parameters in your point source inventory, then building height must be specified by a variable called BLDH, and building width by BLDW, and they both must be expressed in meters.

Table 2-4. Variables Required in AirportProc Input Point Source Inventory SAS® File

Variable Name	Data Description (Required units or values are in parentheses)	Type*
CNTL_EFF	baseline control efficiency, expressed as a percentage	N
EMIS	pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within a site	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)	A5
MACTCODE	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	A25
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions) If you choose to define source groups by this variable as explained in 7.1.1 or 8.1.1, 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

Table 2-5. Additional Variables Required for AirportProc Input Point Source Inventory SAS® File when Processing ISCST3 Area or Volume Sources

Required variables are in bold

Variable Name	Data Description (Required units or values are in parentheses)	Type*
AANGLE	orientation angle of rectangle for ISCST3 area sources (degrees from North)	N
AINPLUM	initial vertical dimension of plume for ISCST3 area source (meters)	N
ARELHGT	release height above ground for ISCST3 area sources (meters)	N
AXLEN	length of X side of rectangle for ISCST3 area sources (meters)	N
AYLEN	length of Y side of rectangle for ISCST3 area sources (meters)	N
ISCTYPE	ISCST3 source type (iscpoint, iscvolume, or iscarea)	A9
SIGMAX	initial lateral dimension of volume source (meters)	N
SIGMAZ	initial vertical dimension of volume source (meters)	N
VOLHGT	release height above ground for volume source (meters)	N

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

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. When processing data for ASPEN, AirportProc uses only one ancillary input file, which is named by the keyword AIRALLC in the batch file (see Table 2-6 in the next section). This SAS® data file contains information on each airport contained within a county, including its latitude and longitude and an allocation factor. In the file supplied with EMS-HAP, which we named apt_allc, the allocation factor for commercial airports is based on the relative activity (number of passengers) 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 apt_allc unless you obtain additional information concerning airport locations or relative airport activity or if you'd like to include Alaska airports which are not represented. Figure 1 of Appendix A shows the format for this file, and Section D.4 (Appendix D) discusses how we developed it.

When processing data for ISCST3, AirportProc uses two ancillary input files: apt_allc and ISC_airport_parameters.txt. The file apt_allc is the same file used when processing data for ASPEN and is discussed above. AirportProc uses ISC_airport_parameters.txt to assign airport-specific ISCST3 area source release parameters to the airport emissions. ISCST3 area sources require the following area source release parameters: release height (ARELHGT), length of the x-side of the area (AXLEN), length of the y-side of the area (AYLEN), orientation angle for the rectangular area in degrees from North, (AANGLE), and initial vertical dimension of the area source plume (AINPLUM). If you've not included the proper airports in the

ISC_airport_parameters.txt file, then AirportProc will assign them default (as opposed to airport-specific) parameters that you must include in the batch file (see Table 2-6). Figure 2 of Appendix A shows the format for the ISC_airport_parameters.txt file, and Section E.4 (Appendix E) discusses how we developed it for an example urban area.

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. Sample batch files for AirportProc for ASPEN and ISCST3 emissions processing are shown in Figures 1 and 2, respectively, of Appendix B. The best way to prepare your batch file is to use one of the samples we provide and modify it to fit your needs.

Specify your keywords

Table 2-6 describes the keywords required in the batch file. 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. Section 2.1.2 (last paragraph) discusses the implications of your selection for ADD2PT. Use the keyword ADD2MB to select whether to append the unallocated records to the output mobile source inventory file. Section 2.1.4 discusses the implications of your selection for ADD2MB.

Table 2-6. Keywords in the AirportProc Batch File when Processing Data for Either ASPEN or ISCST3

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, prefix of filename only
INMOBIL	Input mobile source inventory SAS® file name, prefix of filename only
	Ancillary Files (Prefix of file name provided with EMS-HAP in parentheses)
REFDIR	Ancillary file directory
AIRALLC	Airport allocation SAS® file, prefix only (apt_allc)
ISCAREA*	ISCST3 area source release parameter by airport assignment text file, prefix only (ISC_airport_parameters)
	Default ISCST3 area source release parameters for aircraft emissions
DEFXLEN*	Default length of x side of airports (in the east-west direction if DEFANGLE is 0 degrees) in meters; applied to airports not in file ISCAREA
DEFYLEN*	Default length of y side of airports (in the north-south direction if DEFANGLE is 0 degrees) in meters; applied to airports not in file ISCAREA
DEFANGLE*	Default orientation angle of airports (in degrees from north, measured positive in the clockwise direction), applied to airports not in file ISCAREA
DEFRELHT*	Default release height above ground of airports in meters, applied to airports not in file ISCAREA
DEFINPLM*	Default initial vertical dimension of airports in meters, applied to airports not in file ISCAREA
	Program Options
MODEL	ASPEN=process data for ASPEN model; ISC=process data for ISCST3 model
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, prefix only
OUTMOBIL	Output mobile source inventory SAS® file name, prefix only

* used only when processing data for ISCST3

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.

Prepare the execute statement

The last line in the batch file runs the AirportProc program. In the sample batch files provided in Figures 1 and 2 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*

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 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:

- List of ISCST3 area source release parameters for airports not found in the inventory (*when processing data for ISCST3 only*)
- First 100 allocated airport sites (to get all of the allocated sites, you could analyze the point source output file discussed in Section 2.3.3 together with the airport allocation ancillary file)
- 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 (as indicated in Table 2-6). These files will serve as the inputs to the next point (PtDataProc, Chapter 3) and mobile (MobilePrep, Chapter 10) source processing programs you run. Note, however, that you can only use the file named by OUTMOBIL for input into MobilePrep if you chose to append the unallocated (county-level) aircraft emissions back to the mobile source inventory; that is, you set ADD2MB=1. If you set ADD2MB=0, then OUTMOBIL will contain only the unallocated aircraft emissions.

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

The flowcharts below (Figure 3-1) show how PtDataProc fits into EMS-HAP's point source processing for the ASPEN and ISCST3 models. The point source inventory you input to PtDataProc is the output from AirportProc (Chapter 2) or it is your initial point source inventory. You use the output inventory from PtDataProc as the input to PtModelProc (Chapter 4).

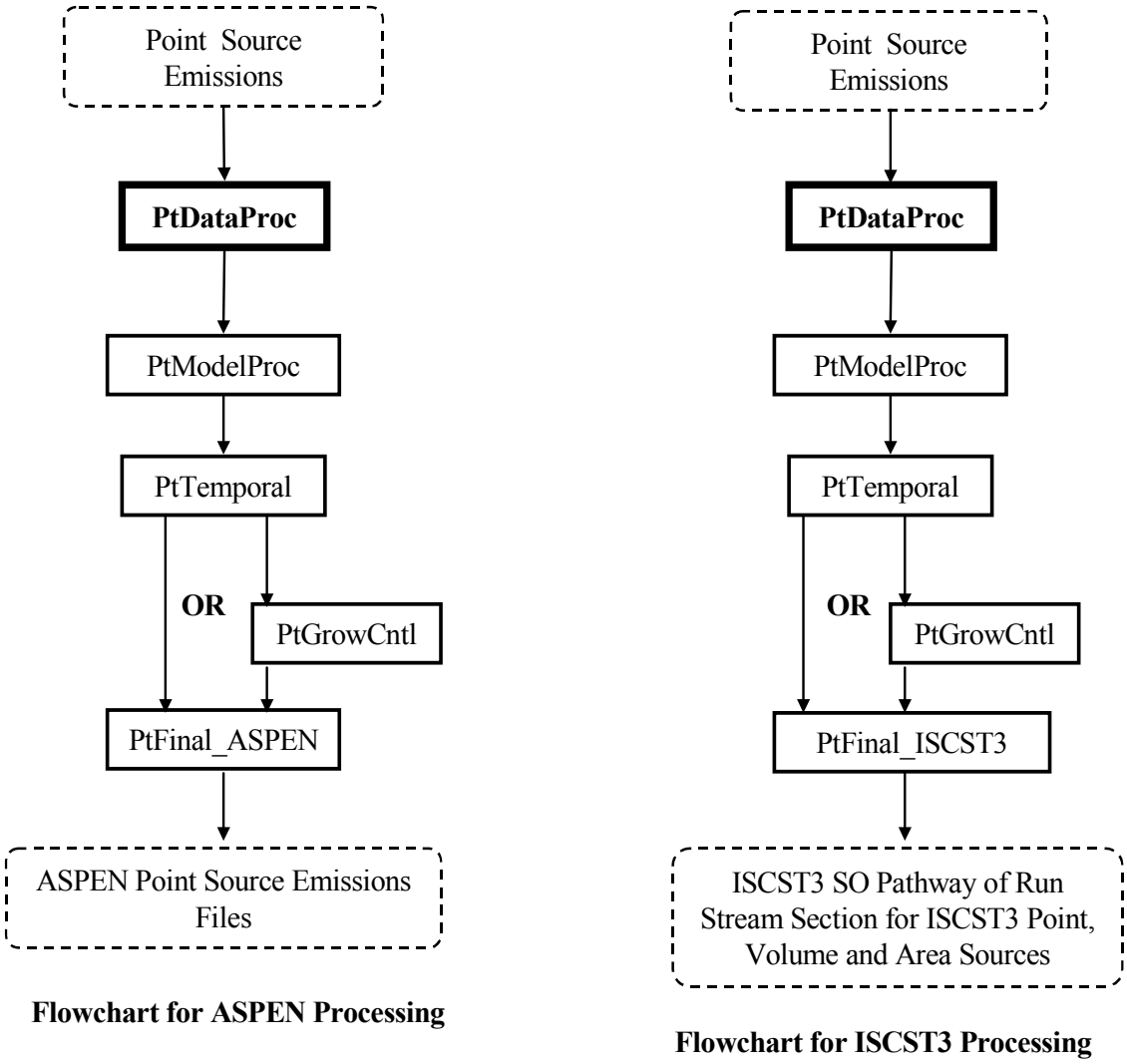


Figure 3-1. Overview of PtDataProc within EMS-HAP Point Source Processing

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 location coordinates and reasonable stack parameters. You control which of the three functions listed below are performed in any given execution of PtDataProc (see Table 3-9 in Section 3.2.3 for details how to do this).

- Quality assures point source location data
- Quality assures stack parameters- defaults if missing or out-of-range and for all allocated aircraft emissions
- Removes inventory variables and records not necessary for further processing (inventory windowing)

Figure 3-2 shows the flowchart of PtDataProc when processing data for ASPEN, and Figure 3-3 shows the flowchart of PtDataProc when processing data for ISCST3. The following sections describe the above bullets.

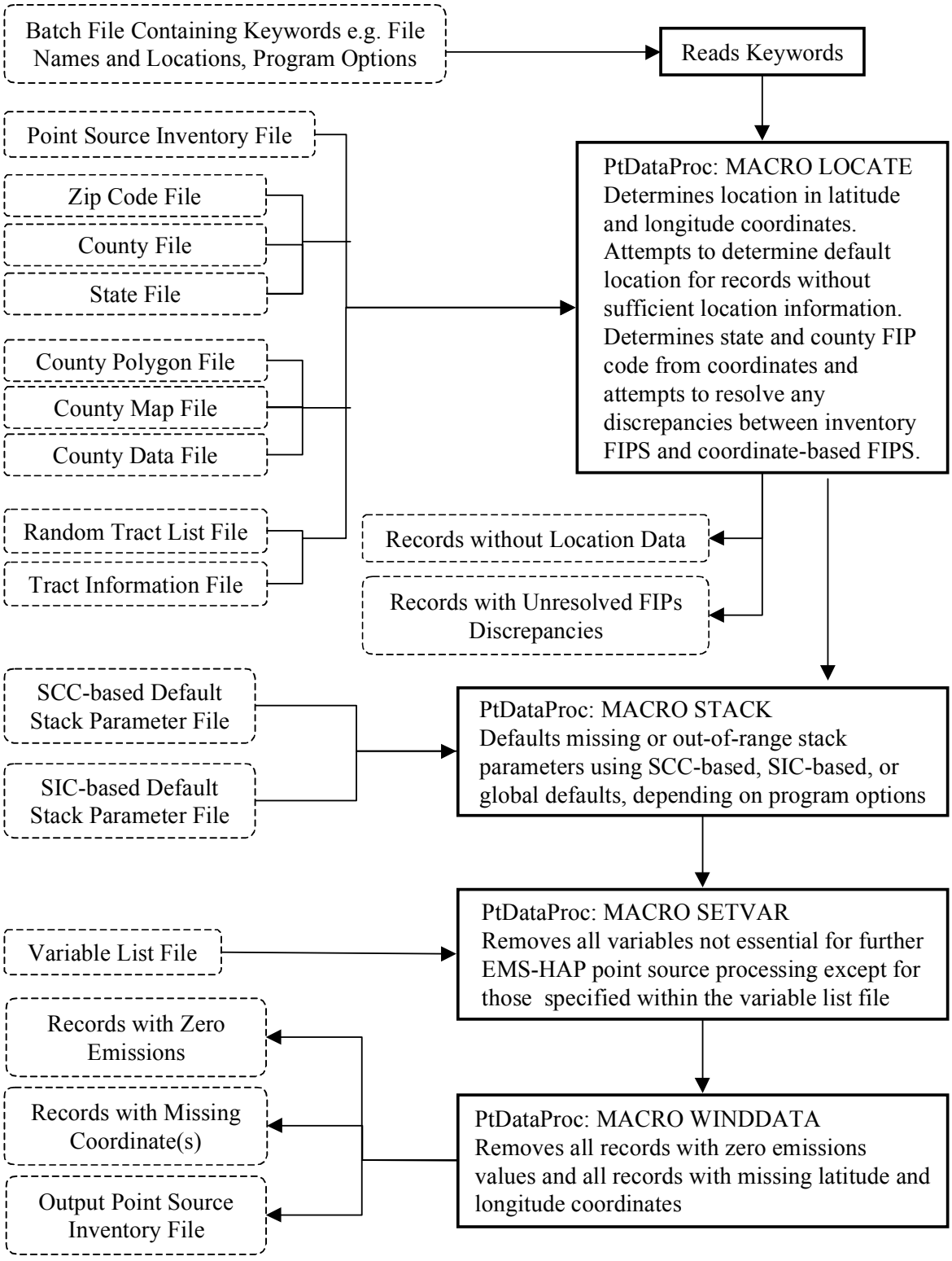


Figure 3-2. PtDataProc Flowchart when Processing Data for ASPEN

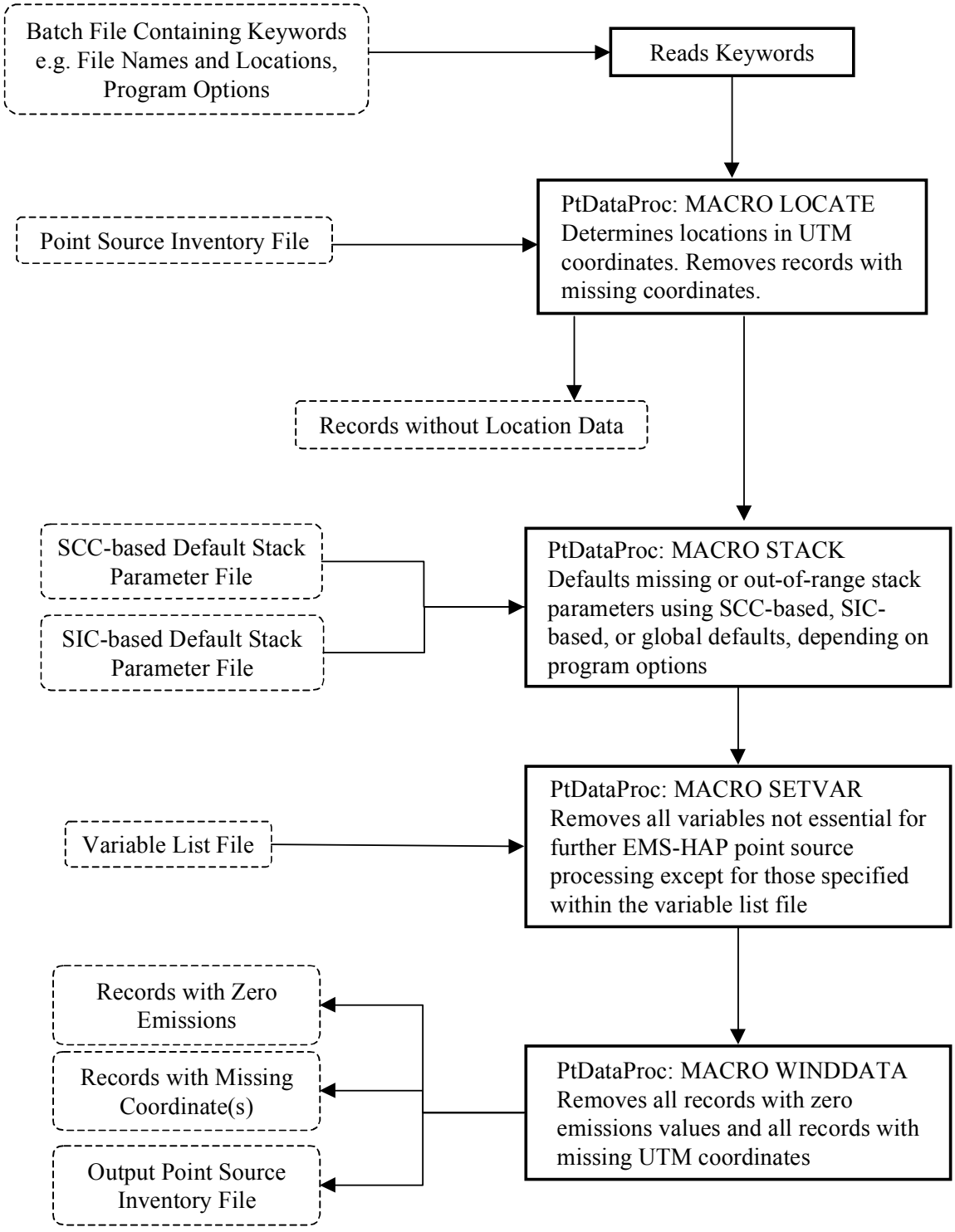


Figure 3-3. PtDataProc Flowchart when Processing Data for ISCST3

3.1.1 Quality assures point source location data

PtDataProc performs different locational data quality assurance functions when processing data for ASPEN and ISCST3. When processing data for input into either model, PtDataProc calculates the location of each point in the coordinate system appropriate for the model. Determining default geographic coordinates for missing, out-of-range, or inconsistent location data is done only when processing data for ASPEN. Generally, when you are processing for ISCST3, we expect you have properly characterized the locations of your sources within your local area and, therefore, PtDataProc does not attempt to assign default locations. Table 3-1 below summarizes the differences in how PtDataProc processes data for ASPEN versus ISCST3.

Table 3-1. PtDataProc Functions for QA of Point Source Location Data

PtDataProc Functions	When Processing Data for ASPEN Model	When Processing Data for ISCST3 Model
Calculating geographic coordinates from variables X, Y, and XY_TYPE	Calculates latitude/longitude in decimal degrees. Creates new inventory variables "LAT" and "LON" to store the calculated values.	Calculates Universal Transverse Mercator (UTM) coordinates in meters. Creates new inventory variables "UTMX" and "UTMY" to store the calculated values. Drops records when any location data are missing or zero
Defaulting missing or out-of-range location data	Defaults, where possible	No defaulting done
Checking consistency between geographic coordinates and FIPS code	Checks and resolves inconsistencies, where possible	No checking done

The following sections detail the quality assurance functions listed above.

Calculating geographic coordinates from variables X, Y, and XY_TYPE

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).

When processing data for ISCST3, PtDataProc calculates UTM in meters based on the same variables (X, Y, and XY_TYPE). For the ISCST3 model, all UTM coordinates must be expressed relative to one UTM zone for the ISCST3 domain, which you specify in the batch file (see keyword REF_ZONE, Table 3-11 in Section 3.2.3). If the UTM coordinates are expressed relative to a different zone, PtDataProc will recalculate the UTM coordinates relative to the domain zone.

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 were evaluated, PtDataProc sets the value of the diagnostic flag variable LLPROB accordingly. Table 3-2 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 point source processing.

When processing data for ISCST3, records are dropped from the inventory when the inventory location data are incomplete or missing. Specifically, this occurs when the value of either the X or Y variable is missing or when the value of the XY_TYPE variable is 'UTM' and the value of the UTM_Z variable is either missing or zero; here, the value of the LLPROB variable is assigned to 'missing.' The record is written to a SAS® data set (called "missing") and is dropped from further processing (i.e., the record will not be modeled in ISCST3).

Table 3-2. 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 when processing data for ASPEN[a]; data is dropped when processing data for ISCST3[b]	missing[a]
LAT and LON, as calculated from X, Y and XY_TYPE variables are outside of an area including the U.S., Puerto Rico, and U.S. Virgin Islands.[a]	None; defaulting will be attempted when processing data for ASPEN[a]	bad_loc[a]
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 not the same as the zone specified in the batch file (keyword REF_ZONE)[b]	UTM coordinates are converted to lat/lon coordinates and then the lat/lon coordinates are converted back to UTM coordinates relative to the correct zone when processing data for ISCST3[b]	chzone[b]
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[a]	X and Y values are used as they are and are not converted from degrees, minutes, seconds notation to decimal degrees when processing data for ASPEN[a]	decimal[a]

[a] evaluation performed and value assigned only when processing data for ASPEN
[b] evaluation performed and value assigned only when processing data for ISCST3

Defaulting missing or out-of-range location data when processing data for ASPEN only

If the location data provided on a record are 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 site. PtDataProc considers the location out-of-range if the calculated latitude and longitude are outside of an area including the 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 tract array 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 or 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 or add facilities) 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).

Checking consistency between geographic coordinates and FIPS code when processing data for ASPEN only

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 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 ensures that PtDataProc won't 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 3-3 contains the details.

Table 3-3. Resolutions in Discrepancy Between Alternate and Inventory FIPS (Processing for ASPEN only)

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 (1st two digits of the SITE_ID), or 3. The state inventory FIPS is invalid and the record doesn't have a valid postal code (e.g., the 1st two digits of the SITE_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 (1st two digits of the SITE_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 3-4 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 3-4. Assignment of Diagnostic Flag Variables LFLAG and FIPFLAG (Processing For ASPEN only)

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 if missing or out-of-range and for all allocated aircraft emissions

PtDataProc checks each record for valid stack parameters and provides defaults to missing or out-of-range data. PtDataProc determines if a non-missing stack parameter is out-of-range by comparing it to the minimum and maximum range values you provide in the batch file (see the "Valid Stack Parameter Ranges" section of Table 3-11 or 12 in Section 3.2.5). 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.

Note that when processing data for the ISCST3 model, stack parameters are not used for ISCST3 volume sources or ISCST3 area sources (including aircraft emissions processed using AirportProc). To process these sources, you must include additional release parameters in your inventory (see Table 3-7 in Section 3.2.1 or, for aircraft emissions, see Section 2.1.3). Nonetheless, PtDataProc will check and default point source stack parameters where missing or out-of-range for these sources. PtDataProc will not check or default the ISCST3 area source or volume source release parameters; thus, you must be careful when supplying this information to your inventory.

You can choose several ways for PtDataProc to default missing or out-of-range stack parameters by providing the proper keywords in your batch file (see Section 3.2.3 for details). You can have PtDataProc assign default stack parameters using the 8-digit Source Classification Code (SCC)-based and/or 4-digit Standard Industrial Classification (SIC)-based defaults. 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 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 provide in the batch file (see Tables 3-10 or 11), (2) If the stack parameters are outside of the valid range you provide in the batch file, 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 3-5. 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 3-5. 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* from the SCC default file and 'out'
	Parameter is missing	SCC-based default	Concatenation of the value of DEFFLAG variable* from the 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* from the SIC default file and 'out'
	Parameter is missing	SIC-based default	Concatenation of the value of DEFFLAG variable* from the 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 in Figures 11 and 12 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 3-9 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. When processing data for ISCST3, PtDataProc checks for the existence of the optional building dimension variables and the release parameters required to process ISCST3 area sources and volume sources (see Table 3-7). If these variables are present, PtDataProc will automatically retain them in the output inventory. To retain additional variables, set the DOSETVAR and USELIST keywords in your batch file to 1 (one), and provide a list of nonessential variables in an ancillary text file (see the varlist.txt file in Table 3-8).

Removal of Nonessential Records

You can choose to have PtDataProc remove all records that have no location coordinate data or that have zero emissions. To do this, set the value of the DOWINDOW keyword in your batch file to 1 (one). Note that if you choose to have PtDataProc perform the location data quality assurance function, windowing the inventory to remove records without location coordinate 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

The point source inventory you use for input into PtDataProc can be your initial point source inventory or, if you choose to process aircraft emissions as point source emissions, it can be the output from AirportProc (see Chapter 2). Appendix C describes how we prepared the point source inventory input file from a modeling file containing the point source portion of the July 2001 version of the 1996 NTI.

When processing data for ISCST3, please note the following:

- You have the option of including ISCST3 volume sources and ISCST3 area sources in your point source inventory. An ISCST3 volume source is used to model emission releases from various industrial sources, such as building roof monitors, multiple vents, and conveyor belts. An ISCST3 area source is used to model low level or ground level emission releases with no plume rise, such as storage piles, slag dumps, lagoons, landfills, or airports. An ISCST3 area source can also be used to model onroad mobile emissions by assigning the emissions to rectangular road segments.
- You can also include building parameters in your point source inventory.

See the last three bullets below on how to include these when processing for ISCST3.

Your input 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 3-6 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 site ID (SITE_ID), pollutant code (POLLCODE), and emission release point ID (EMRELPID).
- All stack parameters within a group of records identified by the site ID (SITE_ID), and emission release point ID (EMRELPID) must be the same.
- It shouldn't contain Alaska and Hawaii emission records unless you add Alaska and Hawaii data to the appropriate ancillary files.
- When processing data for ISCST3, if you choose to model some of your sources as ISCST3 volume sources (as discussed earlier in this section), your inventory must include the ISCST3 source type variable ISCTYPE (which must be 'iscvolume'), and release parameter variables VOLHGT, SIGMAX, and SIGMAY as listed in Table 3-7.
- When processing data for ISCST3, if you choose to model some of your sources as ISCST3 area sources (as discussed earlier in this section), your inventory must include the ISCST3 source type variable ISCTYPE (which must be 'iscarea'), and release parameter variables ARELHGT and AXLEN as listed in Table 3-7. Release parameter variables AYLEN, AANGLE, and AINPLUM are optional. The locational coordinates in your inventory should represent the center of the area source.
- When processing data for ISCST3, if you choose to include building parameters in your point source inventory, then building height must be specified by a variable called BLDH, and building width by BLDW, and they both must be expressed in meters.

Table 3-6. 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*
CNTL_EFF	baseline control efficiency, expressed as a percentage	N
EMIS	pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within a site	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	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	A25
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions) If you choose to define source groups by this variable as explained in 7.1.1 or 8.1.1, 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

Table 3-7. Additional Variables for PtDataProc Input Point Source Inventory SAS® File When Processing ISCST3 Area or Volume Sources

Required variables are in bold.

Variable Name	Data Description (Required units or values are in parentheses)	Type*
AANGLE	orientation angle of rectangle for ISCST3 area sources (degrees from North)	N
AINPLUM	initial vertical dimension of plume for ISCST3 area source (meters)	N
ARELHGT	release height above ground for ISCST3 area sources (meters)	N
AXLEN	length of X side of rectangle for ISCST3 area sources (meters)	N
AYLEN	length of Y side of rectangle for ISCST3 area sources (meters)	N
ISCTYPE	ISCST3 source type (iscvolume or iscarea)	A9
SIGMAX	initial lateral dimension of volume source (meters)	N
SIGMAZ	initial vertical dimension of volume source (meters)	N
VOLHGT	release height above ground for volume source (meters)	N

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

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 3-8 lists the ancillary input files for PtDataProc and when you may need to modify those supplied with EMS-HAP.

Table 3-8. Required Ancillary Input Files for PtDataProc

Files used when processing data for both ASPEN and ISCST3 are in bold; files identified by an asterisk (*) are used only when processing data for ASPEN

Name of File Provided with EMS-HAP	Purpose	Need to Modify?	Format
zipcodes*	Assigns default location coordinates by zip code	If your inventory contains Alaska (and want the ability to default by zip code), you need to add it to this file. Or, to update data from 1996.	SAS®
cty_cntr*	Determines validity of state and county FIPS	If you are modeling Alaska or Hawaii you need to add them to this file. Or, to update data from 1996.	SAS®
st_cntr*	Determines state FIPS from postal code	"	SAS®
counties*	Determines state and county FIPS from geographic coordinates	If you are modeling Alaska you need to add it to this file. Or, to update data from 1996.	SAS®
bound6*	"	"	SAS®
cntyctr2*	"	"	SAS®
trctarry*	Assigns random census tract by county for purpose of assigning default location coordinates	If you are modeling Alaska or Hawaii you need to add them to this file. Or, to update data from 1996.	SAS®
tractinf*	Provides census tract centroid coordinates for default location coordinates	"	SAS®
def_scc.txt	Assigns default stack parameters by SCC if you choose this option	If you want to use different default stack parameters by SCC	Text
def_sic.txt	Assigns default stack parameters by SIC if you choose this option	If you want to use different default stack parameters by SIC	Text
varlist.txt	Provides list of non-essential variables to be retained in inventory if you choose this option	If you want to retain different non-essential variables in your 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. Sample batch files for PtDatalProc for ASPEN and ISCST3 emissions processing are shown in Figures 3 and 4, respectively, of Appendix B. The best way to prepare your batch file is to use one of the samples we provide and modify it to fit your needs.

Specify your keywords

Table 3-9 shows you how to specify keywords to select which functions you want PtDataProc to perform. For example, if you've already calculated your appropriate location coordinates and quality assured them, you may choose not to use this function. For this situation, set the keyword "DOLOCATE" to zero.

Table 3-9. Keywords for Selecting PtDataProc Functions

PtDataProc Function	Keyword (values provided cause function to be performed)
Process data for ASPEN model	MODEL = ASPEN
Process data for ISCST3 model	MODEL = ISC
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

The keywords required in the batch file used to process data for the ASPEN model are described in Table 3-10. PtDataProc is the only EMS-HAP program that uses "include" programs within the main program. When processing data for ASPEN, three include programs are used: 1) validFIP checks the validity of the FIPS code in the emission inventory; 2) utm2ll computes latitude and longitude coordinates from UTM coordinates; and 3) latlon2fip computes FIPS codes based on the inventory geographic coordinates. These programs must be located in the directory specified by the keyword INC_DIR in the batch file. In addition, you must put the three ancillary files used by latlon2fip program 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).

For processing data for the ISCST3 model, the keywords required in the batch file are described in Table 3-11. Two include programs are also used when processing data for ISCST3: 1) ll2utm computes UTM coordinates from latitude and longitude coordinates; and 2) utm2ll computes latitude and longitude coordinates from UTM coordinates. These programs must be located in the directory specified by the keyword INC_DIR in the batch file.

Note the sections called "Valid Stack Parameter Ranges" and "Global Stack Parameters" used to process data for both ASPEN and ISCST3. 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 3-10. Keywords in the PtDataProc Batch File when Processing Data for ASPEN

Keyword	Description of Value
	Input Inventory Files
IN_DATA	Input SAS® file directory
INSAS	Input inventory SAS® file name, prefix of file name only
	Program Files
INC_DIR	Include program directory. This directory must contain the SAS® programs validFIP, utm2ll, and 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 only(zipcodes)
CNTYCENT	County FIPS to county centroid location SAS® file, prefix only (cty_cntr)
STCENT	State FIPS to postal code cross-reference SAS® file, prefix only (st_cntr)
TRACTS	County FIPS to random list of tracts correspondence SAS® file, prefix only (trctarry)
TRCTINFO	Census tracts to state and county FIPS code, tract centroid, and tract radius correspondence SAS® file, prefix only (tractinf)
SCCDEFLT	SCC to default stack parameters correspondence text file, prefix only (def_scc)
SICDEFLT	SIC to default stack parameters correspondence text file, prefix only (def_sic)
VARLIST	file containing list of additional, nonessential variables to be retained in inventory output file, prefix only (varlist)
	Program Options (see also Table 3-9)
MODEL	ASPEN=process data for ASPEN model
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
DOSETVAR	1=retain variables required for further processing and only those non-essential variables specified by you, based on 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

Table 3-10. Keywords in the PtDataProc Batch File when Processing Data for ASPEN
(continued)

Keyword	Description of Value
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)
	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)
	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), prefix only
FINAL	Output inventory SAS® file name after windowing, prefix only
NOLOCATE	Output data SAS® file name containing records without coordinates, prefix only
ZEROEMIS	Output data SAS® file name containing records with zero emissions values, prefix only

Table 3-11. Keywords in the PtDataProc Batch File when Processing Data for ISCST3

Keyword	Description of Value
	Input Inventory Files
IN_DATA	Input SAS® file directory
INSAS	Input inventory SAS® file name, prefix of file name only
	Program Files (Prefix of file name provided with EMS-HAP in parentheses)
INC_DIR	Include program directory. This directory must contain the SAS® programs ll2utm and utm2ll.
	Ancillary Files (Prefix of file name provided with EMS-HAP in parentheses)
REFTEXT	Ancillary text file directory
SCCDEFLT	SCC to default stack parameters correspondence text file, prefix only (def_scc)
SICDEFLT	SIC to default stack parameters correspondence text file, prefix only (def_sic)
VARLIST	File containing list of additional, nonessential variables to be retained in inventory output file, prefix only (varlist)
	Program Options (see also Table 3-9)
MODEL	ISC=process data for ISCST3 model
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
DOSETVAR	1=retain variables required for further processing and only those non-essential variables specified by you, 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)
	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)

Table 3-11. Keywords in the PtDataProc Batch File when Processing Data for ISCST3
(continued)

Keyword	Description of Value
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
REF_ZONE	UTM zone for ISCST3 model domain
	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), prefix only
FINAL	Output inventory SAS® file name after windowing
NOLOCATE	Output data SAS® file name containing records without coordinates, prefix only
ZEROEMIS	Output data SAS® file name containing records with zero emissions values, prefix only

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. You do not need to include keywords required for processing data for ASPEN when processing data for ISCST3 and vice versa.

Prepare the execute statement

The last line in the batch file runs the PtDataProc program. In the sample batch files provided in Figures 3 and 4 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/work1/dyl/' assigns a work directory called "/data/work1/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*

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 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 created when PtDataProc is executed contains information to assist in quality assurance. This file can contain the information listed below. The contents of the list file from a specific run of PtDataProc depend on which functions you choose to have PtDataProc perform.

- First 100 sites* requiring location defaulting due to missing or invalid location data *(when processing data for ASPEN only)*
- First 100 sites* dropped from the inventory because a default location could not be determined; emission total from all records dropped from inventory *(when processing data for ASPEN only)*

- First 100 sites* dropped from the inventory because the disagreement between the location and FIPS of the site could not be resolved; emission total from all records dropped from inventory *(when processing data for ASPEN only)*
- Pollutant and state-level emission totals and record counts after all location defaulting is complete *(when processing data for ASPEN only)*
- First 100 sites* with out-of-range stack parameters; emission total from all records with out-of-range stack parameters
- Pollutant and state-level emission totals and record counts after defaulting stack parameters

* You can analyze the output inventory and additional QA files (Section 3.3.3) to get a complete list of sites with the above-stated problems. We chose 100 of them to be printed out in the list file arbitrarily.

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 PtModelProc, you'll 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, shown in Table 3-12, containing information on the location and stack parameters were defaulted or dropped from the inventory.

Table 3-12. Additional QA Files Created by PtDataProc

QA output files	File Contents
Function: Quality assurance of location data when processing data for ISCST3	
missing	all records found to have missing location data; these records are dropped from the inventory
Function: Quality assurance of location data when processing data for ASPEN	
dfltloc	all records where location was defaulted because of missing or invalid location data
nolocate.txt, nolocate	all records dropped from inventory because a default location could not be determined
nomodel.txt, nomodel	all records dropped from inventory because discrepancy between location and county FIPS could not be resolved
Function: 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 3-10 or 3-11
Function: Window inventory to exclude nonzero emissions and unlocated sites	
file named by keyword ZEROEMIS	all records dropped from the inventory where emission values are zero
file named by 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)

CHAPTER 4
Point Source Processing
The Model-Specific Program (PtModelProc)

The flow charts below (Figure 4-1) show how PtModelProc fits into EMS-HAP's point source processing for the ASPEN and ISCST3 models. The point source inventory you input to PtModelProc is the output from PtDataProc (Chapter 3). You use the output inventory from PtModelProc as the input to PtTemporal (Chapter 5).

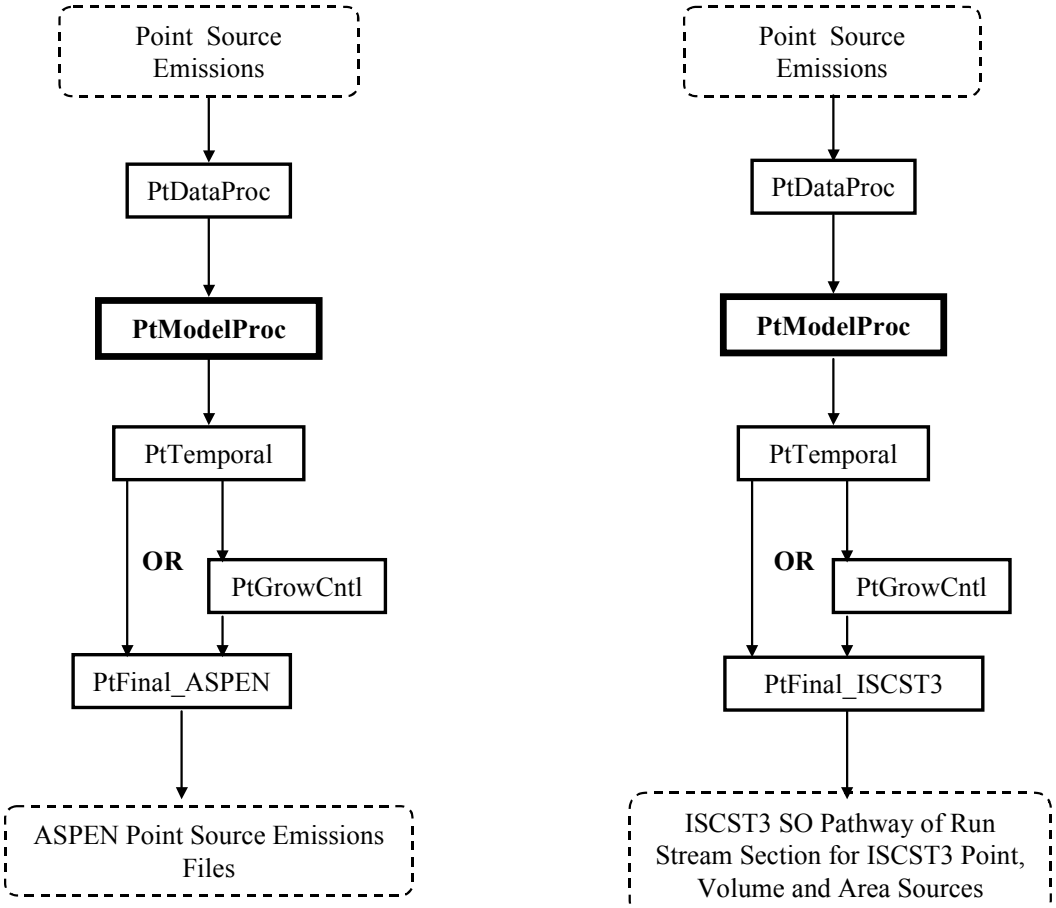


Figure 4-1. Overview of PtModelProc within EMS-HAP Point Source Processing

4.1 What is the function of PtModelProc?

The Model-Specific Processing Program (PtModelProc) performs pollutant selection, grouping and partitioning functions and assigns pollutant and source-specific parameters to the point source inventory. In particular, PtModelProc performs the functions listed below:

- Selects pollutants, groups and/or partitions pollutants, and determines their characteristics
- Assigns urban/rural dispersion parameters when processing data for ASPEN only
- Assigns vent type (ASPEN only) and building parameters (for both ASPEN and ISCST3)

Figure 4-2 shows a flowchart of PtModelProc when processing data for ASPEN and for ISCST3. The following sections describe the above bullets.

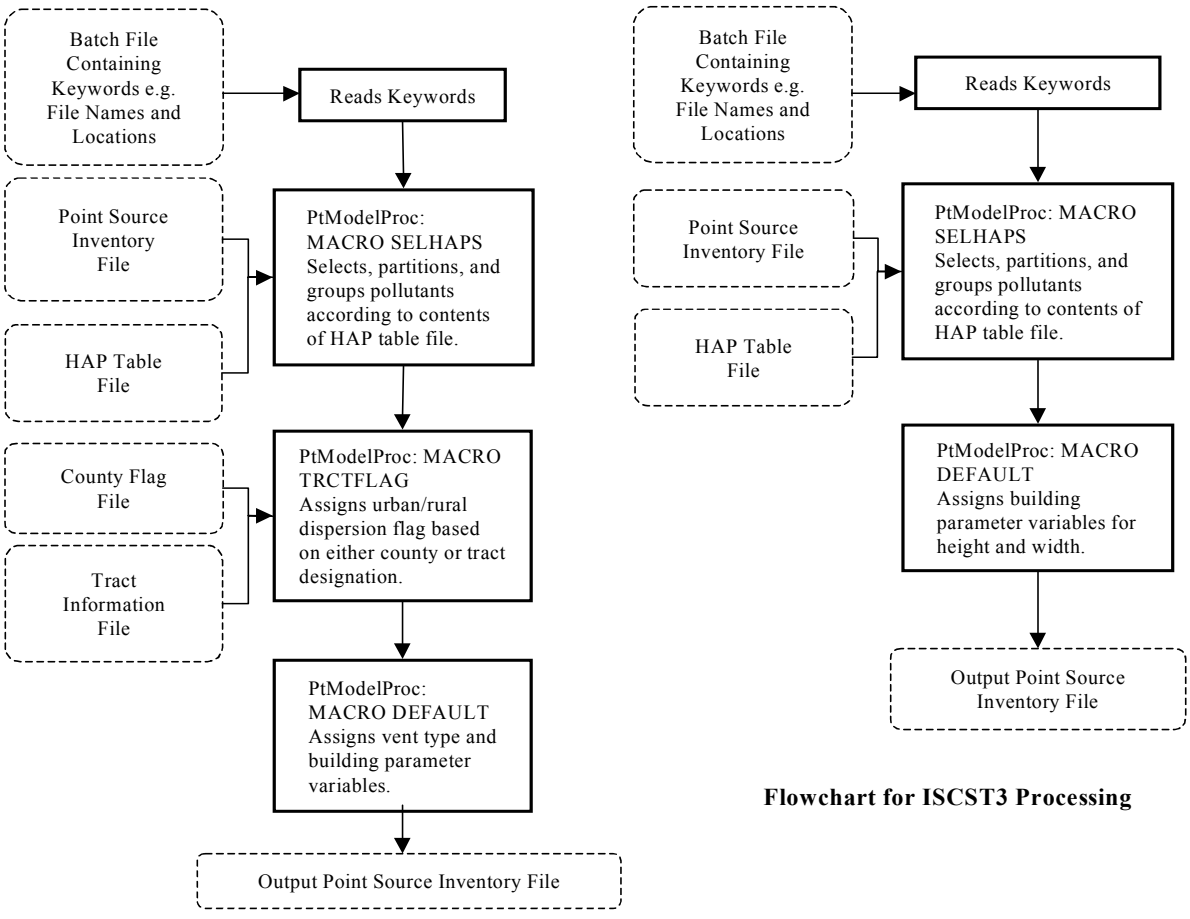


Figure 4-2. PtModelProc Flowcharts when Processing Data for ASPEN and ISCST3

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

PtModelProc reads the point source inventory and selects, partitions, and groups pollutants to be modeled by either ASPEN or ISCST3. It also assigns the pollutant characteristics of "reactivity class" or "particulate size class" that the ASPEN model uses to control reactive decay and deposition. Note that ISCST3 doesn't use the reactivity/particulate class assignments. ISCST3 includes algorithms to model pollutant and source-specific gravitational settling and removal by wet and dry deposition; the variables required for these algorithms are assigned in PtFinal_ISCST3 (see Section 8.1.3).

You control the selection, partitioning and grouping of pollutants, and the assignment of reactivity/particulate size class through your entries in an ancillary file that we refer to as the "HAP table." PtModelProc uses two HAP table files. One is for the allocated aircraft emissions which you obtained by running AirportProc. The other is for all other (i.e., non-aircraft) point sources.

PtModelProc 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". PtModelProc'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 aircraft emission sources when you run these sources together with the non-aircraft point sources through the point source processing programs.

PtModelProc uses the HAP table to:

- Subset the inventory to include only those pollutants you've chosen to model
- Group multiple inventory species into a single pollutant category
- Partition inventory species into multiple pollutant categories with different reactivity or particulate size classes. For example, apportion lead chromate to: 1) lead compounds, fine particulate; 2) lead compounds, coarse particulate; 3) chromium compounds, fine particulate and 4) chromium compounds, coarse particulate
- Assign a reactivity class to each gaseous pollutant and a particulate size class to each particulate pollutant (through the variable REACT). Note that when processing for ISCST3, PtModelProc assigns this variable, but it is not used.
- Apply a mass adjustment factor (FACTOR variable) to the emissions of an inventory species to partition it among multiple pollutant categories, account for a particular portion of it (e.g., the lead portion of lead sulfate), or adjust its potency to determine a toxics or reactivity equivalency
- Assign the resulting pollutant or pollutant category to be modeled a unique HAP code (variable NTI_HAP) used for inventory projections in PtGrowCntl, a unique pollutant code (variable SAROAD) and a description (variable SAROADDC)

Section 4.2.3 contains instructions on how to modify a HAP table to meet your needs. Appendix A, Tables 1 though 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 when processing data for ASPEN only

The dispersion algorithm in the ASPEN model uses different dispersion parameters and deposition rates for urban and rural sources to account for the effect of land characteristics (e.g., numerous tall buildings) on these mechanisms. Therefore, each source must be identified as being either in an urban or rural census tract. PtModelProc supplies this information through the assignment of the urban/rural flag where a value of 1 (one) indicates an urban tract, and a value of 2 indicates a rural tract. When running the ISCST3 model, the urban/rural designation is made for all of the sources within a model run by a setting within the control option pathway; therefore, EMS-HAP does not assign an urban/rural flag when processing for ISCST3.

In the situation where all of the tracts within a county are either all urban or all rural, PtModelProc assigns the urban/rural flag by matching the state and county FIPS code to county data in an ancillary file called ctyflag. This file 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, PtModelProc assigns the urban/rural flag by determining the specific tract in which the site 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).[6] 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. Note this population-based approach is a surrogate for land characteristics, and has no relation to the various population-based methods used for designating counties or tracts as urban/rural used by the census.

You can change the urban/rural designations used for ASPEN modeling by changing ctyflag and tractinf. They are described briefly in Section 4.2.2 (Table 4-5), and their formats are provided in Figures 15 and 10, respectively of Appendix A.

4.1.3 Assigns vent type and building parameters

When processing data for the ASPEN model, PtModelProc assigns the vent type variable (IVENT) based on the stack type, as specified by the emission release point type variable (EMRELPTY). See Table 4-1 for the details. 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 (one), a non-stacked vent, ASPEN does not perform plume rise calculations.

Table 4-1. Assignment of Vent Type Variable for ASPEN Model

Stack Type	Value of EMRELPTY	Assigned Value of IVENT
vertical, goose neck, vertical with rain cap, downward-facing vent	02,04,05,06	0
horizontal	03	1
fugitive	01	1
aircraft emissions	AP	1

The building parameters required by the ASPEN model are: building code (variable IBLDG), building width (variable BLDW), and building height (variable BLDH). For ASPEN processing, PtModelProc sets IBLDG to 1 (one) and BLDH and BLDW to 5 meters for horizontal stacks; for all other stacks, PtModelProc sets IBLDG, BLDH and BLDW to 0.

When processing data for the ISCST3 model, there is no distinction made between different vent types; therefore no IVENT variable is assigned. However, EMS-HAP (in a subsequent program) uses the EMRELPTY variable in defaulting fugitive and horizontal stacks to ISCST3 volume sources. As described previously, ISCST3 can model three types of sources at specific locations: point sources, area sources, and volume sources. An ISCST3 volume source is used to model emission releases from various industrial sources, such as building roof monitors, multiple vents, and conveyor belts. Point sources designated as fugitive sources and horizontal stacks are best modeled as ISCST3 volume sources. In the program PtFinal_ISCST3, default ISCST3 volume source release parameters are assigned to the fugitive sources (EMRELPTY = 1) and horizontal stacks (EMRELPTY = 3) in order to model these sources as ISCST3 volume sources (see Chapter 8, Section 8.1.2)

For ISCST3 processing, building width and building height may be specified for ISCST3 point sources. PtModelProc assigns these building parameters to sources that don't already have them in your inventory based on stack height. If your inventory includes ISCST3 area sources, such as aircraft emission sources, PtModelProc assigns these parameters to these sources as well, even though (similar to point source stack parameters) they are not used in the ISCST3 model. As discussed in Chapter 3 (Section 3.2.1), if you have information on building width and height for some or all of the sources, you can include BLDW and BLDH in your input inventory. In this case, PtModelProc only assigns default values when the values for these are missing. If your inventory does not contain these variables, PtModelProc creates them and assigns default values relative to the stack height for any source with a stack height taller than 65 meters. This is the maximum height where building downwash effects the plume. Table 4-2 shows how PtModelProc assigns these variables. As shown in Table 4-2, the minimum default building height allowed is 3.05 meters; default building heights less than this are set to 3.05 meters.

Stacks with heights greater than or equal to 65 meters are not assigned building parameters; their values remain as missing.

Table 4-2. Assignment of Default Building Height and Width for the ISCST3 Model

	Default Building Height (BLDH)		
Stack Height	**Maximum Value**	**Minimum Value**	**Default Building Width (BLDW)**
Stack Height Less than 65 Meters	Stack Height x 0.625	3.05	Building Height x 2
Stack Height Greater than or Equal to 65 Meters	missing	missing	missing

4.2 How do I run PtModelProc?

4.2.1 Prepare your point source inventory for input into PtModelProc

The point source inventory you use for input into PtModelProc can come from a variety of sources, but you will likely use the output inventory created by PtDataProc (see Chapter 3). When you are processing data for ASPEN and your inventory includes allocated aircraft emissions (from running AirportProc, see Chapter 2), you must run PtDataProc in order to assign default values to the missing aircraft emission stack parameters. This is not required when you are processing data for ISCST3, because aircraft emissions are modeled as ISCST3 area sources and stack parameters are not used for this ISCST3 source type. If your input to PtModelProc is the result of processing through PtDataProc, the inventory will meet all requirements.

When processing data for ASPEN, this inventory will contain at least the variables listed in Table 4-3. 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 and the contents of the varlist.txt file in PtDataProc (see Section 3.1.3).

When processing data for ISCST3, this inventory will contain the variables listed in Table 4-4 with some exceptions. Only if you have included ISCST3 area and/or volume sources will the inventory contain the release parameter variables required for these sources (see Section 3.2.1 for a description of these source types). Only if you have included building parameters will the inventory contain the variables BLDH and BLDW. The inventory may contain additional variables such as the diagnostic flag variables LLPROB or FIPFLAG created by PtDataProc depending on the options you chose for the windowing function and the contents of the varlist.txt file used in PtDataProc.

Table 4-3. Variables in the PtModelProc Input Point Source Inventory SAS® File when Processing Data for ASPEN

Variables used by PtModelProc 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*
CNTL_EFF	baseline control efficiency, expressed as a percentage	N
EMIS	pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within a site	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 (decimal degrees)	N
LON	longitude (negative decimal degrees)	N
MACTCODE	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	A25
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions). If you choose to define 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

Table 4-4. Variables in the PtModelProc Input Point Source Inventory SAS® File when Processing Data for ISCST3

Variables used by PtModelProc 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*
AANGLE[c]	orientation angle of rectangle for ISCST3 area sources (degrees from North)	N
AINPLUM[c]	initial vertical dimension of plume for ISCST3 area source (meters)	N
ARELHGT[a]	release height above ground for ISCST3 area sources (meters)	N
AXLEN[a]	length of X side of rectangle for ISCST3 area sources (meters)	N
AYLEN[c]	length of Y side of rectangle for ISCST3 area sources (meters)	N
BLDH[c]	building height (meters)	N
BLDW[c]	building width (meters)	N
CNTL_EFF	baseline control efficiency, expressed as a percentage	N
EMIS	pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within a site	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
ISCTYPE[a,b]	ISCST3 source type (iscarea or iscvolume)	A9
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
SIGMAX[b]	initial lateral dimension of volume source (meters)	N
SIGMAZ[b]	initial vertical dimension of volume source (meters)	N
SITE_ID	code identifying a unique site	A25
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions). If you choose to define source groups by this variable as explained in 8.1.1, or run PtGrowCntl (Chapter 6) then it must have the value of 'major' or 'area' for non-aircraft emissions.	A15

Table 4-4. Variables in the PtModelProc Input Point Source Inventory SAS® File when Processing Data for ISCST3
(continued)

Variable Name	Data Description (Required units or values are in parentheses)	Type*
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
UTMX	UTM easting (meters)	N
UTMY	UTM northing (meters)	N
VOLHGT[b]	release height above ground for volume source (meters)	N

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

[a] variables required for processing ISCST3 area sources

[b] variables required for processing ISCST3 volume sources

[c] additional variables only included when information is available

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

An ancillary file is any data file you input to the program other than your emission inventory. Table 4-5 lists the ancillary input files for PtModelProc. 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 sources (point and non-point, onroad mobile, and nonroad mobile) and for different pollutant types (directly emitted HAPs, and precursors that lead to secondary HAP formation). Section D.5 (Appendix D) 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. You will need to modify the HAP tables if your inventory contains species not contained the files supplied with EMS-HAP. 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 through 4).

Table 4-5. Required Ancillary Input Files for PtModelProc

Name	Purpose	Need to Modify?	Format
HAP table for non-aircraft point sources	Selects pollutants to be modeled, groups and partitions pollutants, assigns reactivity and particulate size classes used for ASPEN only, adjusts emissions for non-aircraft point source emission records	If you choose to change selection or characteristics of pollutants or if your inventory includes species that aren't in the HAP tables we supplied.	Text
HAP table for aircraft sources	Selects pollutants to be modeled, groups and partitions pollutants, assigns reactivity and particulate size classes used for ASPEN only, adjusts emissions for allocated aircraft emission records	"	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, model with tracts based on census data other than 1990, or to add Alaska and/or Hawaii	SAS®
ctyflag*	Assigns urban/rural dispersion flag based on county FIPS for counties with uniform census tracts	"	SAS®

* required only when processing data for ASPEN

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, non-point, onroad and nonroad sources. (Not used when processing for ISCST3)

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. They are only used when processing for ASPEN.

PtModelProc 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 PtModelProc 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 (which you would only do for ASPEN)..

You may not need to modify any of the HAP table files provided with EMS-HAP. The most likely reasons to modify one of these files would be to select different pollutants to model, or to assign reactivity/particulate size classes differently. You must, however, change the files if they don't include all species contained in your inventory. Do this by adding records for these species to HAP table files. Otherwise, EMS-HAP won't process these pollutants and it won't pass them to the 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 pollutant category (when processing precursor emission data for ASPEN), or expressing the mass of metal-containing HAPs as the mass of the metal only. PtModelProc makes these adjustments to the emissions by applying a mass adjustment factor also included in the HAP table file. ASPEN and ISCST3 modeling requires that every pollutant or pollutant category be assigned a unique code and, for ASPEN modeling, a corresponding reactivity/particulate size class (represented by the variable REACT). PtModelProc assigns these based on the information in the HAP table file. The HAP table we supply uses the SAROAD code as the unique pollutant/pollutant category code because that is the code described in the ASPEN User's guide to identify a pollutant, and ASPEN requires it to be a 5-digit code. This code comes from the air pollution chemical species classification system used in EPA's initial data base for "Storage and Retrieval of Aerometric Data." For pollutants/pollutant categories that do not have this code, we have arbitrarily assigned a 5-digit code.

Table 4-6 shows the format of the HAP tables that PtModelProc uses for HAP-specific processing. When processing data for ASPEN, 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). Note that the variable REACT is not required when processing data for ISCST3. PtModelProc does not default any information not present in your HAP table.

Table 4-6. Structure of the HAP Table

Variable name used in PtModelProc	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 (the 1996 NTI typically uses a Chemical Abstracts System [CAS] No. where available)	C	100	10	
REACT[a]	Reactivity/particulate 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

* C=character, N=numeric

[a] required only when processing data for ASPEN

Table 4-7 gives sample entries which illustrate the key HAP-specific modeling features of EMS-HAP. Note that “lead compounds coarse” has a different SAROAD code from “lead compounds, fine”. They are therefore treated as two distinct pollutant categories. To get the emissions of total lead, you would need to sum up the emissions of the two separate SAROAD codes representing these two separate pollutants.

Table 4-7. Sample Entries in a HAP Table

Inventory species name	HAP category name	NTI species code	React-ivity or Particulate size 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.'

Combining/partitioning inventory species into groups

To group or partition inventory species, follow the directions in Table 4-8 below. If you are partitioning HAPs, you must also adjust the FACTOR variable discussed later in this section.

Table 4-8. 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 4-9 for information on how to adjust the FACTOR variable.	Table 4-7 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 4-7 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 4-7 shows how to group six lead inventory entries into "Lead Compounds" and in turn divide them into fine and coarse particulates. Note that 12 records are needed in the HAP table, two for each of the six species. The two resulting pollutant categories are assigned to different particulate size classes.

Assigning ASPEN reactivity/particulate size classes to the pollutants when processing data for ASPEN only

When processing data for ASPEN, make sure your HAP table has an assignment of the REACT variable for every pollutant you want to model. If you have different information on how HAPs partition between fine and coarse particulate size classes or between gas and particulate matter, you may want to revise the HAP tables provided. To do this, you need to read about combining and partitioning inventory species into groups presented in the previous 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 4-6, 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 μm- (REACT=2)
- coarse: particles with aerodynamic diameter between 2.5 and 10 μm- (REACT=3)

This classification system and the associated decay coefficients were developed for the Cumulative Exposure Project (CEP).[7] The decay coefficients are a function of both reactivity class, stability class, and time block; the actual values are provided in Table D-5 in Appendix D. EMS-HAP provides the coefficients to the ASPEN input file through the ancillary file called indecay.txt. This file is used with PtFinal_ASPEN (Chapter 7, see 7.2.2) and AMProc (Chapter 11, see 11.2.2). Figure 28 in Appendix A contains its format and sample file contents.

Adjusting emissions

Use the FACTOR variable to make adjustments to emissions as shown in Table 4-9. If you are not adjusting emissions, you must set the FACTOR variable to 1 (one). *A missing FACTOR variable will drop emissions for that pollutant from your inventory*

Table 4-9. Using the 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 PtModelProc groups and partitions inventory species. Refer to Table 4-7 for the factors used in this example. A given stack emits lead oxide, lead carbonate, and lead sulfate emissions. PtModelProc 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. Sample batch files for PtModelProc for ASPEN and ISCST3 emissions processing are shown in Figures 5 and 6, respectively, of Appendix B. The best way to prepare your batch file is to use one of the samples we provide and modify it to fit your needs.

Specify your keywords

Table 4-10 describes the keywords required in the batch file when processing data for ASPEN. Table 4-11 describes the keywords required in the batch file when processing data for ISCST3.

Table 4-10. Keywords in the PtModelProc Batch File when Processing Data for ASPEN

Keyword	Description of Value
	Input Inventory Files
IN_DATA	Input SAS® file directory
INSAS	Input inventory SAS® file name, prefix of file name only
	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 used for non-aircraft point source emissions, prefix only (haptabl_point_area or haptabl_precursor)
MOBHAPS	HAP table file used for aircraft point source emissions, prefix only (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, prefix only (ctyflag)
TRCTINF	Census tract information SAS® file containing data necessary to assign an urban/rural flag, prefix only (tractinf)
	Program Options
MODEL	ASPEN=process data for ASPEN model
	Output files
OUTDATA	Output SAS® file directory
OUTSAS	Output inventory SAS® file name, prefix only

Table 4-11. Keywords in the PtModelProc Batch File when Processing Data for ISCST3

Keyword	Description of Value
	Input Inventory Files
IN_DATA	Input SAS® file directory
INSAS	Input inventory SAS® file name, prefix of file name only
	Ancillary Files (Prefix of file name provided with EMS-HAP)
REFTEXT	Ancillary text file directory
PTHAPS	HAP table file used for non-aircraft point source emissions, prefix only (haptabl_point_area)
MOBHAPS	HAP table file used for aircraft point source emissions, prefix only (haptabl_nonroad)
	Program Options
MODEL	ISC=process data for ISCST3 model
	Output files
OUTDATA	Output SAS® file directory
OUTSAS	Output inventory SAS® file name, prefix only

Prepare the execute statement

The last line in the batch file runs the PtModelProc program. In the sample batch files provided in Figures 5 and 6 of Appendix B, you will see a line preceding the run line that creates a copy of the PtModelProc 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 PtModelProc 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 PtModelProc. In the sample batch file, a work directory is defined on the last line following the execution of PtModelProc. For example, the command 'sas PtModelProc_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 PtModelProc

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 PtModelProc.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, 'PtModelProc.bat'.

4.3 How do I know my run of PtModelProc 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 created when PtModelProc is executed contains information to assist in quality assurance. This file can contain the information listed below.

- List of records (if any) from the inventory with pollutant codes not included in the HAP tables
- List of pollutants codes retained for modeling based on the HAP tables, including the SAROAD assignment and FACTOR variable
- List of pollutant codes not retained for modeling based on the HAP tables, including the 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 modeling after application of FACTOR variable
- SAROAD-level emission totals after selection of pollutants, application of FACTOR variable, and accumulation by SAROAD code
- SAROAD-level emission totals for output inventory from PtModelProc

You should check to be sure that all pollutants of interest are included in your HAP tables by reviewing the first list of records describes 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 PtModelProc.

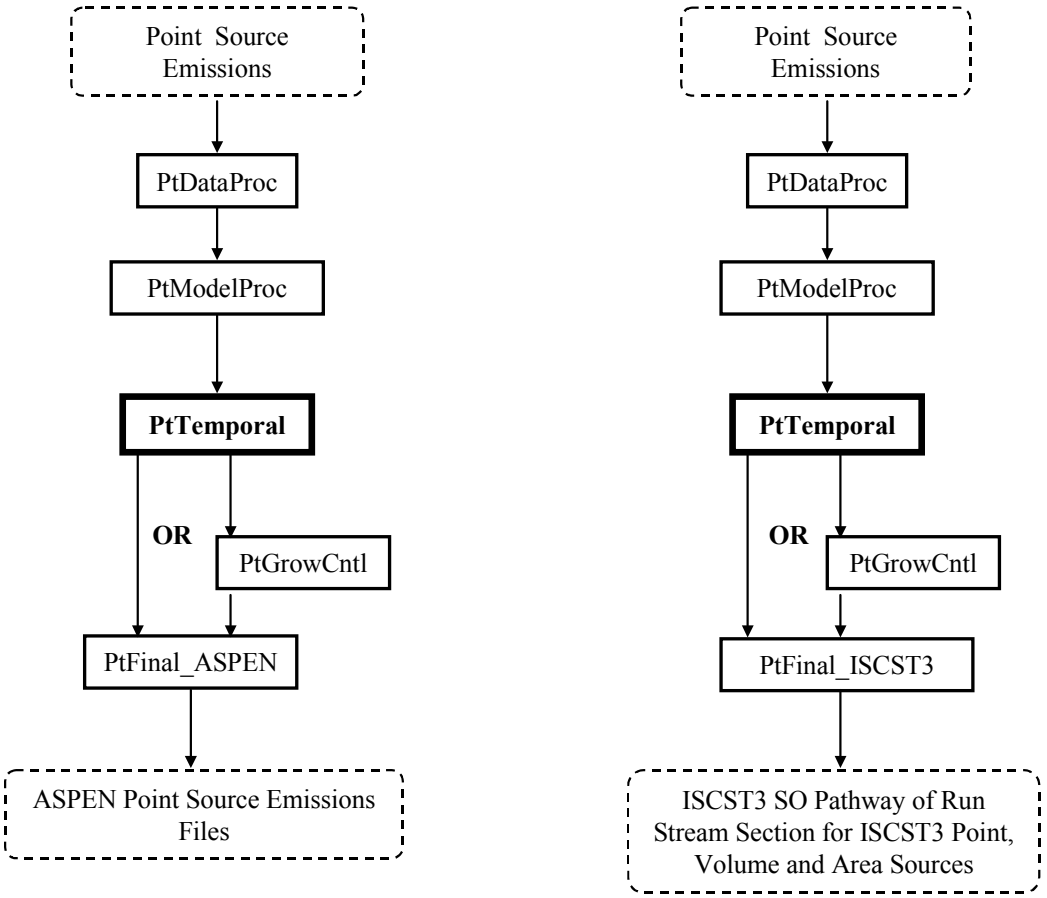
It is important to check the accuracy of the pollutant selection, the application of the FACTOR variable, and the accumulation of emissions to the SAROAD code groups. The tables comparing the emission totals between the pollutants retained for modeling and those not retained to the input emission inventory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

4.3.3 Check other output files from PtModelProc

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

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

The flowcharts below (Figure 5-1) show how PtTemporal fits into EMS-HAP's point source processing for the ASPEN and ISCST3 models. The point source inventory you input to PtTemporal is the output from PtModelProc (Chapter 4). You use the output inventory from PtTemporal as the input to PtGrowCntl (Chapter 6) to project your inventory to a future date. If you choose not to project the inventory, then you use the output inventory as the input to PtFinal_ASPEN (Chapter 7) when processing data for ASPEN, or to PtFinal_ISCST3 (Chapter 8) when processing data for ISCST3.



Flowchart for ASPEN Processing

Flowchart for ISCST3 Processing

Figure 5-1. Overview of PtTemporal within EMS-HAP Point Source Processing

5.1 What is the function of PtTemporal?

The PtTemporal program temporally allocates annual point source emissions. Temporal allocation is the process of estimating emissions at different 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. When processing data for the ASPEN model, this program produces these eight emission rate estimates for each annual emission record in the point source inventory. The ISCST3 model supports emissions for all 24 hours within each of three different day types (weekday, Saturday, and Sunday) and four different season types (spring, summer, fall, and winter). When processing data for the ISCST3 model, this program produces 288 emission rate estimates (24 hours * 4 seasons * 3 day types) for each annual emission record in the point source inventory.

PtTemporal performs the following functions:

- Assigns a temporal profile to each emission record
- Uses the hourly profiles to produce eight 3-hour emission rates, when processing data for ASPEN
- Uses the hourly, day, and seasonal profiles to produce 288 emission rates when processing data for ISCST3

Figure 5-2 shows the flowchart of PtTemporal when processing data for ASPEN, and Figure 5-3 shows the flowchart of PtTemporal when processing data for ISCST3. The following sections describe the above bullets.

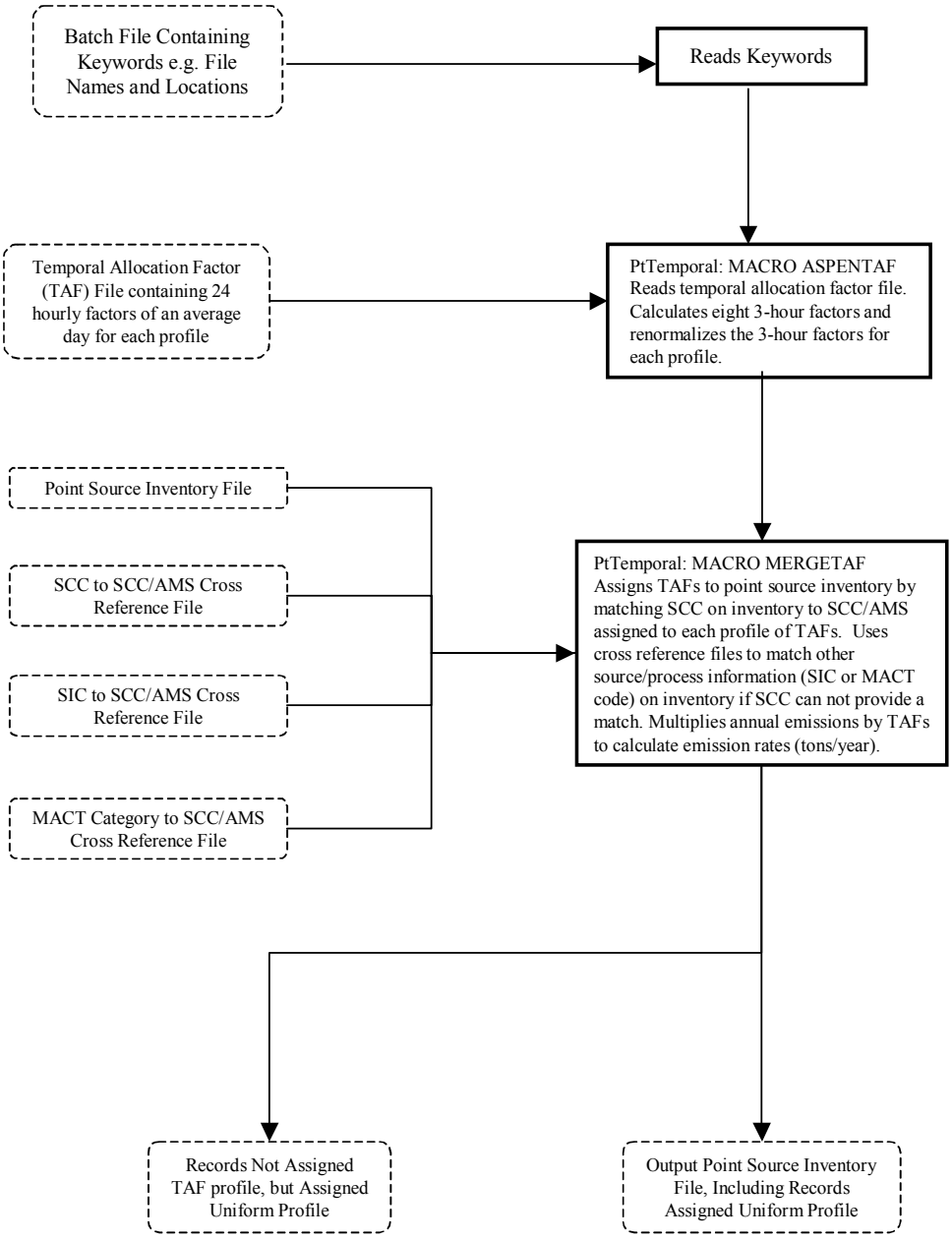


Figure 5-2. PtTemporal Flowchart when Processing Data for ASPEN

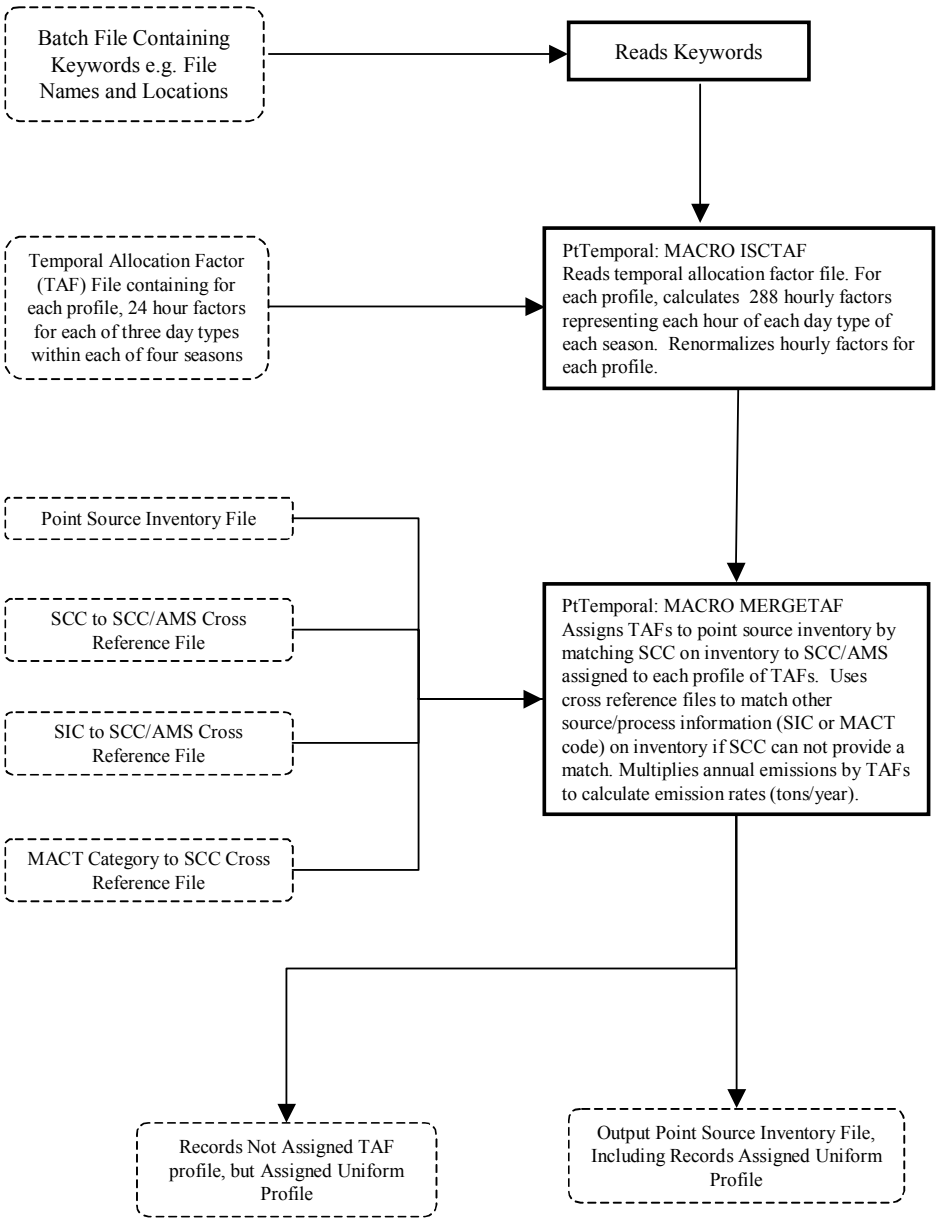


Figure 5-3. PtTemporal Flowchart when Processing Data for ISCST3

5.1.1 Assigns an hourly temporal profile to each emission record

PtTemporal assigns temporal profiles from an ancillary temporal allocation factor (TAF) file. Different TAF files are used when PtTemporal processes emissions for ASPEN than for ISCST3, because ASPEN uses only eight 3-hour values and does not take seasonal or day-of-week variation into account, whereas ISCST3 can use 24 hourly values with day-of-week and seasonal variation.

Both TAF files contain temporal profiles based on 8-digit AIRS Source Classification Codes (SCC) or 10-digit Area and Mobile System (AMS) codes. In the TAF file used to process data for ASPEN, each temporal profile consists of 24 temporal allocation factors (TAFs) that can allocate annual emissions to each hour of an average day. See Figure 16a in Appendix A for the format of this file; Section D.7 discusses its development. In the TAF file used to process data for ISCST3, each profile consists of 24 hourly TAFs for each of four seasons and three day types. See Figure 16b in Appendix A for the format of this file; Section E.7 discusses its development.

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 a temporal profile. By using several cross-reference files, PtTemporal attempts to link the inventory SCC code, SIC code, or MACT code to an SCC or AMS code found in the TAF file. 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 model-appropriate time periods (eight 3-hour periods for ASPEN and 288 hour-day-season-specific periods for ISCST3).

5.1.2 Uses the hourly profiles to produce eight 3-hour emission rates when processing data for ASPEN only

Because ASPEN requires emissions for eight 3-hour periods of an average day, PtTemporal uses the 24 hourly factors in the TAF file (which reflect an average day) to produce 3-hour TAFs and average emission rates for the 3-hour periods. Equation 5-1 shows the methodology for the 3-hour period from midnight to 3 am.

$$E_{0\text{-}3} = E_{ann} \times \text{ave } TAF_{0\text{-}3} \qquad \text{(eq. 5-1)}$$

where:

$E_{0\text{-}3}$ = emission rate during the midnight to 3 a.m. time period for an average day (tons/year)

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

ave $TAF_{0\text{-}3}$ = $(HF_1 + HF_2 + HF_3)/3 \times 24$ hours/day

where:

HF_n = temporal allocation factor for hour "n" (fraction of daily emissions occurring in hour "n" - ([tons/hour]/[tons/day])

Although the initial 24 hourly factors are assumed to be normalized to conserve mass, PtTemporal normalizes the 3-hour TAFs for each profile by dividing each 3-hour TAF by the average of the eight TAFs for that profile. In this way, the average of the 3-hour TAFs will be 1 for each profile. PtTemporal will print out in the SAS® list file (see 5.3.2) the records from the temporal allocation factor (TAF) file where the average of the 3-hour TAFs before normalization is less than 0.9 or greater than 1.1.

5.1.3 Uses the hourly, day, and seasonal profiles to produce 288 emission rates when processing data for ISCST3 only

ISCST3 supports the use of emissions for each hour of each of three day types and four seasons for a total of 288 emission rates. Each temporal profile used with PtTemporal to allocate data for ISCST3 consists of twelve records, one for every combination of season and day type. Each of these records contains a seasonal allocation factor (SF), daily allocation factor (DF), and 24 hourly allocation factors (HF). The 24 individual temporal factors for that season and day are calculated by multiplying the season factor by the day factor by each of the hour factors. PtTemporal then applies the TAFs to the annual emission rate. Equation 5-2 shows the calculation for first hour of a winter Saturday, and delineates which hour, day type and season each of the 288 emission rates represent.

$$E_{97} = E_{ann} \times TAF_{97} \quad \text{(eq. 5-2)}$$

where:

E_{97} = emission rate for the first hour of a winter Saturday (tons/hour), because
emission rates 1-24 represent a Winter weekday,
emission rates 25-48 represent a Spring weekday,
emission rates 49-72 represent a Summer weekday,
emission rates 73-96 represent a Fall weekday,
emission rates 97-120 represent a Winter Saturday,
emission rates 121-145 represent a Spring Saturday,
emission rates 146-168 represent a Summer Saturday,
emission rates 169- 192 represent a Fall Saturday,
emission rates 193-216 represent a Winter Sunday,
emission rates 217-240 represent a Spring Sunday,
emission rates 241-264 represent a Summer Sunday, and
emission rates 265-288 represent a Fall Sunday

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

$TAF_{97} = SF_4 \times DF_2 \times HF_1$

where:

SF_4 = season allocation factor for winter (season 4), because
season allocation factor 1 is for spring
season allocation factor 2 is for summer
season allocation factor 3 is for fall
season allocation factor 4 is for winter

DF_2 = day allocation factor for Saturday (day 2), because
day allocation factor 1 is for a weekday,
day allocation factor 2 is for a Saturday, and
day allocation factor 3 is for a Sunday

HF_1 = hour allocation factor for first hour (hour 1)

Although the TAFs are assumed to be normalized to conserve mass, PtTemporal normalizes the 288 TAFs for each profile by dividing each TAF by the sum of all the hourly factors for the year for that profile. This sum is calculated according to the equation (eq. 5-3) given below:

$$\text{Total TAF}_{year} = \text{Sum TAF}_{Winter} + \text{Sum TAF}_{Spring} + \text{Sum TAF}_{Summer} + \text{Sum TAF}_{Fall} \quad \text{(eq. 5-3)}$$

Where:

$$\text{Sum TAF}_{Winter} = [(\text{Sum TAF}_{Winter\ weekday} \times 5) + \text{Sum TAF}_{Winter\ Saturday} + \text{Sum TAF}_{Winter\ Sunday}] * 13$$

$$\text{Sum TAF}_{Spring} = [(\text{Sum TAF}_{Spring\ weekday} \times 5) + \text{Sum TAF}_{Spring\ Saturday} + \text{Sum TAF}_{Spring\ Sunday}] * 13$$

$$\text{Sum TAF}_{Summer} = [(\text{Sum TAF}_{Summer\ weekday} \times 5) + \text{Sum TAF}_{Summer\ Saturday} + \text{Sum TAF}_{Summer\ Sunday}] * 13$$

$$\text{Sum TAF}_{Fall} = [(\text{Sum TAF}_{Fall\ weekday} \times 5) + \text{Sum TAF}_{Fall\ Saturday} + \text{Sum TAF}_{Fall\ Sunday}] * 13$$

Where:

$\text{TAF}_{Winter\ weekday}$ = 24 hourly factors for a Winter weekday

$\text{TAF}_{Winter\ Saturday}$ = 24 hourly factors for a Winter Saturday

$\text{TAF}_{Winter\ Sunday}$ = 24 hourly factors for a Spring Saturday

etcetera, and

$\text{Sum TAF}_{Winter\ weekday}$ = the sum of all 24 hourly factors for a Winter weekday

In this way, the total TAFs used to process data for ISCST3for a year will sum to 1 for each profile. PtTemporal will print out in the SAS® list file (see 5.3.2) the records from the temporal allocation factor (TAF) file where the where the sum of all hourly factors for the year (Total TAF_{year}) before normalization is less than 0.9 or greater than 1.1

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 PtModelProc, if you intend to create ASPEN input files or the SO section of the ISCST3 run stream. If you don't intend to create ASPEN or ISCST3 specific output by running PtFinal_ASPEN or PtFinal_ISCST3, respectively, you could use the output from PtDataProc as the input into PtTemporal. The inventory produced by either PtDataProc or PtModelProc will meet all requirements.

When processing data for ASPEN, the inventory produced by PtModelProc 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 Section 3.1.3).

When processing data for ISCST3, this inventory will contain the variables listed in Table 5-2 with some exceptions. Only if you have included ISCST3 area and/or volume sources will the inventory contain the release parameter variables required for these sources (see Section 3.2.1 for

a description of these source types). The inventory may contain additional variables such as the diagnostic flag variables LLPROB or FIPFLAG created by PtDataProc depending on the options you chose for the windowing function and the contents of the varlist file used in PtDataProc.

Table 5-1. Variables in the PtTemporal Input Point Source Inventory SAS® File when Processing Data for ASPEN

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*
BLDH	building height (meters) (5 for horizontal stacks, 0 for all other stacks); assigned in PtModelProc (see Section 4.1.3)	N
BLDW	building width (meters) (5 for horizontal stacks, 0 for all other stacks); assigned in PtModelProc (see Section 4.1.3)	N
CNTL_EFF	baseline control efficiency, expressed as a percentage	N
EMIS	pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within a site	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	building code (1 for horizontal stacks, 0 for all other stacks) assigned in PtModelProc (see Section 4.1.3)	A1
IVENT	vent type (0 for stacked sources, 1 for non-stacked sources) assigned in PtModelProc (see Section 4.1.3)	A1
LAT	latitude (decimal degrees)	N
LON	longitude (negative decimal degrees)	N
MACTCODE	MACT code	A7
NTI_HAP	code identifying HAP on the Clean Air Act HAP list; assigned in PtModelProc (see Section 4.1.1)	A3
REACT	pollutant reactivity/particulate size class (1-9); assigned in PtModelProc (see Section 4.1.1)	N
SAROAD	unique pollutant-group code; assigned in PtModelProc (see Section 4.1.1)	A10
SAROADDC	descriptive name for the SAROAD; assigned in PtModelProc (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

Table 5-1. Variables in the PtTemporal Input Point Source Inventory SAS® File when Processing Data for ASPEN (continued)

Variable Name	Data Description (Required units or values are in parentheses)	Type*
SITE_ID	code identifying a unique site	A25
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions) If you choose to define 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 PtModelProc (see Section 4.1.2)	N

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

Table 5-2. Variables in the PtTemporal Input Point Source Inventory SAS® File when Processing Data for ISCST3

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*
AANGLE[c]	orientation angle of rectangle for ISCST3 area source (degrees from North)	N
AINPLUM[c]	initial vertical dimension of ISCST3 area source plume (meters)	N
ARELHGT[a]	release height of ISCST3 area source (meters)	N
AXLEN[a]	length of X side of ISCST3 area source (meters)	N
AYLEN[c]	length of Y side of ISCST3 area source (meters)	N
BLDH	building height (meters); missing values defaulted in PtModelProc (see Section 4.1.3)	N
BLDW	building width (meters); missing values defaulted in PtModelProc (see Section 4.1.3)	N
CNTL_EFF	baseline control efficiency, expressed as a percentage	N
EMIS	pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within a site	A50

Table 5-2. Variables in the PtTemporal Input Point Source Inventory SAS® File when Processing Data for ISCST3 (continued)

Variable Name	Data Description (Required units or values are in parentheses)	Type*
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
ISCTYPE[a,b]	ISCST3 source type (iscarea, or iscvolume)	A9
MACTCODE	MACT code	A7
NTI_HAP	code identifying HAP on the Clean Air Act HAP list; assigned in PtModelProc (see Section 4.1.1)	A3
REACT	pollutant reactivity/particulate size class (1-9); assigned in PtModelProc (see Section 4.1.1)	N
SAROAD	unique pollutant-group code; assigned in PtModelProc (see Section 4.1.1)	A10
SAROADDC	descriptive name for the SAROAD; assigned in PtModelProc (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
SIGMAX[b]	initial lateral dimension of volume source (meters)	N
SIGMAZ[b]	initial vertical dimension of volume source (meters)	N
SITE_ID	code identifying a unique site	A25
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions) If you choose to define source groups by this variable as explained in 8.1.1 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
UTMX	UTM easting (meters)	N
UTMY	UTM northing (meters)	N
VOLHGT[b]	release height above ground for volume source (meters)	N

* Ax = character string of length x, N = numeric
[a] variables required for processing ISCST3 area sources
[b] variables required for processing ISCST3 volume sources
[c] additional variables only included when information is available

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 5-3 lists the ancillary input files required for PtTemporal and when you may need to modify them.

Table 5-3. Required Ancillary Input Files for PtTemporal

Name of File Provided with EMS-HAP	Purpose	Need to Modify?	Format
taff_hourly.txt[a]	Provides temporal profiles containing 24 hourly temporal allocation factors (TAFs) for an average day by SCC and/or AMS codes	When additional source specific temporal factors become available	Text
taff_ISCfactors.txt[b]	Provides temporal profiles containing seasonal allocation factors, day-type allocation factors, and hourly allocation factors 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 on TAF file 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 on TAF file in order to assign temporal profile	When inventory contains records with the source category identified by SIC codes (i.e., no SCC code) that are not in the cross-reference file	Text
mact2scc.txt	Provides cross reference between MACT code on inventory to SCC and/or AMS on TAF file in order to assign temporal profile	When inventory contains records with the source category identified by the MACT category codes (i.e., no SCC) that are not in the cross-reference file	Text

[a] file used only when processing data for ASPEN
[b] file used only when processing data for ISCST3

5.2.3 Modify the temporal allocation factor file (taff_hourly or taff_ISCfactors)

The temporal allocation factor (TAF) file (taff_hourly.txt for ASPEN data processing, or taff_ISCfactors.txt for ISCST3 data processing) is common to point, non-point and mobile source emission processing within EMS-HAP. The temporal profiles are indexed by 8-digit SCC or 10-digit AMS codes. In both files, local time zones are used. The file taff_hourly.txt provides 24 hourly allocation factors that reflect hourly emissions activity on an annual average. Details on the development of the TAF file used for ASPEN data processing are presented in Appendix D, Section D.7, and Figure 16a of Appendix A contains the file format. The file taff_ISCfactors.txt provides 24 hourly allocation factors for each of 4 seasonal factors and 3 day-type factors. Details on the development of the TAF file used for ISCST3 data processing are presented in Appendix E, Section E.6, and Figure 16b of Appendix A contains the file format.

Whether to modify or add to the temporal profiles contained within the TAF files supplied with EMS-HAP depends on the information you have on the temporal characteristics of specific source categories and how well the source category information included in your emission inventory matches to the existing profiles. For example, you might consider modifying the TAF file if you find, after executing PtTemporal, 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).

5.2.4 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 July 2001 version of the 1996 NTI. For instance, this inventory does not include a value for the 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 17, 18, and 19 of Appendix A. Details on how we developed these files are presented in Appendix D, Section D.9. The same files can be when processing data for ASPEN and for ISCST3.

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. Sample batch files for PtTemporal for ASPEN and ISCST3 emissions processing are shown in Figures 7 and 8, respectively, of Appendix B. The best way to prepare your batch file is to use one of the samples we provide and modify it to fit your needs.

Specify your keywords

Table 5-4 describes the keywords required in the batch file. Use keywords to locate and name all input and output files. The same batch file can be used for running PtTemporal for ASPEN or ISCST3. The only differences are in the assignment of the keywords MODEL (either 'ASPEN' or 'ISC') and TAF (different TAF files are used for ASPEN and ISCST3, see Section 5.2.3).

Table 5-4. Keywords in the PtTemporal Batch File when Processing Data for Either ASPEN or ISCST3

Keyword	Description of Value
	Input Inventory Files
IN_DATA	Input SAS® file directory
INSAS	Input inventory SAS® file name, prefix of file name only
	Ancillary Files (Prefix of file name provided with EMS-HAP in parentheses)
REFFILE	Ancillary text file directory
TAF	Temporal profile text file, prefix only (taff_hourly for ASPEN data processing and taff_ISCfactors for ISCST3 data processing)
SCCLINK	SCC to AMS cross-reference text file, prefix only (scc2ams)
SICLINK	SIC to SCC or AMS code cross-reference text file, prefix only (sic2ams)
MACTLINK	MACT category code to SCC or AMS cross-reference text file, prefix only(mact2scc)
	Program Options
MODEL	ASPEN=process data for ASPEN model; ISC=process data for ISCST3 model
	Output files
OUTDATA	Output SAS® file directory
OUTSAS	Output inventory SAS® file name, prefix only

Prepare the execute statement

The last line in the batch file runs the PtTemporal program. In the sample batch files provided in Figures 7 and 8 of 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 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 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.

- *When processing data for ASPEN*, a list of records from the temporal allocation factor (TAF) file where the average of the 3-hour factors before normalization is less than 0.9 or

greater than 1.1

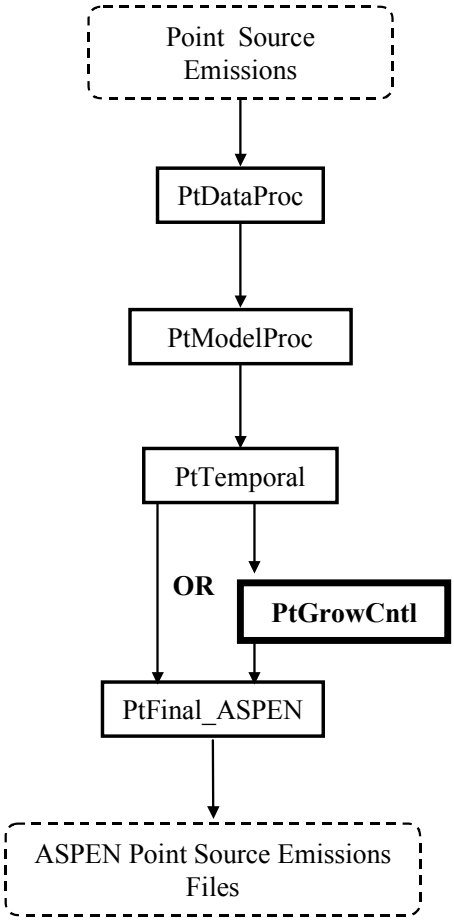
- *When processing data for ISCST3*, a list of records from the temporal allocation factor (TAF) file where the sum of all hourly factors for the year before normalization is less than 0.9 or greater than 1.1
- Annual emission totals of the temporally allocated emissions and the unmatched (uniformly allocated by default) emissions by SAROAD code

5.3.3 Check other output files from PtTemporal

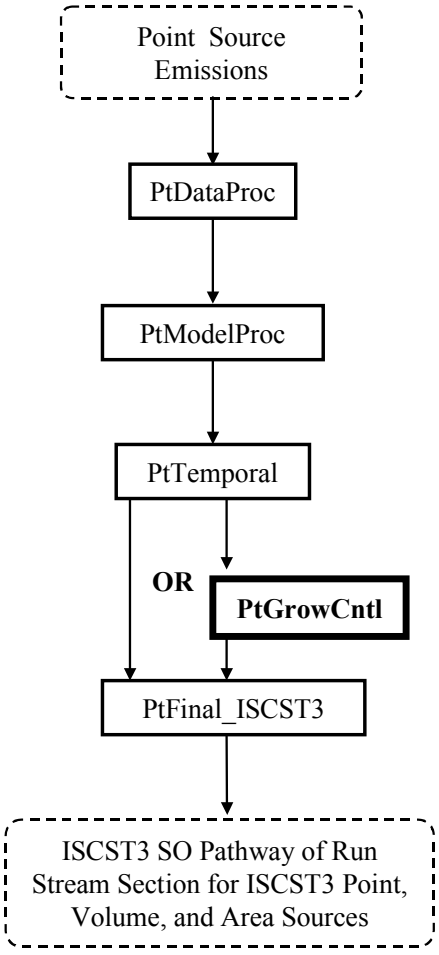
You should check for the existence of the output inventory file named by keyword OUTSAS. This file will serve as the input to the next point source processing program you choose to run. PtTemporal also creates a SAS® output file named notaf. This file contains information on the emission records not assigned a specific temporal profile. For these records, emissions were uniformly allocated to each of the time periods. You can reduce the number of records appearing in this file by the following: 1) You can modify the TAF file (taff_hourly or taff_ISCfactors) by adding SCC codes and corresponding temporal allocation factors; 2) 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 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).

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

The flowcharts below (Figure 6-1) show how PtGrowCntl fits into EMS-HAP's point source processing for the ASPEN and ISCST3 models. The point source inventory you input to PtGrowCntl is the output from PtTemporal (Chapter 5). You use the output inventory from PtGrowCntl as the input to PtFinal_ASPEN (Chapter 7) when processing data for ASPEN and PtFinal_ISCST3 (Chapter 8) when processing data for ISCST3.



Flowchart for ASPEN Processing



Flowchart for ISCST3 Processing

Figure 6-1. Overview of PtGrowCntl within EMS-HAP Point Source Processing

6.1 What is the function of PtGrowCntl?

The Growth and Control Program (PtGrowCntl) computes future year emissions as a result of projected economic growth and/or emission reduction strategy scenarios. You can apply reduction scenarios based on the Maximum Achievable Control Technology (MACT) standards and/or based on your own control strategy. You control which of the functions listed below is performed in any given execution of PtGrowCntl (see Table 6-10 in Section 6.2.7 for details on how to do this).

- Assigns and applies growth factors to project emissions due to growth
- Assigns MACT-based emission reduction information
- Assigns user-defined emission reduction information
- Combines MACT-based and user-defined emission reduction information and applies to project emissions due to an overall emission control scenario

Figure 6-2 shows the flowchart of PtGrowCntl when processing data for ASPEN or ISCST3. The programming steps are the same when processing data for either model, although you still need to identify the model as being either 'ASPEN' or 'ISC' through the batch file keyword MODEL (see Section 6.2.7). The following sections describe the above bullets.

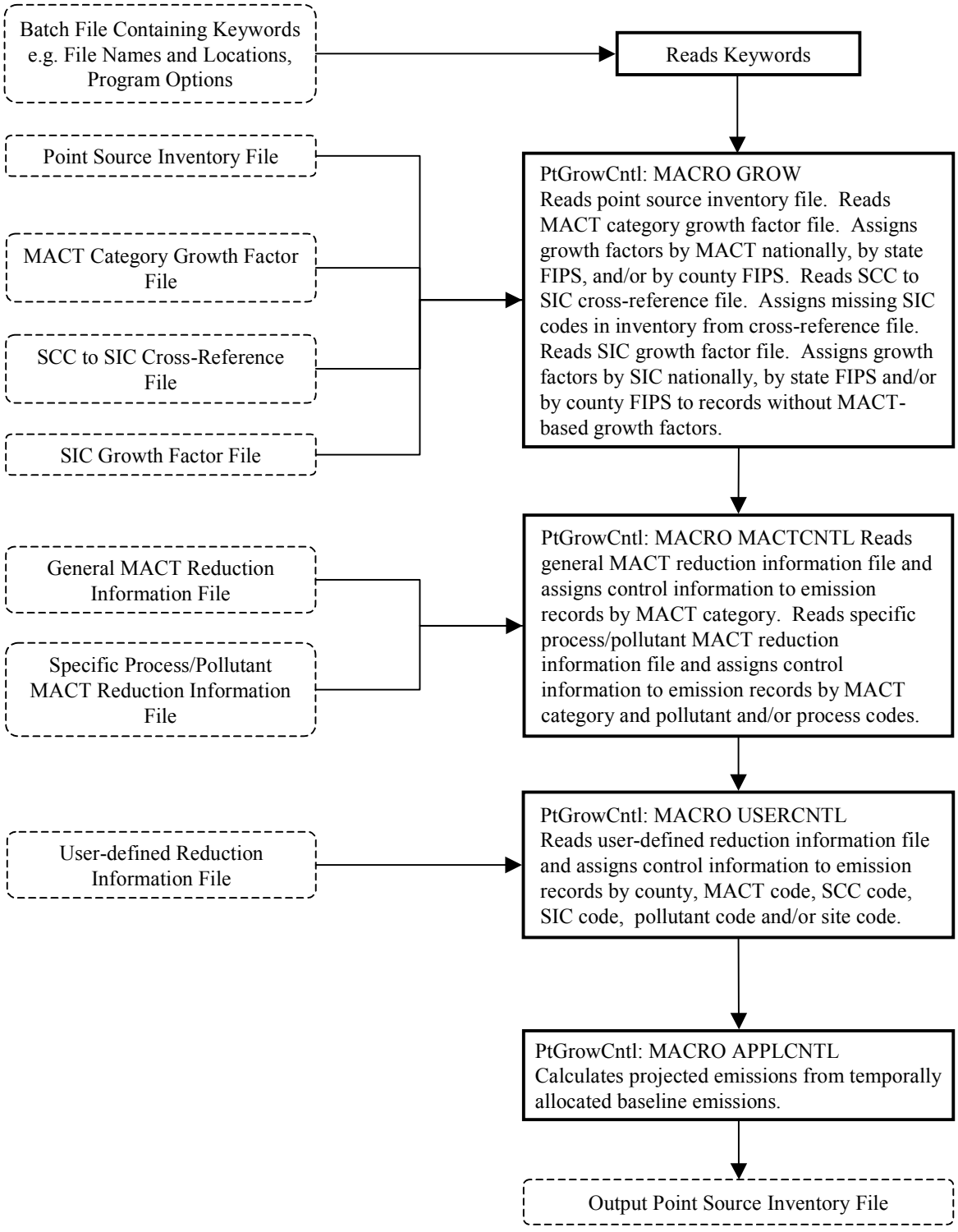


Figure 6-2. PtGrowCntl Flowchart when Processing Data for ASPEN and ISCST3

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

PtGrowCntl assigns growth factors to the emission records based on the MACT category and/or the first two digits of the SIC code, with a geographic resolution at the national, state or county level. You control whether PtGrowCntl assigns growth factors by MACT category only, SIC only, or both (see Table 6-10 in Section 6.2.7 for details on how to do this). If you choose to assign growth factors by both criteria, PtGrowCntl will assign the growth factors by the MACT category first, and then assign growth factors by the SIC to only records without an assignment (i.e., SIC-based growth factors will not replace assigned MACT-based growth factors).

Your inventory may contain many records with SCC codes rather than SIC codes. In order to assign SIC-based growth factors, PtGrowCntl can assign SIC codes to those records in the inventory with missing values for SIC based on the inventory SCC codes (see keyword SICFLAG in Table 6-10 in Section 6.2.7). PtGrowCntl uses an ancillary SCC to SIC cross-reference file (see Section 6.2.4) for this function; the assigned SIC code is stored in the new variable SETSIC.

Both the MACT-based and SIC-based growth factors can be applied to specific geographic regions: nationally, by state, or by county (see Section 6.2.3 for more details). For both the MACT-based and SIC-based growth factors, the more detailed growth factor (e.g., county) will replace the less detailed one (e.g., state).

The MACT-based and SIC-based growth factor files are 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, temporally allocated emission rates (eight 3-hour average emission rates when processing data for ASPEN, and 288 hourly specific emission rates when processing data for ISCST3) for each record by multiplying the base year temporally allocated 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 temporally allocated emission rates comprising a specific inventory record. Note that any record not assigned a growth factor based either on the MACT category or the SIC code will be assigned the default growth factor of one. In these cases, the grown emissions will be unchanged from the base year emissions.

6.1.2 Assigns MACT-based emission reduction information

PtGrowCntl can assign MACT-based emission reduction information to the point source inventory alone or along with the assignment of your own control strategy (user-defined emission reduction information). You choose the method by specifying keywords in the batch file (see Table 6-10 in Section 6.2.7). When you select to assign MACT-based reduction information, PtGrowCntl initially uses the ancillary file MACT_gen.txt to assign general MACT reduction

information. The information in this file applies to an entire MACT category as represented by the MACT code.

The general emission reduction information you supply for each MACT category in the MACT_gen.txt ancillary file consists of:

- 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.

- 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 rebuilt to the extent that the efficiency for new sources would apply. A value of 50% would signify that half of the emissions was due to new sources at the existing facilities and the other half was from the existing part.

- Application control flag. PtGrowCntl uses this flag to determine whether or not to apply the control efficiencies. This enables you to keep a particular emission reduction record that you've put in an ancillary file, but not use it for a particular run of EMS-HAP. An example of this would be if you want to keep in your MACT_gen file, MACT-based information for a category for which the compliance date is prior to the base year, but you don't want to apply the information since the base-year should already account for it and no future reductions for that category would be expected.

- Source control flag. This flag determines to which source type (major[a] versus both area[b] and major) the control efficiencies 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".

- Compliance date for the standard. PtGrowCntl uses this information along with the projection year to determine whether or not the standard will affect the projected emissions. EMS-HAP gives you the option of projecting based on a fiscal year or a calendar year (see Table 6-10 in Section 6.2.7). If the compliance date is within the projection year, then PtGrowCntl assigns a prorated reduction based on the portion (based

[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.."

on the fraction of days) of either the fiscal or calendar year which occurred prior to the compliance date. If there is no compliance date in the file, then PtGrowCntl does not apply any reductions.

Based on the information in the MACT_gen.txt file, the general MACT reductions (or a proration of them, as described in the last bullet above) can only be assigned to the emission inventory when the following criteria are met:

- The application control flag is equal to 1.

- The MACT compliance date occurs within or before the projection (calendar or fiscal) year.

- The source control flag is applicable to the inventory source type. For example, if the source control flag for a particular MACT code is "M" then the reduction would only be applied to an inventory record with that MACT code where the source type variable is 'major'. If the source control flag is "B" (meaning both) the reduction would be applied to both major and area sources.

PtGrowCntl can apply more specific MACT-based reduction information to the emissions that applies to only specific pollutants or specific processes within a MACT category. PtGrowCntl uses information in the MACT_spec.txt ancillary file to do this. For each MACT code, you can specify the reduction information by various combinations of the following types of information:

- process (6-digit SCC code or 8-digit SCC code)
- pollutant (NTI_HAP variable, assigned in PtModelProc)

If you need to apply reduction information at the site-level within a MACT category, you will need to use the user-defined emission reduction information (see Section 6.1.3).

It is important to note that if you choose to apply MACT-based reduction information, PtGrowCntl will always use the MACT_gen.txt file, but will only use the MACT_spec.txt file if you set the batch file keywords appropriately (see Table 6-10 in Section 6.2.7). The MACT_gen.txt file is used to determine the reduction for any pollutant (or process) within a MACT category that is not in the MACT_spec.txt file. In addition PtGrowCntl reads the compliance date from the MACT_gen file (it is not a field in the MACT_spec file). Thus, you must make sure that any MACT category in the MACT_spec.txt file is also in MACT_gen.txt.

PtGrowCntl uses the same criteria for assigning specific MACT reduction information as it does for the general information (see the three bullets above).

When both general and specific reduction information can be assigned to the same inventory record, PtGrowCntl will assign the specific MACT information from the MACT_spec.txt ancillary file over the general information. It is also possible that more than one record in the

MACT_spec.txt file (e.g., a process-specific reduction and a HAP-specific reduction) could apply to an inventory record. In this case, the more specific information replaces the less specific information. Table 6-1 shows the order of precedence followed in PtGrowCntl.

Table 6-1. Order of Precedence for MACT-based Emission Reduction Information

	Information Used to Specify Reduction Information			
Order of Precedence	**MACT**	**HAP**	**6-digit SCC**	**8-digit SCC**
1 (most specific information, supercedes all others)	X	X		X
2	X	X	X	
3	X			X
4	X		X	
5	X	X		
6 (least specific information)	X			

6.1.3 Assigns user-defined emission reduction information

PtGrowCntl can assign your own control strategy (user-defined emission reduction information) to the point source inventory with or without the inclusion of the MACT-based emission reduction information described above. You choose the method of applying reduction information by specifying keywords in the batch file (see Table 6-10 in Section 6.2.7). When you select to assign user-defined reduction information, PtGrowCntl uses the ancillary file User_control.txt (see also Section 6.2.5).

The emission reduction information you supply in the User_control.txt ancillary file consists of:

- Two control efficiencies for the reduction strategy. Same as in the MACT reduction information described in Section 6.1.2.
-
- Percentage of emissions at existing sources that will come from new sources. Same as in the MACT reduction information described in Section 6.1.2.
-
- Application control flag. Same as in the MACT reduction information described in Section 6.1.2.

- Source control flag. Same as in the MACT reduction information described in Section 6.1.2. Note that in specifying user-defined information, you can choose to reduce only major sources with a particular SIC or SCC code rather than only a particular MACT code.

- Replacement flag. This flag lets you decide whether to have a user-defined control efficiency replace a MACT-based control efficiency (flag value 'R') or be applied in addition to it (flag value 'A'). For example, you would set this flag to 'R' for a strategy that contains reduction information on how a particular site's emissions will be reduced by a particular MACT standard. This setting would allow you to use *site*-specific MACT reduction information in lieu of the general or pollutant, process-specific MACT reduction discussed in 6.1.2.

You can assign emission reduction information based on your own control strategy (user-defined information) to the point source inventory alone or after with the assignment of MACT-based emission reduction information. The assignment of the user-defined reduction information is made independent from the assignment of the MACT-based information. Only after the assignment of all emission reduction information, does PtGrowCntl determine what control efficiencies are used to calculate the projected emissions for each record.

The user-defined reduction information can only be assigned when the following criteria are met:

- The user-defined application control flag is equal to 1.

- The user-defined source control flag is applicable to the inventory source type variable (user-defined reductions applicable only to major sources get applied only to inventory sources that are major).

Through the user-defined reduction information, you can assign emission reduction information by various combinations of the following types of information:

- broad industry group and/or process (using the SIC, MACT code and/or SCC)
- site (using the SITE_ID variable)
- pollutant (using the NTI_HAP variable)
- specific county or county types (using the CNTYCODE variable)

The specific combinations of these variables used by PtGrowCntl to match the emission reduction information to the inventory are presented in Table 6-2. In cases where an emission inventory record can be assigned to more than one record in the user-defined reduction information file, PtGrowCntl follows a specific order of precedence as shown in Table 6-2.

Table 6-2. User-defined Emission Reduction Information and Order of Precedence

Order of Precedence	Information Used to Specify Reduction Information					
	Site ID	MACT	SIC	SCC	HAP	County Code
1 (most specific information, supercedes all others)	X	X		X	X	
2	X			X	X	
3	X	X		X		
4	X			X		
5	X	X			X	
6	X				X	
7	X	X				
8	X					
9		X	X	X	X	X
10		X	X	X	X	
11		X		X	X	X
12		X		X	X	
13			X	X	X	X
14			X	X	X	
15				X	X	X
16				X	X	
17		X	X	X		X
18		X	X	X		
19		X		X		X
20		X		X		
21			X	X		X
22			X	X		
23				X		X
24				X		
25		X	X		X	X
26		X	X		X	
27		X			X	X
28		X			X	
29			X		X	X
30			X		X	
31		X	X			X
32		X	X			
33		X				X
34		X				
35			X			X
36			X			
37					X	X
38 (least specific information)					X	

In order to assign reduction information to specific counties or to groups of county types, you must provide the values for the five character county type code (CNTYCODE) in the popflg96.txt ancillary file for each county where you want to apply controls. PtGrowCntl uses this file to assign the CNTYCODE variable to the inventory by the state and county FIPS code. CNTYCODE can identify general types of counties to which you want to assign specific

reduction information, such as urban or rural counties, or it can identify an individual county. These county type codes can then be used in the user-defined emission reduction information file. When you provide site-level reduction information, you don't need to use a county code, because the SITE_ID variable identifies an individual site located in a specific county.

6.1.4 Combines MACT-based and user-defined emission reduction information and applies to project emissions due to an overall emission control scenario

After all MACT-based and user-defined reduction information has been assigned to the inventory, PtGrowCntl combines the information in order to assign the "primary" reduction variables (applied to the emissions first) and the "additional" reduction variables (applied second, and in addition to primary, if necessary). PtGrowCntl calculates projected emissions by first applying primary reduction efficiencies for existing and new sources based on the percentage of projected emissions attributed to the new sources (primary reduction variables are EXISTEFF, NEW_EFF, and NEW_RATE). Depending upon how you have chosen to combine MACT-based and user-defined control scenarios, PtGrowCntl will apply additional reduction efficiencies for existing and new sources to the initially projected emissions in a similar manner (additional reduction variables are ADDXEFF, ADDNEFF, and ADDRATE). Thus, additional reductions are applied on top of the primary reductions.

Assignment of Primary Reduction Efficiencies and Additional Reduction Efficiencies

There are three possible ways to assign the primary and additional reduction variables depending on how you set the keywords in the batch file (see Section 6.2.7) and the emission reduction information you provide to PtGrowCntl. These are described below.

- **Using only MACT-based reduction information**: the MACT-based reduction efficiencies and new source percentage are assigned to the primary reduction variables. Additional reduction variables are set to zero.

- **Using only user-defined reduction information**: the user-defined reduction efficiencies and new source percentages are assigned to the primary reduction variables. Additional reductions are set to zero.

- **Using both MACT-based and user-defined reduction information**: the replacement flag (REPLACE variable) from the user-defined reduction information file is used to determined if the user-defined information is assigned to the primary reduction variables or the additional reduction variables. For records with assigned MACT-based information, the MACT-based reduction efficiencies and new source percentage are assigned to the primary reduction variables. For records with assigned user-defined information where the value of REPLACE is 'R,' the user-defined reduction efficiencies are assigned to the primary reduction variables, replacing any previously assigned MACT-based reduction information. For records with assigned user-defined information where the value of REPLACE is 'A,' the user-defined reduction efficiencies are assigned

to the additional reduction variables, regardless of whether or not any reduction efficiencies are assigned to the primary reduction variables.

Table 6-3 summarizes how the primary and additional reduction variables are assigned in each circumstance.

Table 6-3. Assignment of Primary and Additional Reduction Variables

Emission Reduction Information	Value of REPLACE variable	Source of Reduction Variables Used to Project Emissions	
		Primary Reduction Variables	Additional Reduction Variables
MACT-based only	N/A	MACT-based	all set to zero
User-defined only	N/A	User-defined	all set to zero
Both MACT-based and User-defined	R	User-defined	all set to zero
	A	MACT-based	User-defined

Application of Emission Reduction Efficiencies

PtGrowCntl calculates projected emissions by first applying primary reduction efficiencies for existing and new sources and the percentage of projected emissions attributed to the new sources (primary reduction variables EXISTEFF, NEW_EFF, and NEWRATE). PtGrowCntl uses NEWRATE to apportion the grown emissions between the existing sources, using the factor 1-NEWRATE/100, and new sources, using the factor NEWRATE/100. This allows PtGrowCntl to apply the different reduction efficiencies to the emissions from existing source (EXISTEFF) and to the emissions from new sources (NEW_EFF).

PtGrowCntl uses the baseline control (reduction) efficiency (CNTL_EFF variable) included in the inventory to account for any existing reductions reflected in the original inventory emission values. Note that the input inventory file must contain the variable CNTL_EFF, even if there is no baseline reduction information, for PtGrowCntl to execute successfully. If CNTL_EFF is less than the emission reduction efficiency, PtGrowCntl uses the baseline reduction to adjust the emission reduction efficiency when applying it to the grown emissions. If the baseline reduction efficiency is greater than the emission reduction efficiency, we assume that the assigned emission reduction efficiencies will not affect the site. Therefore, PtGrowCntl doesn't apply the assigned primary emission reduction efficiency. The calculation of projected emissions using the primary emission reduction efficiencies is summarized in Table 6-4.

Table 6-4. Summary of Equations Used to Apply Primary Emission Reduction Information

Projected Emissions from Existing Sources

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

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

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

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

Projected Emissions from New Sources

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

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

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

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

Total Primary Projected Emissions

$$\text{Projected Emissions}_P = \text{Projected Emissions}_E + \text{Projected Emissions}_N \quad \text{(Eq. 6-5)}$$

Where:

$\text{Projected Emissions}_P$ = projected emissions using primary emission reduction efficiencies

$\text{Projected Emissions}_E$ = grown and controlled emissions from existing sources

$\text{Projected Emissions}_N$ = grown and controlled emissions from new sources

Grown Emissions = (Base year baseline emissions) x (Growth factor) [see Section 6.1.1]
Grown Emissions=Base year baseline emissions when growth is not chosen

NEWRATE = primary percentage of grown emissions attributed to new sources

EXISTEFF = primary control efficiency for existing sources

NEW_EFF = primary control efficiency for new sources

CNTL_EFF = inventory baseline control efficiency

Additional reduction efficiencies for existing and new sources are applied to the initially projected emissions (additional reduction variables ADDXEFF, ADDNEFF, and ADDRATE) in a manner similar to that described above for the primary reduction efficiencies; however, the value of the baseline reduction efficiency (CNTL_EFF) has no impact since additional reduction efficiencies are applied in addition to, or, on top of, any existing or primary reductions. The

calculation is summarized in Table 6-5.

Table 6-5. Summary of Equations used to Apply Additional Emission Reduction Information

Projected Emissions from Existing Sources Using Additional Reductions (Eq. 6-6) $\text{Projected Emissions}_{AE} = \text{Projected Emissions}_{P} \times (1\text{-ADDATE}/100) \times (1 - \text{ADDXEFF}/100)$
Projected Emissions from New Sources Using Additional Reductions (Eq. 6-7) $\text{Projected Emissions}_{AN} = \text{Projected Emissions}_{P} \times (\text{ADDRATE}/100) \times (1 - \text{ADDNEFF}/100)$
Final Total Projected Emissions $\text{Projected Emissions}_{F} = \text{Projected Emissions}_{E} + \text{Projected Emissions}_{N}$ (Eq. 6-8)
Where: $\text{Projected Emissions}_{F}$ = final projected emissions using additional emission reduction efficiencies $\text{Projected Emissions}_{AE}$ = grown and controlled emissions from existing sources using additional reduction efficiencies $\text{Projected Emissions}_{AN}$ = grown and controlled emissions from new sources using additional reduction efficiencies $\text{Projected Emissions}_{P}$ = projected emissions using primary emission reduction efficiencies [see Eqs. 6-1 thru 6-5] ADDRATE = additional percentage of grown emissions attributed to new sources ADDXEFF = additional control efficiency for existing sources ADDNEFF = additional control efficiency for new sources

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.

When processing data for ASPEN, the inventory produced by PtTemporal will contain at least the variables listed in Table 6-6. 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 6-6. Variables in the PtGrowCntl Input Point Source Inventory SAS® File when Processing Data for ASPEN

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 *
BLDH	building height (meters) (5 for horizontal stacks, 0 for all other stacks); assigned in PtModelProc (see Section 4.1.3)	N
BLDW	building width (meters) (5 for horizontal stacks, 0 for all other stacks); assigned in PtModelProc (see Section 4.1.3)	N
CNTL_EFF	baseline control efficiency, expressed as a percentage	N
EMIS	pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within a site	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	building code (1 for horizontal stacks, 0 for all other stacks); assigned in PtModelProc (see Section 4.1.3)	A1
IVENT	vent type (0 for stacked sources, 1 for non-stacked sources); assigned in PtModelProc (see Section 4.1.3)	A1
LAT	latitude (decimal degrees)	N
LON	longitude (negative decimal degrees)	N
MACTCODE	MACT code	A7
NTI_HAP	code identifying HAP on the Clean Air Act HAP list; assigned in PtModelProc (see Section 4.1.1)	A3
REACT	pollutant reactivity class (1-9)	N
SAROAD	unique pollutant-group code; assigned in PtModelProc (See section 4.1.1)	A5
SAROADDC	descriptive name for SAROAD; assigned in PtModelProc (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	A25

Table 6-6. Variables in the PtGrowCntl Input Point Source Inventory SAS® File when Processing Data for ASPEN (continued)

Variable Name	Data Description (Required units or values are in parentheses)	Type *
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions) If you choose to define 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
TAFS1-TAFS8	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 (tons/year); calculated in PtTemporal	N
UFLAG	urban/rural dispersion flag (1 for urban, 2 for rural); assigned in PtModelProc (see Section 4.1.2)	N

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

When processing data for ISCST3, your input inventory (output inventory from PtTemporal) will contain the variables listed in Table 6-7 with some exceptions. Only if you have included ISCST3 area and/or volume sources will the inventory contain the release parameter variables required for these sources (see Section 3.2.1 for a description of these source types). The inventory may contain additional variables such as the diagnostic flag variables LLPROB or FIPFLAG created by PtDataProc depending on the options you chose for the windowing function and the contents of the varlist.txt file used in PtDataProc.

Table 6-7. Variables in the PtGrowCntl Input Point Source Inventory SAS® File when Processing Data for ISCST3

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 *
AANGLE[c]	orientation angle of rectangle for ISCST3 area source (degrees from North)	N
AINPLUM[c]	initial vertical dimension of ISCST3 area source plume (meters)	N
ARELHGT[a]	release height of ISCST3 area source (meters)	N
AXLEN[a]	length of X side of ISCST3 area source (meters)	N
AYLEN[c]	length of Y side of ISCST3 area source (meters)	N
BLDH	building height (meters); missing values defaulted in PtModelProc (see Section 4.1.3)	N
BLDW	building width (meters); missing values defaulted in PtModelProc (see Section 4.1.3)	N
CNTL_EFF	baseline control efficiency, expressed as a percentage	N
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
ISCTYPE[a,b]	ISCST3 source type (iscpoint, iscarea, or iscvolume)	A9
MACTCODE	process or site-level MACT code	A7
NTI_HAP	code identifying HAP on the Clean Air Act HAP list; assigned in PtModelProc (see Section 4.1.1)	A3
REACT	pollutant reactivity class (1-9)	N
SAROAD	unique pollutant-group code; assigned in PtModelProc (See section 4.1.1)	A5
SAROADDC	descriptive name for the SAROAD; assigned in PtModelProc (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
SIGMAX[b]	initial lateral dimension of volume source (meters)	N
SIGMAZ[b]	initial vertical dimension of volume source (meters)	N

Table 6-7. Variables in the PtGrowCntl Input Point Source Inventory SAS® File when Processing Data for ISCST3
(continued)

Variable Name	Data Description (Required units or values are in parentheses)	Type *
SITE_ID	code identifying a unique site	A25
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions) If you choose to define source groups by this variable as explained in 8.1.1, 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
TEMIS1-TEMIS288	temporally allocated emissions for each hour of each of three day types and four seasons (tons/hour); calculated in PtTemporal	N
UTMX	UTM easting (meters)	N
UTMY	UTM northing (meters)	N
VOLHGT[b]	release height above ground for volume source (meters)	N

*Ax = character string of length x, I = integer, N = numeric
[a] variables required for processing ISCST3 area sources
[b] variables required for processing ISCST3 volume sources
[c] additional variables only included when information is available

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 6-8 lists the ancillary input files required for PtGrowCntl and when you may need to modify them.

Table 6-8. Required Ancillary Input Files for PtGrowCntl

Name of File Provided with EMS-HAP	Purpose	Need to Modify?	Format
gfegas_bymactXX_YY (where XX specifies the base year and YY specifies the projection year)	Provides the assignment of year-specific growth factors by MACT category and nationally, by state FIPS, or by county FIPS	When you need growth factors for a different projection year or base year or when you update growth information for a MACT category	Text
gfegas_bysicXX_YY (where XX specifies the base year and YY specifies the projection year)	Provides the assignment of year-specific growth factors by SIC code and nationally, by state FIPS, or by county FIPS	When you need growth factors for a different projection year or base year or when you update growth information by SIC	Text
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	When additional or updated MACT-based reduction information is obtained	Text
MACT_spec	Provides emission reduction strategy information by MACT category and SCC and/or HAP identification code	When additional or updated MACT-based reduction information is obtained	Text
User_cntl*	Provides user-defined emission reduction information by user-defined combinations of site, MACT category, SCC code, SIC code, HAP identification code, and/or county type code	Develop to create a user-specific emission reduction scenario for a future year	Text
popflg96	Allows you to define the county type code based on the actual counties in the U.S. The county-type code is used in the User_control file to allow you to develop emission reduction scenarios by individual counties or groups of counties.	If you want to apply emission reductions to specific counties or groups of counties	Text

* not provided as part of EMS-HAP.

6.2.3 Modify the MACT-based and SIC-based growth factor input files (gfegas_bymactXX_YY.txt and gfegas_bysicXX_YY.txt)

The growth factors in the growth factor files provided with EMS-HAP were obtained primarily by running the Economic Growth Analysis System, version 4.0[8], (EGAS4.0) with the "BLS" option. To create the MACT-based factors we used the SCC-based factors from EGAS4.0 that matched most appropriately to the MACT category. In a few cases, we replaced the EGAS4.0 factors with MACT-based growth factors recommended by EPA MACT standard development project leads. The SIC-based factors were based on the SIC-based factors from EGAS4.0. Some of the factors are county-specific, while others apply uniformly across the nation. You may want to modify the growth factor files to use more updated information or location-specific information, if you have it.

The MACT-based growth factor file indexes the factors by MACT and state and county FIPS code, whereas the SIC-based growth factor indexes it by 2-digit SIC and state and county FIPS code. The state and county FIPS can be used to control the geographic region over which the growth factor is to be applied: nationally, state-wide, or within a specific county. This is done by assigning the state FIPS and county FIPS as shown in Table 6-9.

Table 6-9. Regional Assignment of Growth Factors in the Growth Factor Files

Assignment of Growth Factor	State FIPS	County FIPS
Nationally	'00'	'000'
State-wide	specific state FIPS code	'000'
County-wide	specific state FIPS code	specific county FIPS code

Note that any nationally applied growth factor will be superceded by a state-wide growth factor, and any state-wide growth factor will be superceded by a county-specific growth factor.

The SIC-based growth factor file contains the same information as the MACT-based growth factor file, except that the growth factors are identified by the first two digits of the SIC code. The growth factors are applied nationally, state-wide, and within a specific county in the same way as in the MACT-based file. Note that if you assign growth factors by MACT category and by SIC, the SIC-based growth factors will not replace any assigned MACT-based growth factors.

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 MACT-based or SIC-based growth factor files, with each separate version addressing a different base and projection year. Only one version (i.e., pertaining to one base year and one projection year) of one or both of these growth factor files can be used in a particular run of EMS-HAP. The formats for the MACT-based and SIC-based growth factor files are provided in Figures 20a and 20b, respectively, of Appendix A.

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 a corresponding 4-digit SIC code. In this file, you can assign only one SIC code to a given SCC code. Note that PtGrowCntl uses only the first two digits of the SIC code along with the state and county FIPS to assign growth factors to the inventory records. The format for this file is provided in Figure 21 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 Modify the MACT-based emission reduction information files (MACT_gen.txt and MACT_spec.txt)

The general MACT reduction information file (MACT_gen.txt) contains the list of MACT categories and the general reduction information described in Section 6.1.2. You will need to modify this file to account for updates to this information. This is because this information was not known for some of the MACT categories at the time we developed this file or may have changed since then. The format for the general MACT reduction information file is provided in Figure 22a of Appendix A.

The specific MACT reduction information file (MACT_spec.txt) contains reduction efficiencies for specific HAPs or specific processes within a MACT category as described in Section 6.1.2. Similarly, as discussed (above) for the MACT_gen.txt file, you will need to modify this file to account for updates to the information. The format for the specific MACT reduction information file is provided in Figure 22b of Appendix A. If you need to apply reduction information at the site-level within a MACT category, you will need to use the user-defined emission reduction information file, User_control.txt (see Section 6.2.6).

It is important to note that all MACT categories included in the MACT_spec.txt file must be included in the MACT_gen.txt file. If not, the reduction information in the MACT_spec.txt file for that MACT category will not be used. This is necessary because the compliance date from the MACT_gen.txt file is used to determine whether or not the specific reduction information should be applied to the emissions for the specified projection year. In addition, the compliance date must be provided in the MACT_gen.txt file.

In cases where an emission inventory record is affected by more than one record in the specific MACT reduction information file, a specific order of precedence is followed. This order is presented in Table 6-1 (see Section 6.1.2). As an example, a reduction information record that specifies MACT code and NTI_HAP will be superceded by a record that specifies MACT code and 6-digit SCC.

6.2.6 Develop the user-defined emission reduction information files (User_control.txt and popflg96.txt)

The user-defined emission reduction information file (User_control.txt) is not provided as part of EMS-HAP, because it is based on your own detailed reduction strategy information and preferences. If you want to apply your own emission reductions to the inventory, you will need to develop this file. The User_control.txt file allows you to define emission reduction information by any combination of process and pollutant information, specified by the MACT code, SCC, SIC, and/or NTI_HAP variable. In addition, you can define any of this information for specific counties or groups of counties of your own creation (e.g., urban versus rural counties, counties in a specific MSA, or all counties within a state). Finally, you can define reduction information for a specific site using the SITE_ID variable. You can do this for the site alone or in various combinations with process and pollutant information, specified by the MACT code, SCC , SIC, and/or NTI_HAP variable. Section 6.1.3 describes how PtGrowCntl uses this file and the hierarchy of assigning the various strategies you may include in the file. The format for the user-defined reduction information file is provided in Figure 23 of Appendix A.

You must modify the popflg96.txt file if you choose a user-defined scenario which is specific to either a single county or a group of similar counties (e.g., all urban counties). You define specific counties or groups of counties for which you want to specify emission reduction information in PtGrowCntl, by populating the CNTYCODE variable in this file. All counties that you want to group together should have the same value for CNTYCODE. For example, if you want to develop a scenario for all urban counties, then you might use the code 'URBAN' for the CNTYCODE. You would then assign 'URBAN' to each urban county in the popflg96.txt file. The popflag96.txt file also contains 1996 county-level urban/rural designations to help you if you choose to use that as the basis of a reduction scenario. The format for the popflg96.txt file is provided in Figure 24 of Appendix A. You must use the same value of CNTYCODE in the popflg96.txt file as you use in the User_control.txt file.

6.2.7 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. Sample batch files for PtGrowCntl for ASPEN and ISCST3 emissions processing are shown in Figures 9 and 10, respectively, of Appendix B. The best way to prepare your batch file is to use one of the samples we provide and modify it to fit your needs.

Specify your keywords

Table 6-10 shows you how to specify keywords to select which functions you want PtGrowCntl to perform. For example, if you want to project your emissions by economic growth based only on the MACT category, set the GROWFLAG keyword to 'MACT'.

Table 6-10. Keywords for Selecting PtGrowCntl Functions

PtGrowCntl Function	Keyword (values provided cause function to be performed)
Select model for which data is being processed	
Process data for ASPEN model	MODEL = ASPEN
Process data for ISCST3 model	MODEL = ISC
Assign and apply growth factors	
Assign growth factors by MACT category and geographic region only	GROWFLAG = MACT
Assign growth factors by two-digit SIC and geographic region only	GROWFLAG = SIC
Assign growth factors by MACT category and geographic region and two-digit SIC and geographic region	GROWFLAG = BOTH
Do not assign growth factors	GROWFLAG = NONE
Assign missing SICs by SCC to SIC cross-reference file (used only when assigning growth factors by two-digit SIC)	SICFLAG = 1
Assign and apply reduction information	
Use MACT-based emission reduction information only	CNTLFLAG = MACT
Use User-defined emission reduction information only	CNTLFLAG = USER
Use both MACT-based and User-defined emission reduction information	CNTLFLAG = BOTH
Do not assign reduction information	CNTLFLAG = NONE
Use general MACT-based information only (applies only when CNTLFLAG = 'MACT' or 'BOTH')	SPECMACT = 0
Use both general and process and/or pollutant specific MACT-based information (applies only when CNTLFLAG = 'MACT' or 'BOTH')	SPECMACT = 1
Project Emissions beginning January 1 in the projected year	YEARTYPE = CALENDAR
Project Emissions beginning October 1 in the year prior to the projected year	YEARTYPE = FISCAL

Table 6-11 describes all of the keywords required in the batch file. Use keywords to locate and name all input and output files. The same batch file can be used for running PtGrowCntl for ASPEN or ISCST3. The only difference is the assignment of the keywords MODEL (either 'ASPEN' or 'ISC').

Table 6-11. Keywords in the PtGrowCntl Batch File For Either ASPEN or ISCST3

Keyword	Description of Value
	Input Inventory Files
IN_DATA	The input SAS® file directory
INSAS	Input inventory SAS® file name, prefix of file name only
	Ancillary Files (Prefix of file name provided with EMS-HAP in parentheses)
REFSAS	The reference SAS® file directory
REFTEXT	The reference text file directory
GFMACT	MACT-based growth factors text file, prefix only (gfegas_bymactXX_YY, where XX specifies base year and YY specifies projection year)
GFSIC	SIC-based growth factors text file, prefix only (gfegas_bysicXX_YY, where XX specifies base year and YY specifies projection year)
SCC2SIC	SCC to SIC cross-reference text file, prefix only (ptscc2sic)
MACTGEN	General MACT-based emission reduction information text file, prefix only (MACT_gen)
SPECFILE	Specific MACT-based emission reduction information text file, prefix only (MACT_spec)
USERFILE	User-defined emission reduction information text file, prefix only (file not provided with EMS-HAP)
CNTYUR	State/County FIPS to county control code cross-reference text file, prefix only (popflg96)
	Program Options (See also Table 6-10)
MODEL	ASPEN=process data for ASPEN model; ISC=process data for ISCST3 model
GROWFLAG	MACT= project emissions due to economic growth by MACT code and geographic region only; SIC=project emissions due to economic growth two-digit SIC and geographic region only; BOTH=project emissions due to economic growth both by MACT code and geographic region and by two-digit SIC and geographic region; NONE = does not project emissions due to economic growth
SICFLAG	1=use SCC to SIC cross-reference file to assign SIC where missing in inventory; 0=don't assign SIC where missing
CNTLFLAG	MACT=project emissions using MACT-based emission reduction information only; USER=project emissions using user-defined emission reduction information only; BOTH=projects emissions using both MACT-based and user-defined emission reduction information NONE=does not project emissions using emission reductions
SPECMACT	1=Use process and/or pollutant specific MACT emission reduction information; 0=don't use process and/or pollutant specific MACT emission reduction information
YEARTYPE	CALENDAR = Project Emissions beginning January 1 in the projected year FISCAL = Project Emissions beginning October 1 in the year prior to the projected year
	Additional Input Data
GROWYEAR	Year to which emissions are to be projected
	Output files
OUTDATA	The output SAS® file directory
OUTSAS	Output inventory SAS® file name, prefix only

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 GROWFLAG to 'NONE,' you still need to assign values to the keywords GFMACT, GFSIC, SICFLAG, SCC2SIC, and YEARTYPE. Although the values provided in this circumstance will be ignored by PtGrowCntl, place holder values for the keywords are still required.

Prepare the execute statement

The last line in the batch file runs the PtGrowCntl program. In the sample batch files provided in Figures 9 and 10 of Appendix B, you will see a line preceding 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. For example, the statement: 'sas PtGrowCntl_062000.sas -work /data/work15/dyl/' assigns a work directory called "/data/work15/dyl". The directory you reference here must be created prior to running the program.

6.2.8 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

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 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. This file can contain the information listed below. The contents of the list file from a specific run of PtGrowCntl depend on which functions you choose to have PtGrowCntl perform.

- List of general MACT emission reduction information indicating which records contain information to be used considering the application code and the growth year
- Summary of inventory records assigned general MACT reduction information
- List of specific MACT emission reduction information indicating which records contain information that is to be used considering the application code
- List of duplicate records in specific MACT emission reduction information files
- List of specific MACT emission reduction information not assigned to any records in the inventory
- Summary of inventory records assigned process and/or pollutant specific MACT reduction information
- List of user-defined emission reduction information indicating which records contain information that is to be used considering the application code and the growth year
- List of state and county FIPS in the popflg96 (keyword=CNTYUR) file that are not found in the inventory
- List of duplicate records in the user-defined emission reduction information file
- List of user-defined emission reduction information not assigned to a record in the inventory
- Summary of inventory records assigned user-defined emission reduction information
- Summary of assigned growth factors and emission reduction information and the resulting projected emissions

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 PtFinal_ASPEN or PtFinal_ISCST3, depending on the model you are using. If your projection included the use of any reduction strategies (MACT, user-defined, or both), the output inventory file will contain the variable CNTLCODE. This variable contains information about what reduction information (general MACT, specific MACT, and/or user-defined) was assigned to the emission record and how the information was combined for the assignment of the primary and additional control efficiencies. Reviewing the CNTLCODE variable can help confirm how your reduction strategies were used to project the emissions.

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

The flowchart below (Figure 7-1) shows how PtFinal_ASPEN fits into EMS-HAP's point source processing for the ASPEN model. You don't use this program if you are processing emissions for ISCST3. The point source inventory you input to PtFinal_ASPEN is either the output from PtTemporal (Chapter 5) or the output from PtGrowCntl (Chapter 6). You use the output from PtFinal_ASPEN as the input emission files for the ASPEN model.

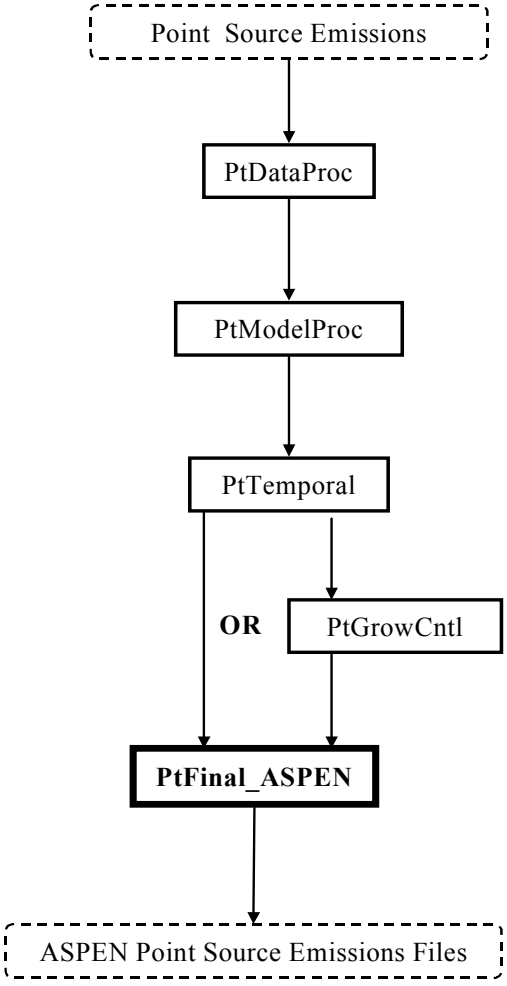


Figure 7-1. Overview of PtFinal_ASPEN Within EMS-HAP Point Source Processing

7.1 What is the function of PtFinal_ASPEN?

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

- Assigns ASPEN source groups used in the ASPEN model output
- Converts temporally allocated emissions from tons/year to grams/second for each of the eight 3-hour periods
- Creates ASPEN input files, a SAS® file and an optional column formatted text file

Figure 7 shows a flowchart of PtFinal_ASPEN. The following sections describe the above bullets.

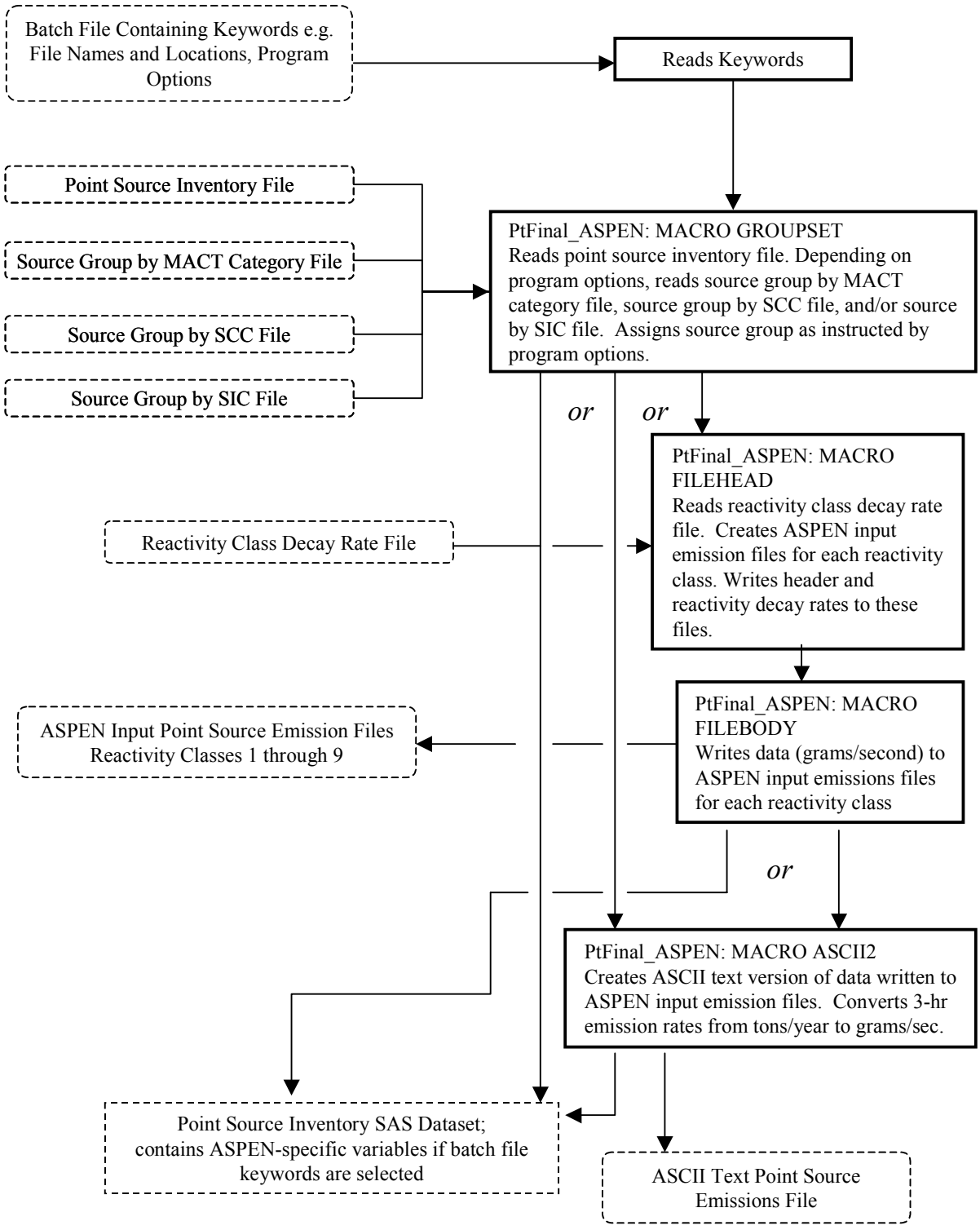


Figure 7-2. PtFinal_ASPEN Flow Chart

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. PtFinal_ASPEN can assign ASPEN source groups by the criteria listed below. You choose the method based on the keywords you specify in your batch file (see Table 7-4 in Section 7.2.4).

- source type (variable SRC_TYPE)
- MACT category code (variable MACTCODE)
- 6-digit SCC
- SIC

The assigned source group value (which can be 0 through 9) is stored in the variable named GROUP. When assigning the source group by SRC_TYPE, PtFinal_ASPEN makes the assignment as shown in Table 7-1.

Table 7-1. Assignment of Source Groups for ASPEN Model Using Source Type

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[c]	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..."

[c] 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, PtFinal_ASPEN uses the appropriate ancillary file (mact_grp, SCC_grp, or SIC_grp) based on your assignment method. These files contain the group assignment value by code. See Section 7.2.3 for instructions on how to modify these files if you choose to assign your groups this way.

Although you may choose several of the criteria listed above, PtFinal_ASPEN will not combine the above criteria to define a group. You can't, for example, assign a major sources with a particular SIC to a group by selecting both the source type and SIC criteria. Only one criterion is

used for each emission point. In cases where you do choose more than one of the criteria, the order of precedence from lowest to highest priority is as follows: source type, MACT category code, 6-digit SCC, and SIC. Thus, a source group assigned by MACT category code will replace one assigned by the source type. There is one exception to this order. If you choose to assign the source group by both SCC and SIC, the SCC_grp and SIC_grp ancillary files need to contain an associated ranking that controls 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 (keyword DFLTGRP, see Table 7-5 in Section 7.2.4).

7.1.2 Converts temporally allocated emissions from tons/year to grams/second for each of the eight 3-hour periods

PtTemporal produces emissions in units of tons per year for each of the eight 3-hour time periods. If you choose to either create the ASPEN input files or the column formatted ASCII text file (see Section 7.1.3), PtFinal_ASPEN converts these emissions to grams per second, because these units are required by the ASPEN model. The following formula is used:

$$E_{gps(i)} = E_{tpy(i)} \times (1 \text{ year}/365 \text{ days}) \times (1 \text{ day}/24 \text{ hrs}) \times (1 \text{ hr}/3600 \text{ sec}) \times (907{,}184 \text{ grams/ton}) \quad \text{(eq. 7-1)}$$

where:

$E_{gps(i)}$ = emissions grams/second for time block i (where i represents one of the eight 3-hour time blocks; e.g., time block i=1 represents the midnight to 3 a.m. time period)

$E_{tpy(i)}$ = emissions (tons/year) for time block i

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

PtFinal_ASPEN 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 PtFinal_ASPEN, based on the keywords you specify in your batch file (see Table 7-4 in Section 7.2.4). PtFinal_ASPEN automatically creates the SAS® output file.

ASPEN Input Files

The ASPEN model requires emissions data in the form of one ASCII text file for each of the possible nine reactivity/particulate size classes. Each file contains data for all pollutants having the same class. PtFinal_ASPEN creates all nine files in the appropriate format. (See Section 4.0 of the ASPEN User's Guide[1] for more details on the required format.) Each text file consists of a header and body. The elements of the header are:

- A run identifier: You supply this in the batch file (keyword RUNID, see Table 7-5 in Section 7.2.4)
- Species type: PtFinal_ASPEN sets this to 0 for gaseous species, 1 for fine particulates, and 2 for coarse particulates.
- Wet and dry deposition codes: PtFinal_ASPEN 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).
- Decay coefficients associated with the reactivity class: PtFinal_ASPEN 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/particulate size classes.

The file body contains source information such as latitude and longitude, the source group, 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/particulate size class) emitted from the stack.

PtFinal_ASPEN 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 (see Table 7-5 in Section 7.2.4), and REACT is the reactivity/particulate size class (a number between 1 and 9, inclusive). An example file name is 'Pt96.US.D121599.r1.inp' where OUTCODE is 'Pt96.US.D121599' and REACT is '1'.

Column-Formatted ASCII File

PtFinal_ASPEN 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, see Table 7-5 in Section 7.2.4); the suffix is 'txt'. Table 7-7 in Section 7.3.3 shows the format of this file.

SAS® Output File

PtFinal_ASPEN automatically creates an output SAS® inventory file. This file contains the same data as in the input SAS® inventory file with the following exceptions:

- The source group variable (GROUP), and possibly some ASPEN-specific variables (see Table 7-6 in Section 7.3.3), have been added.

- The units of the temporally allocated emissions have been converted to grams/second (unless, in the unlikely event that you chose not to create neither the ASPEN input nor the column-formatted ASCII files)

You specify the name of this file in your batch file (keyword OUTSAS, see Table 7-5 in Section 7.2.4).

7.2 How do I run PtFinal_ASPEN?

7.2.1 Prepare your point source inventory for input into PtFinal_ASPEN

The point source inventory you use for input into PtFinal_ASPEN can be the output from either PtTemporal (see Chapter 5) or PtGrowCntl (see Chapter 6). The inventory produced by either of these programs will meet all requirements and will contain the variables listed in Table 7-2 with some exceptions. If the output from PtTemporal is used, the file will not include the control variables created in PtGrowCntl. The file may also 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 PtFinal_ASPEN Input Point Source Inventory SAS® File

Variable Name	Data Description (Required units or values are in parentheses)	Type*
ADDNEFF [a]	reduction (%) for new sources to be applied in addition to primary reductions; assigned in PtGrowCntl (see Section 6.1.4)	N
ADDXEFF [a]	reduction (%) for existing sources to be applied in addition to primary reductions; assigned in PtGrowCntl (see Section 6.1.4)	N
ADD_RATE [a]	percentage of emissions attributable to new sources for the purpose of applying additional reductions; assigned in PtGrowCntl (see Section 6.1.4)	N
BLDH	building height (meters) (5 for horizontal stacks, 0 for all other stacks); assigned in PtModelProc (see Section 4.1.3)	N
BLDW	building width (meters) (5 for horizontal stacks, 0 for all other stacks); assigned in PtModelProc (see Section 4.1.3)	N
CNTL_EFF	baseline reduction efficiency, expressed as a percentage	N
CNTLCODE [a]	control code indicating the reductions applied to emissions; assigned in PtGrowCntl	A100
EMIS	baseline pollutant emissions value (tons/year)	N
EMRELPID	code identifying a unique emission point within a site	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
EXISTEFF [a]	primary percent reduction for existing sources; assigned in PtGrowCntl (see Section 6.1.4)	N
FIPS	5-digit FIPS code (state and county combined)	A5
GF[a]	growth factor; assigned in PtGrowCntl (see Section 6.1.1)	N
IBLDG	building code (1 for horizontal stacks, 0 for all other stacks); assigned in PtModelProc (see Section 4.1.3)	A1
IVENT	vent type (0 for stacked sources, 1 for non-stacked sources); assigned in PtModelProc (see Section 4.1.3)	A1
LAT	latitude (decimal degrees)	N
LON	longitude (negative decimal degrees)	N
MACTCODE	MACT code	A7
NEW_EFF [a]	primary percent reduction for new sources; assigned in PtGrowCntl (see Section 6.1.4)	N
NEW_RATE [a]	percentage of emissions attributable to new sources for the purpose of applying primary reductions; assigned in PtGrowCntl (see Section 6.1.4)	N

Table 7-2. Variables in the PtFinal_ASPEN Input Point Source Inventory ... (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 PtModelProc (see Section 4.1.1)	A3
REACT	pollutant reactivity/particulate size class (1-9); assigned in PtModelProc (see Section 4.1.1)	N
REPLACE[a]	user-defined reduction flag (R=replace MACT-based reductions with user-defined reductions; A=apply user-defined reductions in addition to the primary MACT-based reductions); assigned in PtGrowCntl (see Section 6.1.4)	A1
SAROAD	unique pollutant-group code; assigned in PtModelProc (see Section 4.1.1)	A10
SAROADDC	descriptive name for the SAROAD; assigned in PtModelProc (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[a]	SIC assigned by cross-reference to SCC for use in assigning growth factors; assigned in PtGrowCntl (see Section 6.1.1)	A4
SIC	Standard Industrial Classification (SIC) code for the site	A4
SITE_ID	code identifying a unique site	A25
SRC_TYPE	description of the emission source at the site ('nonroad' for aircraft emissions) If you choose to define 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
TAFS1-TAFS8	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 (tons/year); 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 PtModelProc (see Section 4.1.2)	N

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

[a] variable present only if you run the optional Growth and Control Program, PtGrowCntl (Chapter 6)

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

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 PtFinal_ASPEN and when you may need to modify them.

Table 7-3. Required Ancillary Input Files for PtFinal_ASPEN

Name of File Provided with EMS-HAP	Purpose	Need to Modify?	Format
mact_grp.txt	Provides the assignment of source groups by MACT code	If you want to make source group assignments by MACT code	Text
scc6_grp.txt	Provides the assignment of 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 source group assignments by SCC code	Text
sic_grp.txt	Provides the assignment of 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 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/particulate classes	No	Text

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

The ASPEN model output presents data for each pollutant (SAROAD) by census tract and by source group. The source group assignment you make in PtFinal_ASPEN 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 Figures 25 through 27 of Appendix A. 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 PtFinal_ASPEN is shown in Figure 11 of Appendix B. The best way to prepare your batch file is to use the sample we provide and modify it to fit your needs.

Specify your keywords

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

Table 7-4. Keywords for Selecting PtFinal_ASPEN Functions

PtFinal_ASPEN Function	Keyword (values provided cause function to be performed)
Process data for ASPEN model	MODEL = ASPEN
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 PtFinal_ASPEN Batch File

Keyword	Description of Value
	Input Inventory Files
IN_DATA	Input SAS® file directory
INSAS	Input inventory SAS® file name, prefix of file name only
	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 only (mact_grp)
SCCGRP	SCC code to source group correspondence text file, prefix only (scc6_grp)
SICGRP	SIC code to source group correspondence text file, prefix only (sic_grp)
DECAY	Reactivity class decay coefficients for 6 stability classes for eight 3-hour time periods, prefix only (indecay)
	Program Options (see also Table 7-4)
MODEL	ASPEN = process data for the ASPEN model
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, prefix only
OUTFILES	Output ASPEN emission files directory
ASCIIFILE	Output ASCII text file directory
ASCII	Column-formatted ASCII text file name, prefix only

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 (zero), 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 PtFinal_ASPEN program. In the sample batch file provided in Figure 11 of Appendix B, you will see a line preceding the run line that creates a copy of the PtFinal_ASPEN 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 PtFinal_ASPEN 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 PtFinal_ASPEN. In the sample batch file, a work directory is defined on the last line following the execution of PtFinal_ASPEN. For example, the command 'sas PtFinal_ASPEN_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 PtFinal_ASPEN

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 PtFinal_ASPEN.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, 'PtFinal_ASPEN.bat'.

7.3 How Do I Know My Run of PtFinal_ASPEN 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*

You need to check this list file for records that do not contain source types. Source groups are also provided for every unique combination of MACT, SCC, and SIC code.

7.3.3 Check other output files from PtFinal_ASPEN

PtFinal_ASPEN 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 and additional data that depends on how you set the keywords DOASCII and DOWRITE in the batch file (see Table 7-4 in Section 7.2.4). Table 7-6 lists the variables that can be added to the output point source inventory. The temporally allocated emissions values are also converted from tons/year to grams/sec (see Section 7.1.2) if you choose to create the either the ASPEN input or column formatted ASCII files (i.e., either DOWRITE or DOASCII=1).

Table 7-6. Variables Added to Input Inventory in Creating the PtFinal_ASPEN Output Point Source Inventory SAS® File

Variable Name	Data Description (Required units or values are in parentheses)	Type*
GROUP	Emissions source group written to the ASPEN input file; assigned in PtFinal_ASPEN	A1
ITYPE	ASPEN source type written to the ASPEN input file (0=point; 3= pseudopoint. Should be "0" for all point sources); assigned if batch file keywords DOASCII or DOWRITE = 1	A1
PLANTID	Plant ID variable written to the ASPEN input file (first 10 characters of EMS-HAP SITE_ID); assigned if batch file keywords DOASCII or DOWRITE = 1	A10
STACKID	Stack ID variable written to the ASPEN input file (last five characters of the EMRELPID variable); assigned if batch file keywords DOASCII or DOWRITE = 1	A5

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

If you set the DOWRITE keyword to 1 (one), PtFinal_ASPEN 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/particulate size 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 (one), PtFinal_ASPEN will create a single column formatted ASCII file which can be helpful in checking the quality of the ASPEN input emission data. Table 7-7 provides the variables in this file.

Table 7-7. PtFinal_ASPEN 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 SITE_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)	1.0
STACKID: ASPEN Stack ID (last 5 characters of 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	A25

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

CHAPTER 8
Point Source Processing
The Final Format Program for ISCST3
(PtFinal_ISCST3)

The flowchart below (Figure 8-1) shows how PtFinal_ISCST3 fits into EMS-HAP's point source processing for the ISCST3 model. You don't use this program if you are processing emissions for ASPEN. The point source inventory you input to PtFinal_ISCST3 is either the output from PtTemporal (Chapter 5) or the output from PtGrowCntl (Chapter 6). You use the output from PtFinal_ISCST3 as the source (SO) pathway section of the ISCST3 run stream for running the ISCST3 model.

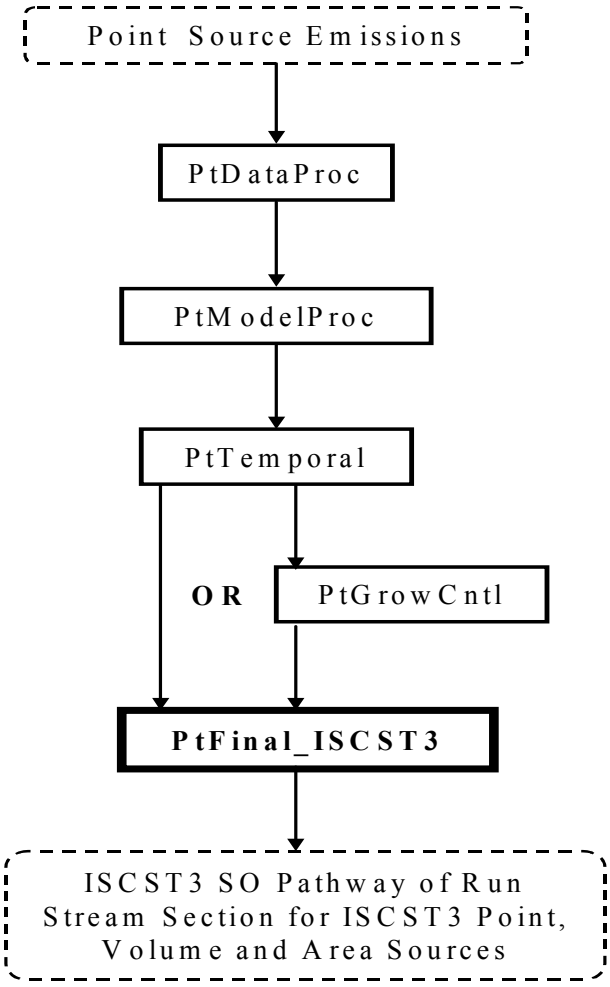


Figure 8-1. Overview of PtFinal_ISCST3 within EMS-HAP Point Source Processing

8.1 What is the function of PtFinal_ISCST3?

The Final Format Program for ISCST3 (PtFinal_ISCST3) creates the SO pathway section of the ISCST3 run stream. PtFinal_ISCST3 performs the functions listed below.

- Assigns source groups used in the ISCST3 model output
- Assigns default release parameters in order to model fugitive sources and horizontal stacks as ISCST3 volume sources
- Assigns available particulate size and gas deposition data by pollutant or by combination of SCC and pollutant
- Removes emission sources outside your modeling domain
- Assigns available emission source elevation data by modeling grid cell
- Assigns source identification codes needed for the ISCST3 SO pathway section files
- Adjusts UTM coordinates of ISCST3 area emission sources from the center of the source to its southwest corner
- Converts temporally allocated emissions from tons/hour to the necessary units for each source for each of the 288 emission rates
- Creates SO pathway section of the ISCST3 run stream and include files

Figure 8-2 shows a flowchart of PtFinal_ISCST3. The following sections describe the above bullets.

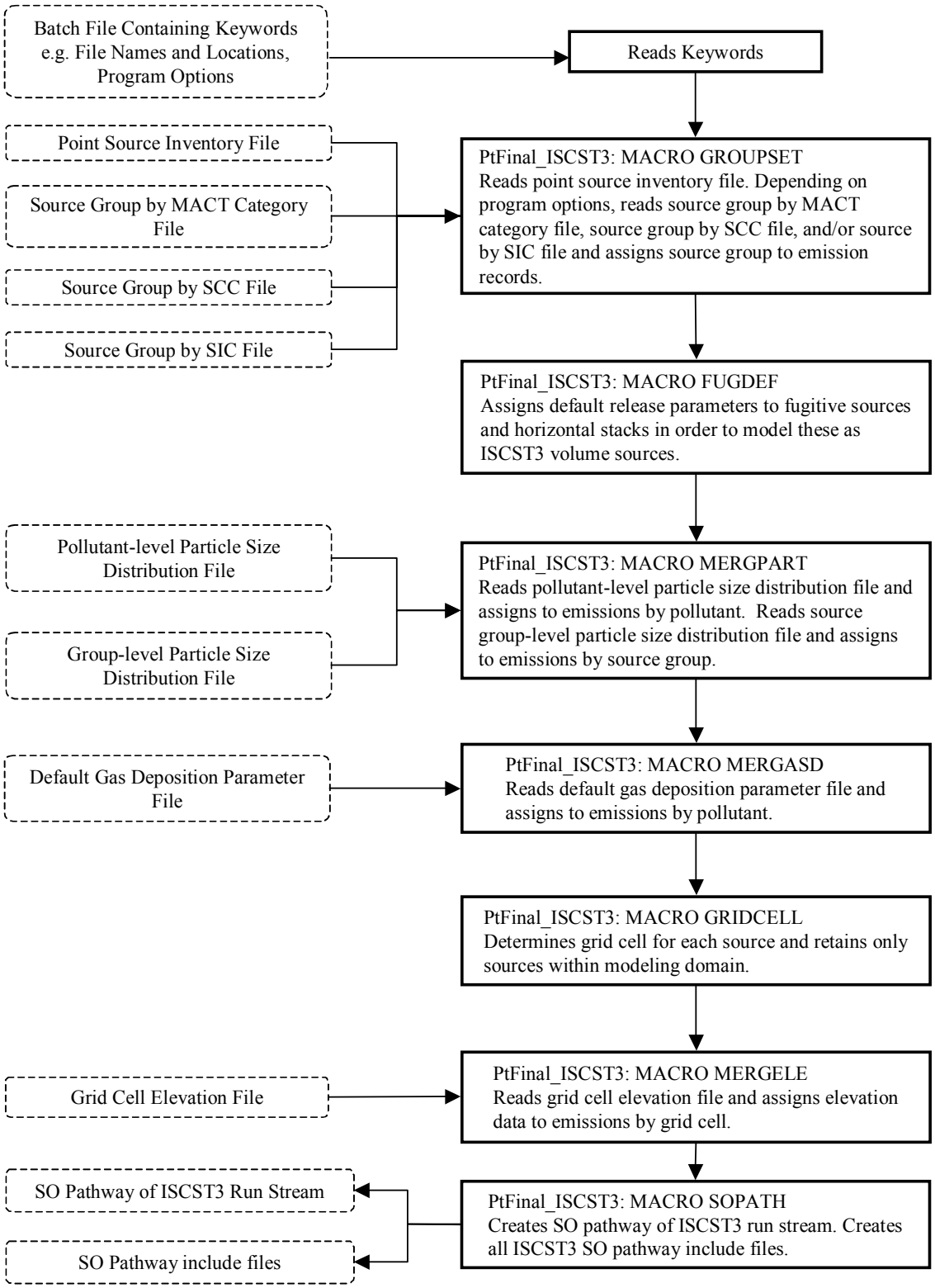


Figure 8-2 PtFinal_ISCST3 Flowchart

8.1.1 Assigns source groups used in the ISCST3 model output

The ISCST3 model can compute pollutant concentrations at the receptors by source groups. This information can then be used to analyze the relative impacts of different types of emissions sources. For example, ISCST3 can output concentrations from dry cleaning sources separately from onroad mobile sources. This source group assignment is also incorporated into a sequential source identification code (discussed in 8.1.6) that PtFinal_ISCST3 assigns to each source for use in the ISCST3 model.

ISCST3 can use up to 100 source groups. PtFinal_ISCST3 can assign source groups by the criteria listed below. You choose the method based on the keywords you specify in your batch file (see Table 8-9 in Section 8.2.5).

- source type (variable SRC_TYPE)
- MACT category code (variable MACTCODE)
- 6-digit SCC
- SIC

The assigned source group value (which can be 00 through 99) is stored in the variable named GROUP. When assigning the source group by SRC_TYPE, PtFinal_ISCST3 makes the assignment as shown in Table 8-1.

Table 8-1. Assignment of Source Groups for the ISCST3 Model

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]	00
area	Area source of HAPs based on definition in Section 112 of Clean Air Act[b]	01
onroad	Onroad mobile source emissions (for example: GIS-based onroad segment emissions appended into the point source inventory)	02
nonroad	Nonroad mobile source emissions (for example: allocated aircraft emissions incorporated into the point source inventory through running AirportProc)	03

[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.."

If you choose to assign the source group by the MACT category, the 6-digit SCC, or the SIC, PtFinal_ISCST3 uses the appropriate ancillary file (mact_grp, scc_grp, or sic_grp) based on your assignment method. These files contain the group assignment value by code. See Section 8.2.3 for instructions on how to modify these files if you choose to assign your groups this way.

Although you may choose several of the criteria listed above, PtFinal_ISCST3 will not combine the above criteria to define a group. You can't, for example, assign a major sources with a particular SIC to a group by selecting both the source type and SIC criteria. Only one criterion is used for each emission point. In cases where you do choose more than one of the criteria, the order of precedence from lowest to highest priority is as follows: source type, MACT category code, 6-digit SCC, and SIC. For example, a source group assigned by MACT category code will replace one assigned by the source type. There is one exception to this order. If you choose to assign the source group by both SCC and SIC, the SCC_grp and SIC_grp ancillary files need to contain an associated ranking that controls 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 (keyword DFLTGRP, see Table 8-10 in Section 8.2.5).

8.1.2 Assigns default release parameters in order to model fugitive sources and horizontal stacks as ISCST3 volume sources

The ISCST3 model can process three types of EMS-HAP point sources located at specific coordinates: ISCST3 point sources, ISCST3 volume sources and ISCST3 area sources. An ISCST3 point source is used to model discrete emission stacks and vents. We expect that the majority of your point source inventory consists of these type of sources. An ISCST3 volume source is used to model emission releases from various industrial sources, such as building roof monitors, multiple vents, and conveyor belts. An ISCST3 area source is used to model low level or ground level emission releases with no plume rise, such as storage piles, slag dumps, lagoons, landfills, airports, or onroad mobile segments. You can include ISCST3 volume and ISCST3 area sources in the point source inventory you input to EMS-HAP by including the required variables needed to describe these sources (see Table 3-7 in Section 3.2.1).

Even if you don't include ISCST3 volume sources in your inventory, PtFinal_ISCST3 assigns certain emission sources in your point source inventory, based on the emission release type (variable EMRELPTY), to be modeled as ISCST3 volume sources. These are fugitive sources (EMRELPTY=01) and horizontal sources (EMRELPTY=03), which are typically included in point source inventories, but we believe would be best modeled as ISCST3 volume sources rather than as ISCST3 point sources. For these release types in your inventory, PtFinal_ISCST3 assigns default ISCST3 volume source release parameters as shown in Table 8-2. This assignment does not affect any ISCST3 volume or ISCST3 area sources you have included in the inventory. PtFinal_ISCST3 also assigns the ISCTYPE variable to the value 'iscpoint' to all sources not identified as either ISCST3 volume or ISCST3 area sources.

Table 8-2. Default ISCST3 Volume Source Release Parameters Assigned to Fugitive and Horizontal Emission Release Types

Variable Name	Release Parameter	Assigned Value
ISCTYPE	ISCST3 source type	'iscvolume'
VOLHGT	Release height (meters)	2
SIGMAX	Initial lateral dimension of the volume (meters)	1.5
SIGMAZ	Initial vertical dimension of the volume (meters)	1.5

8.1.3 Assigns available particulate size and gas deposition data by pollutant or by combination of SCC and pollutant

The ISCST3 model includes several different algorithms for deposition, some of which require information in addition to the emissions inventory data. The type of deposition and the additional information required is summarized in Table 8-3.

Table 8-3. ISCST3 Deposition Algorithms and Required Information

Type of Deposition	Additional Information Required	Specificity of Information
Gravitational settling and removal of particulates in the plume by dry deposition	Emission source particle size distribution parameters (particle diameter, mass fraction, and particle density) for up to 10 fractions	by SAROAD or SAROAD and SCC
Scavenging and removal of particles by wet deposition	Liquid and ice scavenging coefficients for up to 10 fractions	by SAROAD or SAROAD and SCC
Dry deposition and removal of gaseous pollutants	Molecular diffusivity, solubility enhancement factor, reactivity parameter, mesophyll resistence term, and Henry's Law coefficient	by SAROAD

Depending on which, if any, of these deposition algorithms you will be using when running the ISCST3 model, you need to provide the appropriate information by using one of three ancillary files. One ancillary file contains the particle size distribution information and, if necessary, the liquid and ice scavenging coefficients by pollutant as identified by the SAROAD variable (for a description of the assigning of the SAROAD variable, see Section 4.1.1). Another ancillary file contains this same type of information, but by the SAROAD code and the SCC code. You

control whether or not these files are used and how they are used by PtFinal_ISCST3 through the keywords DEFPART, SCCPART and SCAVENG assigned in the batch file (see Table 8-9 in Section 8.2.5).

A third ancillary file contains the gas deposition parameters and, if necessary, the liquid and ice scavenging coefficients by SAROAD. You control whether or not this file is used and whether the scavenging coefficients are used by PtFinal_ISCST3 through the keywords GASDEPO and DEFGAS and SCAVENG assigned in the batch file (see Table 8-9 in Section 8.2.5). If you instruct PtFinal_ISCST3 to read scavenging coefficients by setting the keyword SCAVENG to 1, then these coefficients will be read from both the gas deposition and particle size distribution files.

8.1.4 Removes emission sources outside your modeling domain

PtFinal_ISCST3 windows the inventory to exclude any records in grid cells that are outside of the modeling domain; PtFinal_ISCST3 drops these records from the inventory. Grid cells are outside the domain if they have a column or row greater than the maximum column and row for the domain.

PtFinal_ISCST3 computes the modeling grid cell of each emission source in your inventory using equations 8-1 through 8-3, and the information you supply in your batch file (see Table 8-10 in Section 8.2.5) that describes your modeling grid. Table 8-4 summarizes this information.

Table 8-4. Modeling Grid Information Required by PtFinal_ISCST3 to Assign Grid Cell

Modeling Grid Information	Batch File Keyword
UTM easting coordinate of grid origin (meters)	X_ORIG
UTM northing coordinate of grid origin (meters)	Y_ORIG
Grid cell size (meters)	CELLSIZE
Number of grid columns	MAXCOL
Number of grid rows	MAXROW

The grid cell column, row, and cell number are computed according to the equations given below.

$$COL = (UTMX - X\_ORIG)/(CELLSIZE) + 1 \quad \text{(Eq. 8-1)}$$

$$ROW = (UTMY - Y\_ORIG)/(CELLSIZE) + 1 \quad \text{(Eq. 8-2)}$$

$$CELL = (COL \times 1000) + ROW \quad \text{(Eq. 8-3)}$$

Where:

COL = modeling domain grid column number

UTMX = UTM easting coordinate (meters)

ROW = modeling domain grid row number

UTMY = UTM northing coordinate (meters)

CELL = modeling domain grid cell number

Note that PtFinal_ISCST3 assigns the variables that define the grid cell to the inventory (variables CELL, ROW, COL, described above) as this information may be used for assigning emission source elevation data. This is discussed in 8.1.5.

8.1.5 Assigns available emission source elevation data by modeling grid cell

ISCST3 supports both flat and complex terrain modeling.PtFinal_ISCST3 provides two options for entering source elevations. You can use an ancillary file to provide elevation data by modeling grid cell or you can enter a single elevation to be used for all sources. If you provide an ancillary file containing elevation data by modeling grid cell, PtFinal_ISCST3 assigns this data to the inventory using the COL and ROW variables assigned based on the location of the emission source (see Section 8.1.4). If you want to use a single elevation for all sources, you provide this value through the keyword DEFELEV assigned in the batch file (see Table 8-9 in Section 8.2.5).

8.1.6 Assigns source identification codes needed for the ISCST3 SO pathway section files

PtFinal_ISCST3 also assigns a source identification code to each emission record for use in the files for ISCST3. This identification code is created from the source group (variable GROUP, see Section 8.1.1), the RUN_ID keyword provided in the batch file (see Table 8-10, Section 8.2.5), and a sequential number. This number is determined by arranging the inventory by pollutant and source group (variables SAROAD and GROUP) and numbering the emission records sequentially within each source group (remember that separate files are created for each pollutant). The one character RUN_ID is included in the source identification code to allow the ISCST3 model to distinguish between emission sources from different runs of EMS-HAP with different inventories (i.e., the NTI non-point source inventory and the NTI point source inventory). Without the RUN_ID, the same source identification code would be given to sources

from different runs of EMS-HAP for different inventories.

8.1.7 Converts temporally allocated emissions from tons/hour to the necessary units for each source for each of the 288 emission rates

When running for the ISCST3 model, PtTemporal produces emissions in units of tons per hour for each of the 288 time periods. PtFinal_ISCST3 converts the ISCST3 point source emissions to grams per second using the following formula:

$$E_{gps(i)} = E_{tons/hour(i)} \times (1 \text{ hour} / 3600 \text{ seconds}) \times (907{,}184 \text{ grams} / \text{ton}) \quad \text{(eq. 8-4)}$$

where:

$E_{gps(i)}$ = emissions grams/second for time block i (where i represents one of the 288 time blocks; e.g. time block i=1 represents the first hour of a winter weekday)

$E_{tons/hour(i)}$ = emissions in tons/hour for time block i

For ISCST3 area sources (ISCTYPE="iscarea"), the emissions are converted from tons/hours to grams/sec-m^2, by using Equation 8-4 and then dividing by the area (in square meters) of the source as follows:

$$E_{g/s\text{-}m2(i)} = E_{gps(i)} / (\text{axlen} \times \text{aylen}) \quad \text{(eq. 8-5)}$$

where:

$E_{g/s\text{-}m2(i)}$ = emissions flux from the ISCST3 area source in grams/second per square meter for time block i (where i represents one of the 288 time blocks; e.g. time block i=1 represents the first hour of a winter weekday)

$E_{gps(i)}$ = emissions in grams/second for time block i

axlen = length of X side of rectangle for ISCST3 area sources (meters)

aylen = length of Y side of rectangle for ISCST3 area sources (meters)

For ISCST3 volume sources (ISCTYPE="iscvol"), the emissions are converted from tons/hours to grams/sec, by using Equation 8-4.

8.1.8 Adjusts UTM coordinates of emission sources

The location of the ISCST3 area sources in the inventory is given as the UTM coordinates of the center of the area. For modeling in ISCST3, the location must be given as the coordinates of the southwest corner of the area rectangle. PtFinal_ISCST3 changes the UTM coordinates from the center of the area rectangle to the southwest corner. This conversion is not done for any ISCST3 area source representing onroad segments (variable SRC_TYPE=onroad). For these sources, the

UTM coordinates in your inventory must represent the southwest corner of the area rectangle due to the varying angles of rotation about that corner. The original UTM coordinates for the center of the ISCST3 area sources (not including onroad segments) can be obtained from the PtFinal_ISCST3 output by adding one-half the value of AXLEN and AYLEN to UTMX and UTMY, respectively.

Within the ISCST3 model, only six significant digits are used for the UTM coordinates of any source. If you are modeling a large domain, it is possible that some sources have the UTM coordinates greater than 1,000,000 meters. To avoid the truncation of such coordinates in the ISCST3 model, PtFinal_ISCST3 makes all of the coordinates relative to the origin of the modeling domain. The keywords X_ORIG and Y_ORIG, provided in the batch file (see Table 8-9 in Section 8.2.5), are used in the following equations to perform this adjustment.

$$\text{Adjusted UTMX} = \text{UTMX} - \text{X\_ORIG} \quad \text{(Eq. 8-7)}$$

$$\text{Adjusted UTMY} = \text{UTMY} - \text{Y\_ORIG} \quad \text{(Eq. 8-8)}$$

Where:

UTMX = UTM easting coordinate (meters)

X_ORIG = UTM easting coordinate of grid origin

UTMY = UTM northing coordinate (meters)

X_ORIG = UTM northing coordinate of grid origin

PtFinal_ISCST3 output retains the original UTM coordinates in the output SAS® inventory file described in 8.3.3, however the ISCST3 area source coordinates (other than those for onroad mobile road segments) have been shifted to their southwest corners.

8.1.9 Creates SO pathway section of the ISCST3 run stream and include files

ISCST3 is run using a "run stream" file that provides the model with information about the emission sources to be used, meteorological data, receptors, etc. PtFinal_ISCST3 produces text files that contain the emission source portion of the ISCST3 run stream, called the SO pathway. The SO pathway text files produced by PtFinal_ISCST3 are formatted for direct use in an ISCST3 run stream.

The ISCST3 model processes only one pollutant during a run; therefore, PtFinal_ISCST3 creates the SO pathway text files for each pollutant, as identified by SAROAD variable. The names of these files are a concatenation of the OUTNAME keyword specified in the batch file, the RUN_ID (see Section 8.1.6), SAROAD, and an extension of ".inp."

In order to reduce the size of the SO pathway section of the run stream text files, PtFinal_ISCST3 uses the "include file" feature of ISCST3 run streams. Depending on functions you have specified in the batch file (see Section 8.2.5), PtFinal_ISCST3 creates the necessary include files.

The include files created are referenced in the SO pathway section of the run stream text files. Table 8-5 shows a list of the include files and when they are created, and Table 8-6 shows how PtFinal_ISCST3 names these include files.

Table 8-5. ISCST3 SO Pathway Run Stream Include Files

Include File	Contents	When File is Created
emission factors	288 temporally allocated emission rates (inventory variables TEMIS1-TEMIS288)	For each SAROAD in inventory
emission source data	Each file contains source location coordinates, stack parameters for point sources, release parameters for area and volume sources, and emission rate [set to 1] for each source	For each SAROAD in inventory; one created for each combination of ISCST3 source type (ISCST3 point, ISCST3 volume, or ISCST3 area) and source group (up to 100 source groups can be specified) found in inventory
particle size distribution data	Particle diameter, mass fraction, and particle density and, if provided, liquid and ice scavenging coefficients (see Section 8.1.3)	Only if particle size distribution data is provided
gas deposition parameters	Molecular diffusivity, solubility enhancement factor, reactivity parameter, mesophyll resistence term, and Henry's Law coefficient (see Section 8.1.3)	Only if gas deposition data is provided
building dimension data	Building height and width (inventory variables BLDH, BLDW)	Only if keyword USEBLDG is set to 'YES' in batch file (see Table 8-9, Section 8.2.5)

Table 8-6. ISCST3 SO Pathway Include File Names

Type of Include File	File Name (located in OUTFILES directory)
Hourly emission factors	"hrlyemis_" + RUN_ID + "." + SAROAD
Emission source data for point sources	"pnt" + GROUP + RUN_ID + "." + SAROAD
Emission source data for ISCST3 area sources	"area" + GROUP + RUN_ID + "." + SAROAD
Emission source data for ISCST3 volume sources	"vol" + GROUP + RUN_ID + "." + SAROAD
Particle size distribution data/scavenging coefficients	"particle_" + RUN_ID + "." + SAROAD
Gas deposition parameters	"gasdepo_" + RUN_ID + "." + SAROAD
Building dimension parameters	"bldgdim_" + RUN_ID + "." + SAROAD

In addition to the SO pathway (section of the ISCST3 run stream) files and include files, PtFinal_ISCST3 automatically creates an output SAS® inventory file, named by keyword OUTSAS. With the exception of the (not onroad mobile segment) ISCST3 area source coordinates being shifted to their southwest corners and the conversion of the units of the emissions (Section 8.1.7), this file contains the same data as in the input SAS® inventory file and additional data that depends on how you set the keywords in the batch file (see Table 8-9, Section 8.2.5). Table 8-11 lists the variables that can be added to the output point source inventory.

8.2 How do I run PtFinal_ISCST3?

8.2.1 Prepare your point source inventory for input into PtFinal_ISCST3

The point source inventory you use for input into PtFinal_ISCST3 can be the output from either PtTemporal (see Chapter 5) or PtGrowCntl (see Chapter 6). The inventory produced by either of these programs will meet all requirements and will contain the variables listed in Table 8-7 with some exceptions. If the output from PtTemporal is used, the file will not include the growth and control variables created in PtGrowCntl. Only if you have included ISCST3 area and/or volume sources will the inventory contain the release parameter variables required for these sources (see Section 3.2.1 for a description of these source types). The inventory may contain additional variables such as the diagnostic flag variables LLPROB or FIPFLAG created by PtDataProc depending on the options you chose for the windowing function and the contents of the varlist file used in PtDataProc.

Table 8-7. Variables in the PtFinal_ISCST3 Input Point Source Inventory SAS® File

Variable Name	Data Description (Required units or values are in parentheses)	Type*
AANGLE[a]	Orientation angle of rectangle for ISCST3 area source (degrees from North)	N
ADDNEFF[c]	Reduction (%) for new sources to be applied in addition to primary reductions; assigned in PtGrowCntl (see Section 6.1.4)	N
ADDXEFF[c]	Reduction (%) for existing sources to be applied in addition to primary reductions; assigned in PtGrowCntl (see Section 6.1.4)	N
ADD_RATE[c]	Percentage of emissions attributable to new sources for the purpose of applying additional reductions; assigned in PtGrowCntl (see Section 6.1.4)	N
AINPLUM[a]	Initial vertical dimension of ISCST3 area source plume (meters)	N
ARELHGT[a]	Release height of ISCST3 area source (meters)	N
AXLEN[a]	Length of X side of ISCST3 area source (meters)	N
AYLEN[a]	Length of Y side of ISCST3 area source (meters)	N
BLDH	Building height (meters); missing values defaulted in PtModelProc (see Section 4.1.3)	N
BLDW	Building width (meters);missing values defaulted in PtModelProc; (see Section 4.1.3)	N
CNTL_EFF	Baseline reduction efficiency, expressed as a percentage	N
CNTLCODE[c]	Control code indicating the reductions applied to emissions; assigned in PtGrowCntl	A100
EMIS	Baseline pollutant emissions value (tons/year)	N
EMRELPID	Code identifying a unique emission point within a site	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
EXISTEFF[c]	Primary percent reduction for existing sources; assigned in PtGrowCntl (see Section 6.1.4)	N
FIPS	5-digit FIPS code (state and county combined)	A5
GF[c]	Growth factor; assigned in PtGrowCntl (see Section 6.1.1)	N
ISCTYPE [a, b]	ISCST3 source type (iscvolume or iscarea)	A9
MACTCODE	MACT code	A7
NEW_EFF[c]	Primary percent reduction for new sources; assigned in PtGrowCntl (see Section 6.1.4)	N
NEW_RATE[c]	Percentage of emissions attributable to new sources for the purpose of applying primary reductions; assigned in PtGrowCntl (see Section 6.1.4)	N

Table 8-7. Variables in the PtFinal_ISCST3 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 PtModelProc (see Section 4.1.1)	A3
REACT	Pollutant reactivity class (1-9); assigned in PtModelProc (see Section 4.1.1)	N
REPLACE[c]	User-defined control flag (R=replace MACT-based reductions with user-defined reductions; A=apply user-defined reductions in addition to the primary MACT-based reductions); assigned in PtGrowCntl (see Section 6.1.3)	A1
SAROAD	Unique pollutant-group code; assigned in PtModelProc (see Section 4.1.1)	A10
SAROADDC	Descriptive name for the SAROAD; assigned in PtModelProc (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[c]	SIC assigned by cross-reference to SCC for use in assigning growth factors; assigned in PtGrowCntl (see Section 6.1.1)	A4
SIC	Standard Industrial Classification (SIC) code for the site	A4
SIGMAX[b]	Initial lateral dimension of volume source (meters)	N
SIGMAZ[b]	Initial vertical dimension of volume source (meters)	N
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 source groups by this variable as explained in 8.1.1, or run PtGrowCntl (Chapter 6) then it must have the value of 'major', 'area', or 'onroad' 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
TEMIS1-TEMIS288	Temporally allocated emissions for each hour of each of three day types and four seasons (tons/hour); calculated in PtTemporal	N
UTMX	UTM easting coordinate (meters)	N
UTMY	UTM northing coordinate (meters)	N
VOLHGT[b]	Release height above ground for volume source (meters)	N

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

[a] variables required for processing ISCST3 area sources; [b] variables required for processing ISCST3 volume sources; [c] variables present only if you run the optional Growth and Control Program (Chapter 6)

8.2.2 Determine whether you need to modify the ancillary input files for PtFinal_ISCST3

An ancillary file is any data file you input to the program other than your emission inventory. Table 8-8 lists the ancillary input files you can choose to use in PtFinal_ISCST3 and when you may need to modify them.

Table 8-8. Required Ancillary Input Files for PtFinal_ISCST3

Name of File Provided with EMS-HAP	Purpose	Need to Modify?	Format
mact_grp.txt	Provides the assignment of source groups by MACT code	If you want to make source group assignments by MACT code	Text
scc6_grp.txt	Provides the assignment of 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 source group assignments by SCC code	Text
sic_grp.txt	Provides the assignment of 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 source group assignments by SIC code	Text
defpart.txt	Provides the default particle size distribution data by pollutant	If you want to add new pollutants or replace parameter values with new values	Text
sccpart.txt	Provides the particle size distribution data by source group	If you want to add new SCCs or replace parameter values with new values	Text
defgas.txt	Provides the default gas deposition parameters by pollutant	If you want to add new pollutants or replace parameter values with new values	Text
hstn-elev.dat	Provides terrain elevations (in meters) by modeling domain grid cell	If you want to use elevation data for your domain and grid	Text

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

The ISCST3 model can present output concentrations that are grouped by specific source types or it can present output concentrations for all sources. The source group assignments you make in PtFinal_ISCST3 will determine how ISCST3 will group the concentration estimates. You can control this assignment based on the source type using the SRC_TYPE variable (as was discussed in Section 8.1.1) and/or by using any one of the three source group assignment files. The specific formats for these files are presented in Figures 25 through 27 of Appendix A. The mact_grp.txt is a simple text file that has a MACT code followed by a source group code (a number between 0 and 99, 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).

8.2.4. Develop the particle size distribution, gas deposition, and terrain elevation files (defpart.txt, sccpart.txt, defgas.txt, and hstn-elev.txt)

The particle size distribution, gas deposition, and terrain elevation files (defpart.txt, sccpart.txt, defgas.txt, and hstn-elev.txt) that are currently being provided as part of EMS-HAP are those used for a specific application as discussed in Appendix E. Depending on the pollutants you choose to run and your domain, you will likely need to develop your own files. Unless you are modeling the same Houston domain, the hstn-elev.txt file is strictly presented for illustrative purposes. Sections 8.1.3 and 8.1.4 discuss how PtFinal_ISCST3 uses these files. These files, with the exception of sccpart.txt, are also used in the program AMFinalFormat (see Chapter 12).

The defpart.txt file contains information about particle size distributions that are applied to specific pollutants identified by the SAROAD code. You can include up to 10 particle size classes. You must specify the number of size classes in the file. You can also include liquid and ice scavenging coefficients for each size class, but this is optional. The format for the particle size distribution by SAROAD file is provided in Figure 29 of Appendix A, and Section E.7 (Appendix E) discusses how we developed it.

The sccpart.txt file contains information about particle size distributions that are applied to

specific pollutants based on the SCC of the emission source. The format of this file is provided in Figure 30 of Appendix A.

The defgas.txt file contains gas deposition parameters that are assigned to the inventory by the SAROAD code. The format for this file is provided in Figure 31 of Appendix A, and Section E.7 (Appendix E) discusses how we developed it.

The hstn-elev.txt file contains terrain elevation data by grid cell. This information is specific for your modeling domain. You would need to develop a new file when your modeling domain changes. The format for this file is provided in Figure 32 of Appendix A, and Section E.8 (Appendix E) discusses how we developed it.

8.2.5 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 PtFinal_ISCST3 is shown in Figure 12 of Appendix B. The best way to prepare your batch file is to the sample we provide and modify it to fit your needs.

Specify your keywords

Table 8-9 shows you how to specify keywords to select PtFinal_ISCST3 functions.

Table 8-9. Keywords for Selecting PtFinal_ISCST3 Functions

PtFinal_ISCST3 Functions	Keyword (values provided cause function to be performed)
Process data for ISCST3 model	MODEL = ISC
Assign source groups	
by source type	DOSOURCE = 1
by MACT code	DOMACT = 1
by SCC	DOSCC = 1
by SIC	DOSIC = 1
Use particle size distribution data provided	
by SAROAD without scavenging data	DEFPART = Prefix of data file SCCPART = NONE SCAVENG = 0 PARTMETH = 2
by SAROAD with scavenging data	DEFPART = Prefix of data file SCCPART = NONE SCAVENG = 1 PARTMETH = 2
by SCC without scavenging data	DEFPART = NONE SCCPART = Prefix of data file SCAVENG = 0 PARTMETH = 1
by SCC with scavenging data	DEFPART = NONE SCCPART = Prefix of data file SCAVENG = 1 PARTMETH = 1
Use gas deposition parameters provided	
without scavenging data	DEFGAS = Prefix of data file; SCAVENG = 0
with scavenging data	DEFGAS = Prefix of data file; SCAVENG = 1
Use elevation data provided	ELEVDAT = Prefix of data file
Create gas deposition include file	GASDEPO = YES
Create building dimensions include file	USEBLDG = YES

Note that because the keyword SCAVENG applies to both gaseous and particulate pollutants, you do not have the option to use scavenging data for one of these pollutants without the other.

Table 8-10 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 8-10).

Table 8-10. Keywords in the PtFinal_ISCST3 Batch File

Keyword	Description of Value
	Input Inventory Files
IN_DATA	Input SAS® file directory
INSAS	Input inventory SAS® file name, prefix of file name only
	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 only (mact_grp)
SCCGRP	SCC code to source group correspondence text file, prefix only (scc6_grp)
SICGRP	SIC code to source group correspondence text file, prefix only (sic_grp)
DEFPART	Default pollutant-level particle distribution text file, prefix only (defpart) put 'NONE' if no file is to be used
SCCPART	SCC-level particle distribution text file, prefix only (sccpart) put 'NONE' if no file is to be used
DEFGAS	Default pollutant-level gas deposition data text file, prefix only (defgas) put 'NONE' if no file is to be used
ELEVDAT	Gridded terrain elevation data text file, prefix only (hstn-elev) put 'NONE' if no file is to be used
	Program Options
MODEL	ISC=process data for the ISCST3 model
RUN_ID	Run identification code used to insure unique ISCST3 source ID's; typically used to distinguish between point, non-point, and mobile inventory runs (one character limit)
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
GASDEPO	YES=create gas deposition include files; NO=do not write gas deposition include files
SCAVENG	1=scavenging coefficients are included in the DEFPART or DEFGAS files; 0=scavenging coefficients are not included in the DEFPART or DEFGAS files
USEBLDG	YES=write building dimension include files; NO=do not write building dimension include files
PARTMETH	0=do not create particle distribution include files; 1=create particle distribution include files by SCC; 2=create particle distribution include files by pollutant
	Additional Input Data
DFLTGRP	Default source group
DEFELEV	Default elevation value used for all sources (meters); only used if ELEVDAT file prefix is 'NONE'
X_ORIG	UTM easting coordinate of the modeling grid origin (meters)
Y_ORIG	UTM northing coordinate of the modeling grid origin (meters)
CELLSIZE	Width of each grid cell (meters)

Table 8-10. Keywords in the PtFinal_ISCST3 Batch File
(continued)

Keyword	Description of Value
MAXCOL	Total number of columns in the modeling grid
MAXROW	Total number of rows in the modeling grid
	Output files
OUTDATA	Output SAS® file directory
OUTSAS	Output inventory SAS® file name, prefix only
OUTFILES	Output directory of SO pathway file and include files
OUTNAME	File identifier included in name of SO pathway file (limited to 10 characters)

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 DEFPART to "NONE", you still need to assign a value to keyword SCAVENG in your batch file. The value provided in this circumstance will not be used by the program; it is merely a place holder value for the keyword.

Prepare the execute statement

The last line in the batch file runs the PtFinal_ISCST3 program. In the sample batch file provided in Figure 12 of Appendix B, you will see a line preceding the run line that creates a copy of the PtFinal_ISCST3 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 PtFinal_ISCST3 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 PtFinal_ISCST3. In the sample batch file, a work directory is defined on the last line following the execution of PtFinal_ISCST3. For example, the command 'sas PtFinal_ISCST3_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.

8.2.6 Execute PtFinal_ISCST3

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 PtFinal_ISCST3.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, 'PtFinal_ISCST3.bat'.

8.3 How Do I Know My Run of PtFinal_ISCST3 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.

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.

8.3.2 Check your SAS® list file

You need to check this list file for records that may not contain source types. Source groups are also provided for every unique combination of MACT, SCC, and SIC code. PtFinal_ISCST3 also ensures that the ISCTYPE variable is valid (see Table 8-7); records with invalid values are dropped from the inventory and identified in this file.

8.3.3 Check other output files from PtFinal_ISCST3

To ensure that PtFinal_ISCST3 created the SO pathway sections of the ISCST3 run stream files and all necessary include files, you need to check the output file directory that you specified in the batch file using keyword OUTFILES. For each pollutant in the point source inventory, PtFinal_ISCST3 always creates an SO pathway section of the ISCST3 run stream file, an emission factors include file, and an emission source data include file for each ISCST3 source type found in the inventory (ISCST3 point, ISCST3 area, and/or ISCST3 volume). The creation of other include files containing particle size distribution data, gas deposition parameters, and building dimension data depends on how you set the keywords in your batch file.

In addition to the SO pathway sections of the ISCST3 run stream files and include files, PtFinal_ISCST3 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:

1. 1_In the output file, the ISCST3 area source coordinates (other than those for onroad mobile road segments) have been shifted to their southwest corners, as was discussed in 8.1.8
2. The temporally allocated emissions values have been converted from tons/hour to the proper units as was discussed in 8.1.6
3. Additional data may be present depending on how you set the keywords in the batch file (see Table 8-9, Section 8.2.5). Table 8-11 lists the variables that can be added to the output point source inventory.

Table 8-11. Variables Added to Input Inventory in Creating the PtFinal_ISCST3 Output Point Source Inventory SAS® File

Variable Name	Data Description (Required units or values are in parentheses)	Type*
ALPHA[d]	Gas deposition parameter: solubility enhancement factor	N
CELL	Grid cell number (see Section 8.1.4)	I
COL	Grid cell column number (see Section 8.1.4)	I
DIFF[d]	Gas deposition parameter: molecular diffusivity (cm^2/sec)	N
GROUP	Source group (see Section 8.1.1)	A2
HENRY[d]	Gas deposition parameter: Henry's Law coefficient	N
ISCTYPE[a]	ISC source code (iscpoint, iscvolume, or iscarea)	A9
LIQSCAV[d]	Gas deposition parameter: liquid scavenging coefficient (1/(sec-mm/hr))	N
NUMCAT	Number of particle size classes	N
PDEN1-PDEN10[b]	Particle size distribution parameter: density (grams/cm^3)	N
PDIA1-PDIA10[b]	Particle size distribution parameter: diameter (microns)	N
PFRA1-PFR10[b]	Particle size distribution parameter: mass fraction	N
PICE1-PICE10[c]	Particle size distribution parameter: ice scavenging coefficient (1/(sec-mm/hr))	N
PLIQ1-PLIQ10[c]	Particle size distribution parameter: liquid scavenging coefficient (1/(sec-mm/hr))	N
ROW	Grid cell row number (see Section 8.1.3)	I
RSUBM[d]	Gas deposition parameter: mesophyll resistence term (sec/cm)	N
RX[d]	Gas deposition parameter: reactivity parameter	N
SELEV	Source elevation	N
SIGMAX[a]	Initial lateral dimension of volume source (meters)	N
SIGMAZ[a]	Initial vertical dimension of volume source (meters)	N
SRCID	Source identification code (see Section 8.1.5)	A8
VOLHGT[a]	Release height above ground for volume source (meters)	N

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

[a] variables added only when no ISCST3 volume sources are included in input inventory

[b] variables added only when particle size distribution data are provided

[c] variables added only when liquid/ice scavenging data are provided

[d] variables added only when gas deposition parameters are provided

CHAPTER 9
Non-Point Source Processing
The Area Source AMProc Preparation Program (AreaPrep)

The flowcharts below (Figure 9-1) show how AreaPrep fits into EMS-HAP's non-point source processing for the ASPEN and ISCST3 models. Note we use the term "non-point inventory" to describe what was formerly referred to as the area source inventory so as not to conflict with the regulatory term "area source" which is also used to describe a type of stationary source based on its size as defined in the Clean Air Act. We are still, however, using the term "area" in the name of the EMS-HAP programs for processing the non-point inventory. AreaPrep is the first non-point source processing program you run in EMS-HAP and the non-point source inventory you input to AreaPrep is your initial inventory. You use the output inventory from AreaPrep as the input to AMProc (Chapter 11).

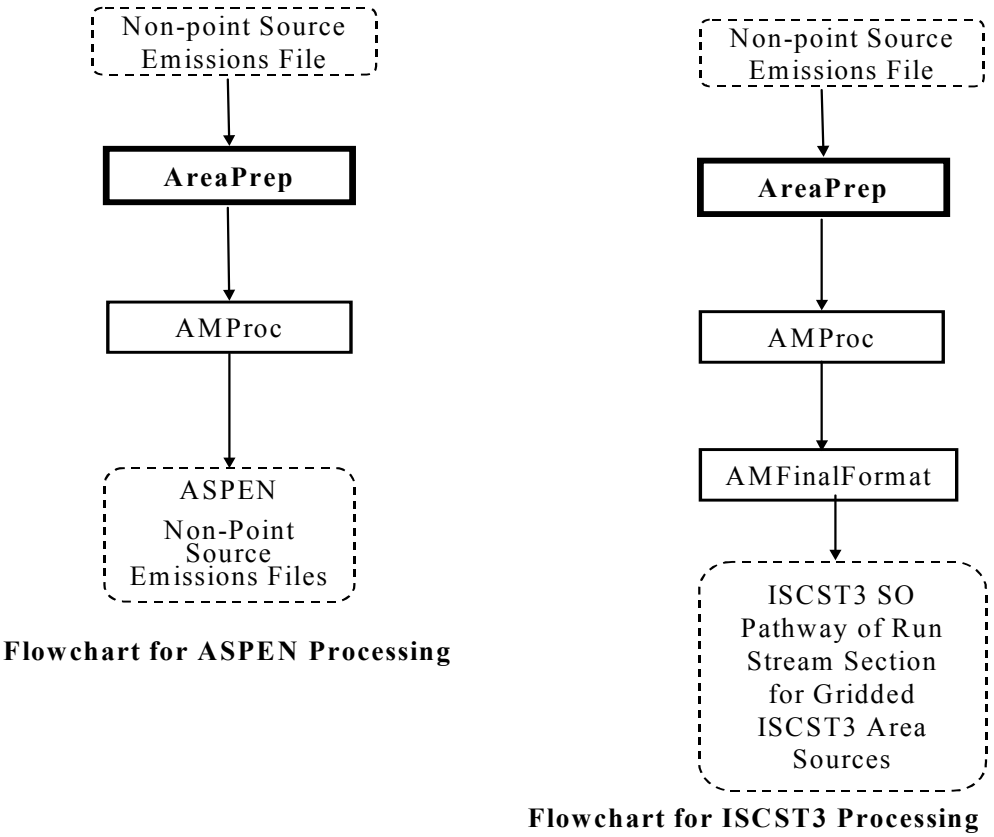


Figure 9-1. Overview of AreaPrep within EMS-HAP for Non-point Source Processing

9.1 What is the Function of AreaPrep?

The Area Source AMProc Preparation Program (AreaPrep) prepares your non-point source emission inventory for the Area and Mobile Source Processor (AMProc). AreaPrep performs the following functions:

- Assigns a spatial surrogate for each non-point source category for subsequent spatial allocation of county-level emissions
- Assigns a code to each source category for matching to temporal profiles
- Creates inventory variables required by AMProc

Figure 9-2 shows a flowchart of AreaPrep when processing data for either ASPEN or ISCST3. The following sections describe the above bullets.

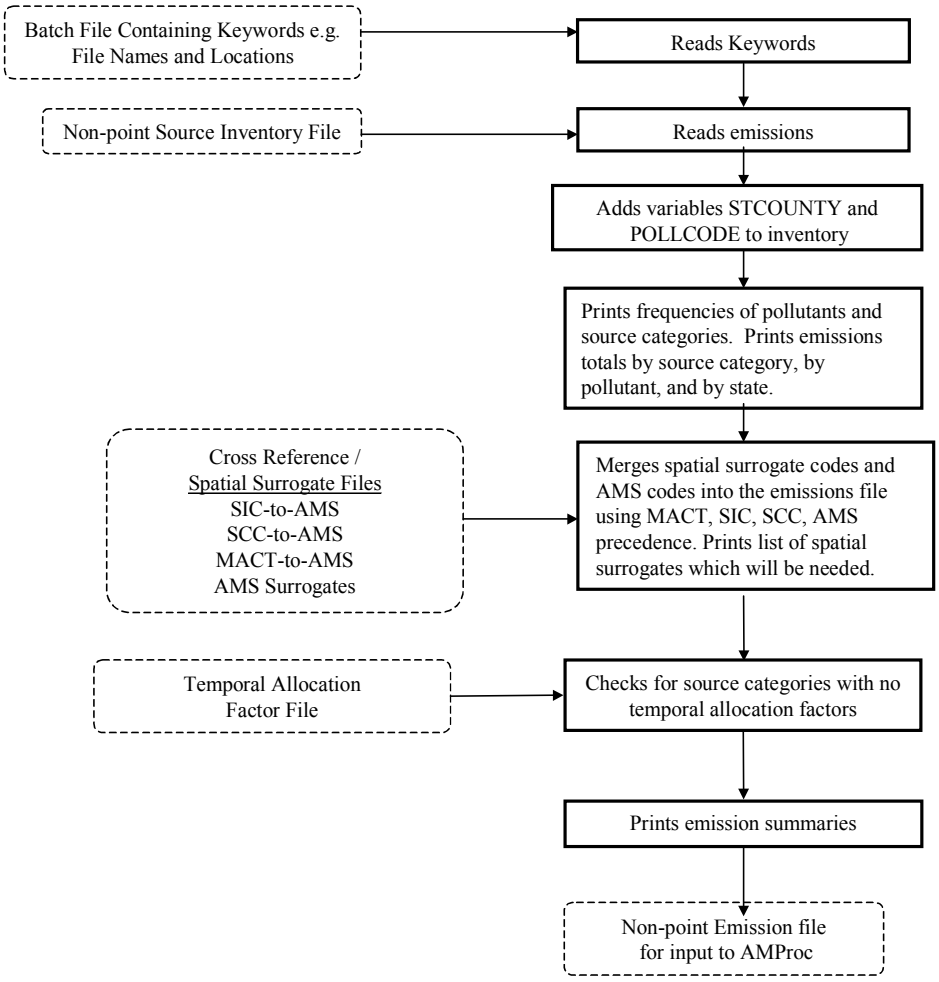


Figure 9-2. AreaPrep Flowchart for Processing Data for ASPEN or ISCST3

9.1.1 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 emissions based on the premise that the geographic distributions 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 2001 version of the 1996 NTI, it can assign spatial surrogates to non-point source categories using a variety of codes that may be in the non-point 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 non-point 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 non-point 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 non-point source category to available spatial surrogates for the 1996 NTI, because of the level of detail provided in that inventory by the different classification codes. Generally, we found that the MACT category code provided the most detail, followed by the SIC, SCC, and AMS codes. Note that even though AreaPrep was designed based on the 2001 version of the 1996 NTI, it is sufficiently general to assign surrogates for any emission inventory that can be formatted as shown in Table 9-3. 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 9.2.3 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 allocation of the county-level emissions is performed in AMProc (see Section 11.1.2 in Chapter 11). Table 9-1 gives a description of the spatial surrogates in the EMS-HAP ancillary files for ASPEN processing and their corresponding spatial surrogate code. Information on how we developed the spatial allocation factors for these surrogates for use with ASPEN is provided in Appendix D (see Section D.10). Information on how we developed the spatial allocation factors for these and other surrogates for use with ISCST3 for an urban scale domain is provided in Appendix E (see Section E.8).

Table 9-1. Surrogates for Spatially Allocating Emissions for the ASPEN Model

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 (see 20) divided by census tract area. Tracts with zero population assigned spatial factor 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

9.1.2 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. AMProc, the next non-point source processing program you run, 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 the MACT code, SIC, SCC or AMS in the inventory along with the ancillary files discussed in Section 9.2.3.) 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 AMS_SCC a value of 7777777. AMProc will eventually assign this category a uniform temporal profile.

AreaPrep also reads in the temporal allocation factor (TAF) ancillary input file, and gives you diagnostic information (see Section 9.3.2) 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. Note that different TAF files are used when processing data for ASPEN (taff_hourly.txt) and when processing data for ISCST3 (taff_ISCfactors.txt).

9.1.3 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 non-point source inventory you input to AMProc (see Table 11-3 in Section 11.2.1) requires these variables.

9.2 How do I run AreaPrep?

9.2.1 Prepare your area source inventory for input into AreaPrep

Your non-point 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 9-2, with units and values as provided. Additional variables will not be retained in the output inventory file.
- All data records should be uniquely identifiable by using the combination of the state

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

- It shouldn't contain Alaska and Hawaii emission records unless you add Alaska and Hawaii data to the appropriate ancillary files.

Table 9-2. Variables Required in the AreaPrep Non-point Source Inventory SAS® Input File

Variable Name	Data Description (Required units or values are in parentheses)	Type*
AMS	AMS code	A10
CAS	unique pollutant code	A10
CAT_NAME	non-point 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

9.2.2 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 9-3 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), because they were developed based on the 2001 version of the 1996 NTI. How to do this is explained in the next section.

Table 9-3. 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 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 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 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 spatial surrogate or AMS_SCC assignments or have SIC codes in your inventory not included in this file	Text
taff_hourly.txt[a]	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 (see Chapter 11)	If you choose to add or change temporal allocation factors for a particular source category	Text
taff_ISCfactors.txt[b]	Provides temporal profiles containing seasonal allocation factors, day-type allocation factors, and hourly allocation factors by SCC and/or AMS codes (i.e., AMS_SCC). These will be applied in AMProc (see Chapter 11)	If you choose to add or change temporal allocation factors for a particular source category	Text

[a] file used when processing data for ASPEN
[b] file used when processing data for ISCST3

9.2.3 Modify the files that assign codes and spatial surrogates based on MACT, SIC, SCC, and AMS codes (scc2ams.txt, sic2ams.txt, surrxref.txt, and mact2ams.txt)

Figures 17, 18, 33, and 34 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 non-point source category or add a record for a source category that is in your inventory, but not represented in these files. Table 9-1 lists the available spatial surrogates for use with the ASPEN model and their corresponding surrogate codes. Information on how we developed the spatial allocation factors for these surrogates is

provided in Appendix D (see Section D.10). Information on how we developed the spatial allocation factors for these and other surrogates when processing data for ISCST3 for an urban area is provided in Appendix E (see Section E.8).

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 file (see Figures 16a and 16b of Appendix A). 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 9.1.3, AreaPrep uses the MACT code file first, followed by the SIC, SCC and AMS. So, if your category has all four codes, modify the mact2ams.txt file first.

9.2.4 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 13 of Appendix B. The best way to prepare your batch file is to use the sample we provide and modify it to fit your needs.

Specify your keywords

Table 9-4 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 9-4. Keywords in the AreaPrep Batch File

Keyword	Description (prefix of file name provided with EMS-HAP in parentheses)
	Input Inventory Files
INPFILES	Input emission file directory
AREADATA	Input inventory SAS® file name, prefix of file name only
	Ancillary Files (Prefix of file name provided with EMS-HAP in parentheses)
REFFILES	Ancillary files directory
SIC2AMS	Spatial surrogate assignments and codes for matching to temporal profiles by SIC text file, prefix only (sic2ams)
SCC2AMS	Spatial surrogate assignments and codes for matching to temporal profiles by SCC text file, prefix only (scc2ams)
MACT2AMS	Spatial surrogate assignments and codes for matching to temporal profiles by MACT text file, prefix only (mact2ams)
SURRXREF	Spatial surrogate assignments by AMS text file, prefix only (surrxref)
TAFFILE	Temporal profile text file, prefix only (taff_hourly for ASPEN; taff_ISCfactors for ISCST3)
	Additional Input Data
RUNID	Run identification for titles
	Output files
OUTFILES	Output files directory
OUTDATA	Output inventory SAS® file name

Prepare the execute statement

The last line in the batch file runs the AreaPrep program. In the sample batch file provided in Figure 13 of 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.

9.2.5 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'.

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

9.3.1 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.

9.3.2 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 non-point 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.

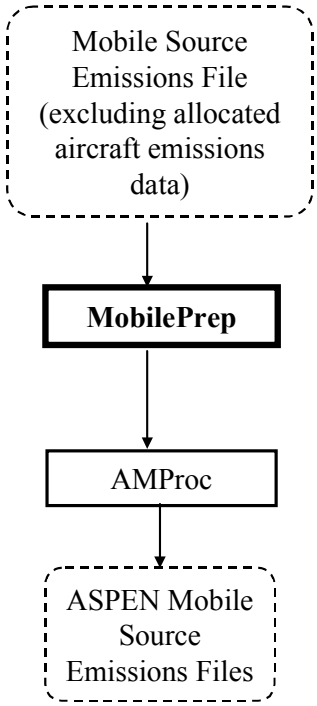
9.3.3 Check other output files from AreaPrep

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 AMProc.

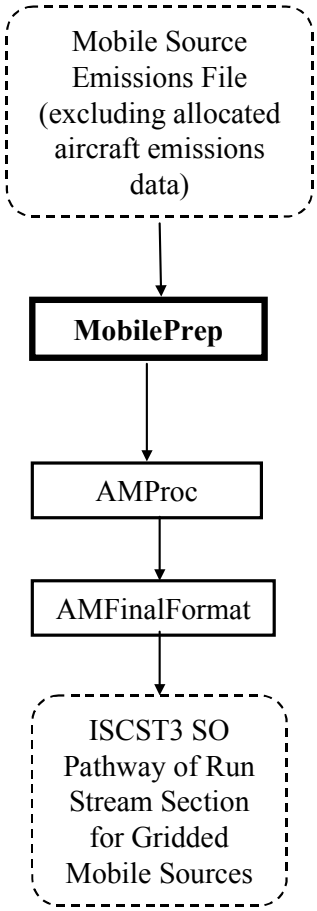
CHAPTER 10
Mobile Source Processing
The Mobile Source AMProc Preparation Program (MobilePrep)

The flowcharts below (Figure 10-1) show how MobilePrep fits into EMS-HAP's mobile source processing for the ASPEN and ISCST3 models. The mobile source inventory you input to MobilePrep is the output from AirportProc (Chapter 2) or it is your initial mobile source inventory. You use the output inventories from MobilePrep as inputs to AMProc (Chapter 11).

.



Flowchart for ASPEN Processing



Flowchart for ISCST3 Processing

Figure 10-1. Overview of MobilePrep within EMS-HAP Mobile Source Processing

10.1 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 9), 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 10-2 shows a flowchart of MobilePrep when processing data for either ASPEN or ISCST3. The following sections describe the above bullets.

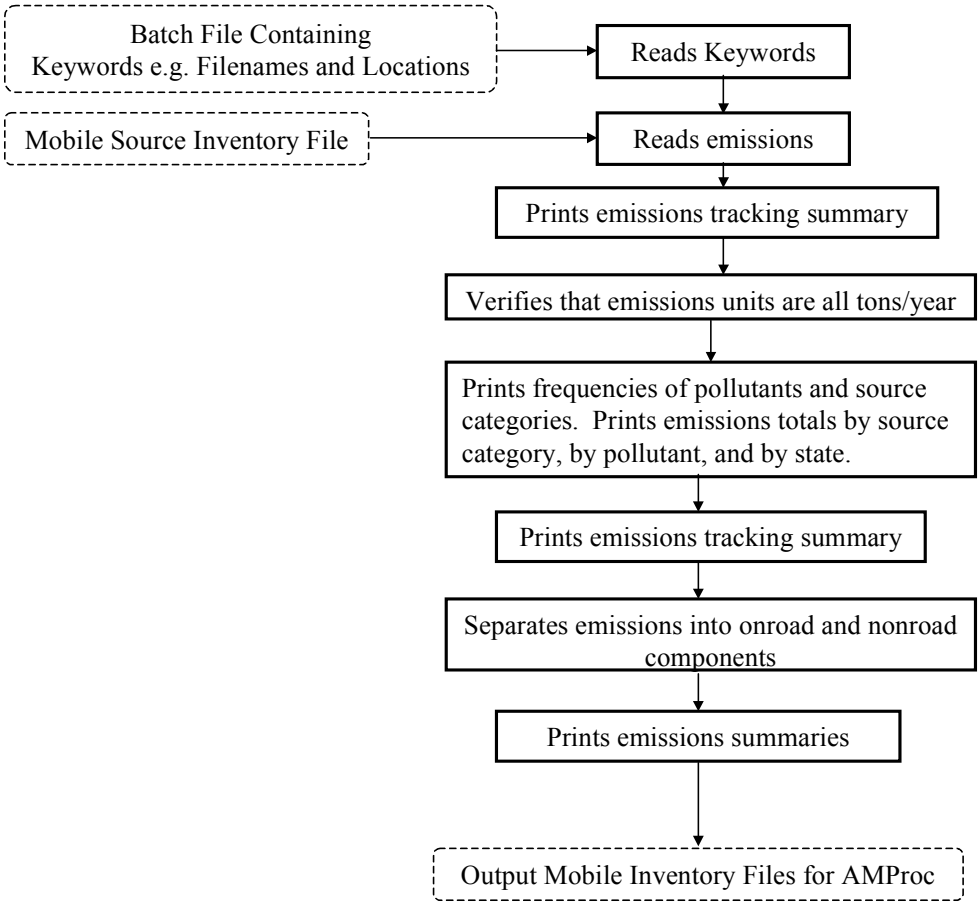


Figure 10-2. MobilePrep Flowchart for Processing Data for ASPEN or ISCST3

10.1.1 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 Chapter 4 (Section 4.2.3), Chapter 11 (Section 11.1.1), and Appendix D (Sections D.5 and D.6).

10.1.2 Creates inventory variables required by AMProc

MobilePrep 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. These variables are required in the inventory you input to AMProc (see Table 11-4 in Section 11.2.1).

10.2 How do I run MobilePrep?

10.2.1 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 10-1, 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 FIPS code (STATE), county FIPS code (COUNTY), AMS source category code (AMS), and pollutant code (CAS).
- It shouldn't contain Alaska and Hawaii emission records unless you add Alaska and Hawaii data to the appropriate ancillary files.

Table 10-1. Variables Required in the MobilePrep 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 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

10.2.2 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.

10.2.3 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. Figure 14 of Appendix B shows a sample batch file for MobilePrep.

Specify your keywords

Table 10-2 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 10-2. Keywords in the MobilePrep Batch File

Keyword	Description of Value
	Input Inventory Files
INPFILES	Input emission file directory
INEMIS	Input emissions file name, prefix of file name only
	Additional Input Data
TITLE	Run identification for titles
WORKDIR	Temporary directory for large work file
	Output files
OUTFILES	Output files directory
OUTEMIS	Output file name, prefix of file name only

Prepare the execute statement

The last line in the batch file runs the MobilePrep program. In the sample batch file provided in Figure 14 of 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.

10.2.4 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'.

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

10.3.1 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.

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
- 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.'

10.3.3 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 AMProc.

CHAPTER 11
Non-point and Mobile Source Processing
The Area and Mobile Source Processor (AMProc)

The flowcharts below (Figure 11-1) show how AMProc fits into EMS-HAP's non-point and mobile source processing for ASPEN and ISCST3. Note we use the term "non-point inventory" to describe what was formerly referred to as the area source inventory so as not to conflict with the regulatory term "area source" which is also used to describe a type of stationary source based on its size as defined in the Clean Air Act. We are still, however, using the term "area" in the name of the EMS-HAP programs for processing the non-point inventory. You must run AMProc separately for non-point sources and mobile sources. The non-point inventory you input to AMProc is the output from AreaPrep (Chapter 9). You will likely need to run AMProc separately for nonroad and onroad sources, as discussed in Section 11.1.1. The mobile inventory you input to AMProc is either the nonroad inventory, the onroad inventory, or the combined nonroad and onroad inventory output from MobilePrep (Chapter 10). This is the last non-point and mobile source program you run when processing data for the ASPEN model. When processing data for the ISCST3 model, you use the output from AMProc as the input to AMFinalFormat (Chapter 12).

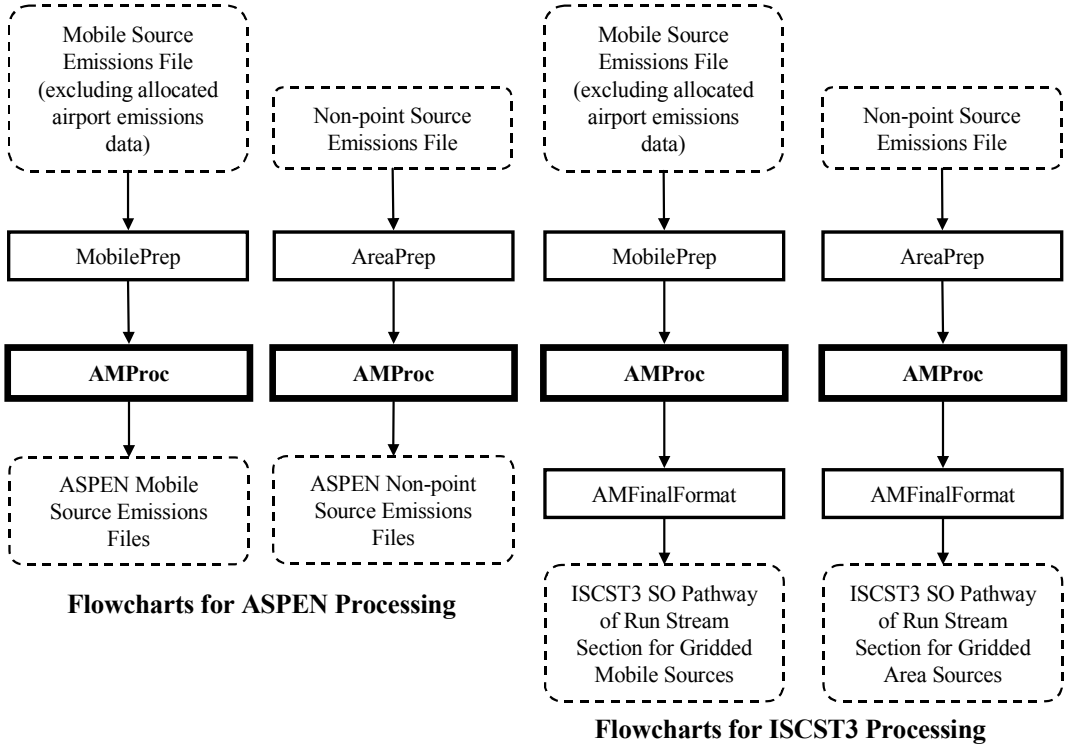


Figure 11-1. Overview of AMProc within EMS-HAP for Non-point and Mobile Source Processing

11.1 What is the Function of AMProc?

The Area and Mobile Sources Processor (AMProc) is the core of EMS-HAP's processing of non-point and mobile source emissions that are inventoried and processed at the county-level. 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
- Assigns ASPEN-specific modeling parameters when processing data for ASPEN only
- Assigns source groups and source type
- Projects emissions to a future year
- Converts temporally allocated emissions from tons/year to grams/second for each of the eight 3-hour periods when processing data for ASPEN only
- Creates ASPEN input files, column formatted text and SAS® files when processing data for ASPEN only
- Creates SAS® file used as input to AMFinalFormat when processing data for ISCST3

You control whether or not to have AMProc project emissions to a future year in your execution of the program (see Section 11.2.8 for details on how to do this). You also have the option of having AMProc only project emissions to a future year. In this case, the input emissions inventory would be a base year inventory previously processed through AMProc.

Figure 11-2 gives an overview of AMProc when processing data for ASPEN and Figure 11-3 gives an overview of AMProc when processing data for ISCST3. The following sections describe the above bullets.

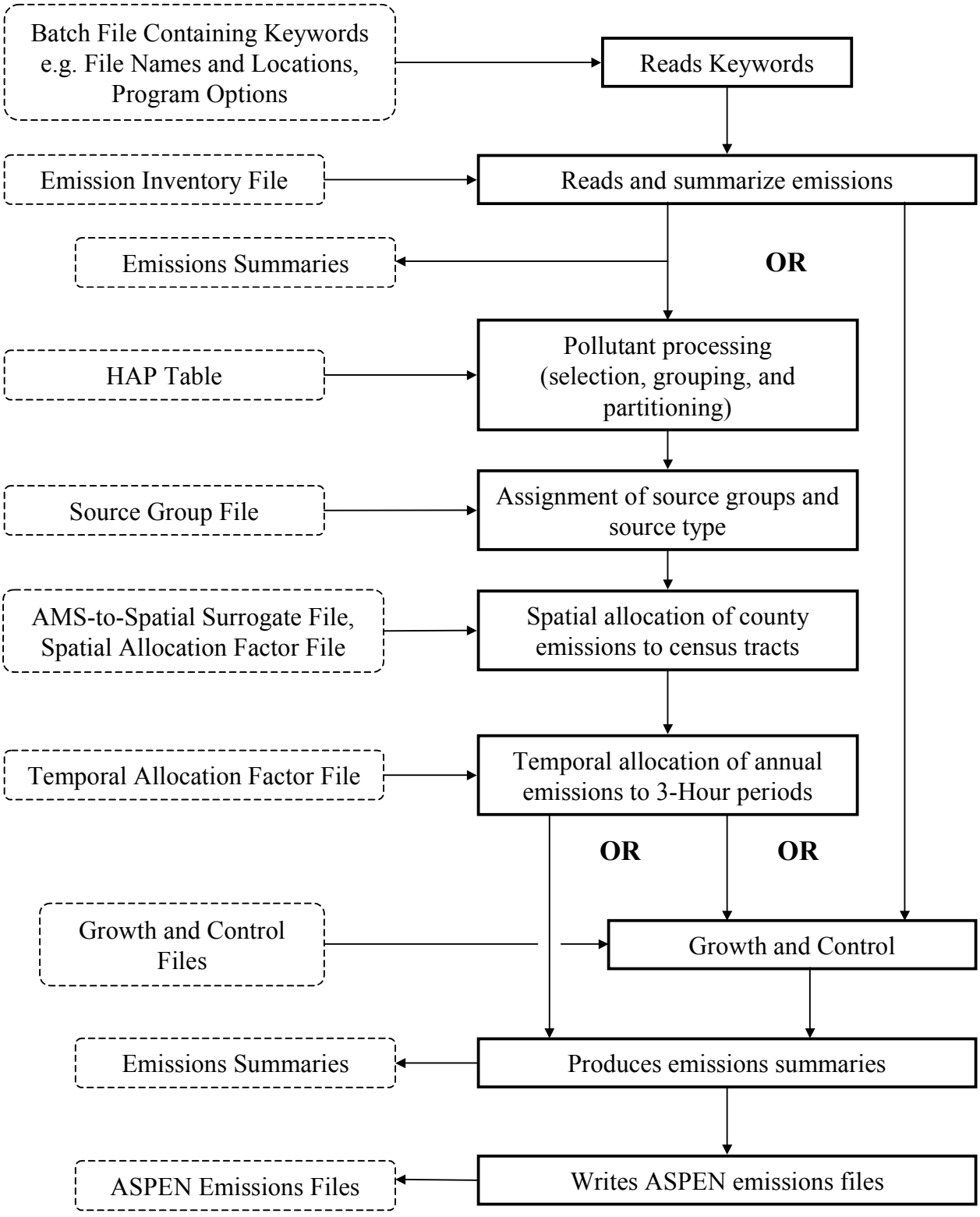


Figure 11-2. AMProc Flowchart when Processing Data for ASPEN

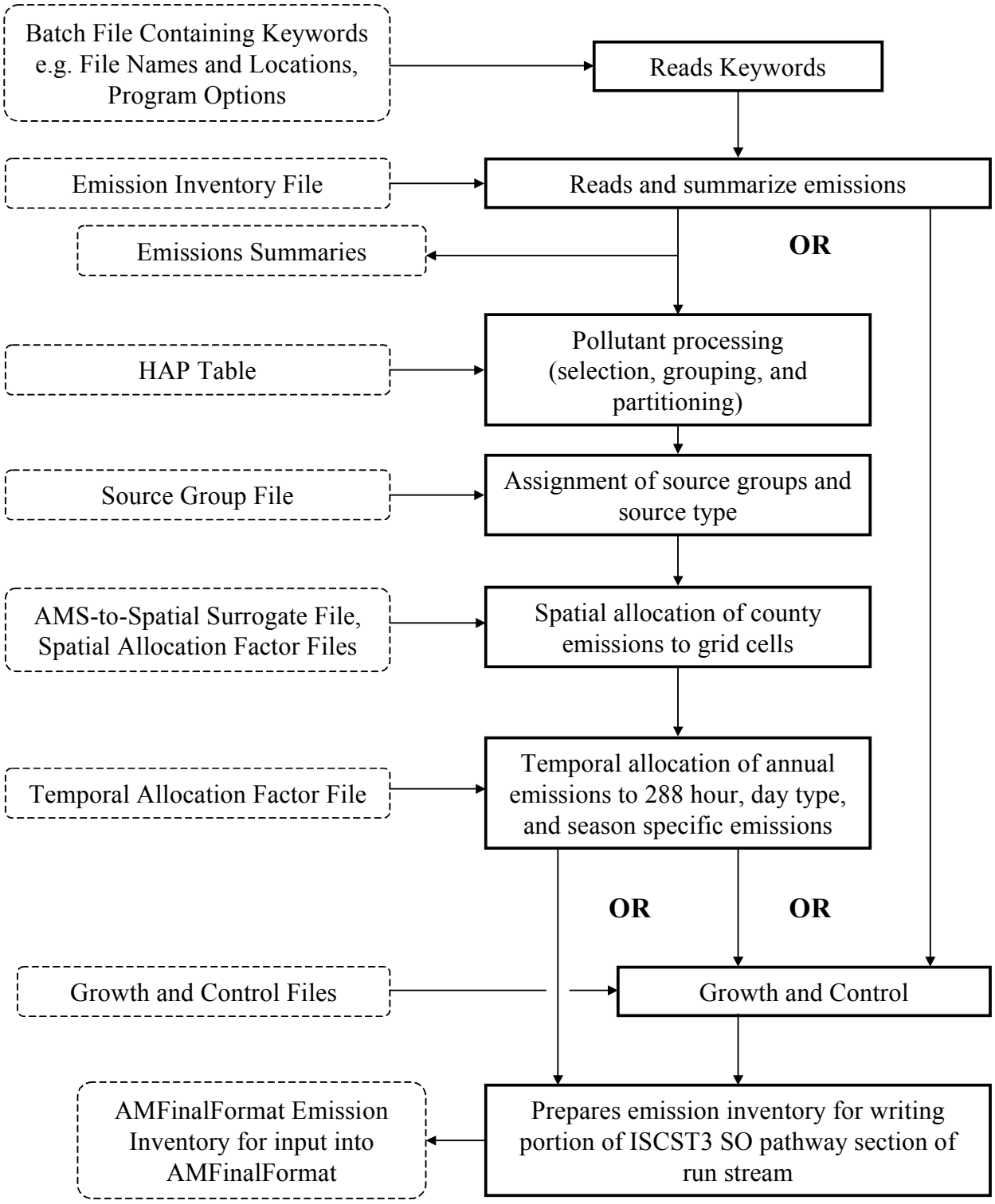


Figure 11-3. AMProc Flowchart when Processing Data for ISCST3

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

One of AMProc's first functions is the selection, partitioning, and grouping of pollutants to be modeled by either ISCST3 or ASPEN and the assignment of their characteristics. This same function is performed for point source processing with the PtModelProc 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, in order 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 onroad emissions, and once with the nonroad HAP table and nonroad emissions. We run this way to allow EMS-HAP to use different values for the percentage of the particulate HAPs that would be emitted as coarse versus fine particulates for onroad versus nonroad sources (see Appendix D, Section D.5.1, and in particular Table D-6).

AMProc uses the HAP table for non-point and mobile sources in the same way PtModelProc uses it for point sources (Section 4.1.1 of Chapter 1) with a few minor exceptions (last bullet). It uses it to:

- Subset the inventory to include only those pollutants you've chosen to model
- Group multiple inventory species into a single pollutant category
- Partition inventory species into multiple pollutant categories with different reactivity or particulate size classes. For example, apportion lead chromate to: 1) lead compounds, fine particulate; 2) lead compounds, coarse particulate; 3) chromium compounds, fine particulate and 4) chromium compounds, coarse particulate
- Assign a reactivity class to each gaseous pollutant and a particulate size class to each particulate pollutant (through the variable REACT). Note that when processing for ISCST3, AMProc assigns this variable, but it is not used.
- Apply a mass adjustment factor (FACTOR variable) to the emissions of inventory species to partition it among multiple pollutant groups, account for a particular portion of it (e.g., the lead portion of lead sulfate), or adjust its potency to determine a toxics or reactivity equivalency
- Assign the resulting pollutant or pollutant category to be modeled a unique HAP code (variable NTI_HAP) used for inventory projections (if you choose this function), and a unique pollutant code (variable POLLCODE). Note that in the EMS-HAP point source processing programs, this variable is named the SAROAD code. In contrast to point source processing, AMProc does not assign the pollutant description to the inventory.

Because this function is the same for point sources as it is for non-point 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 (Sections D.5 and D.6) describes how we developed these HAP tables.

11.1.2 Spatially allocates county-level emissions

Emission inventories generally provide non-point and mobile source emissions at the county level. When processing data for ASPEN, EMS-HAP spatially allocates county-level emissions to the census tracts within each county. When processing data for ISCST3, EMS-HAP spatially allocates county-level emissions to the grid cells within the modeling domain. AMProc uses "spatial allocation factors" to apportion county-level emissions to the appropriate geographical area. 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. For example, the residential heating source categories may be allocated using the geographic distribution of population, while autobody refinishing may be allocated using the geographic distribution of commercial land.

The spatial allocation factors (SAF) are stored in a series of ancillary files. Each SAF file is specific to a particular surrogate (e.g., population) and a particular model (ASPEN versus ISCST3). The SAF files for ASPEN supplied with EMS-HAP cover the continental US, PR and VI. The development of these SAF files are discussed in Appendix D (see Section D.10). The SAF files for ISCST3 supplied with EMS-HAP cover a 9752 km^2 area encompassing Houston. The development of these SAF files is discussed in Appendix E (see Section E.8). You will have to develop your own SAF files tailored to your modeling domain when processing data for ISCST3. You will likely need to use a geographic information system (outside of EMS-HAP) to create the SAF files.

Figure 11-4 presents a flow chart of the spatial allocation process in AMProc. The first step is to assign the appropriate spatial surrogate to each source category. For non-point sources, this is done in AreaPrep; the process is explained in detail in Section 9.1.1. For mobile sources, AMProc assigns the spatial surrogates using the AMS code and the AMS-based surrogate assignment ancillary file, surrxref.txt (see Section 11.2.5).

In the next step, AMProc uses the spatial surrogate assignments discussed above to link each county-level emission record to the appropriate SAF file. The spatial allocation factors from this file are then matched to the appropriate emission record by the state and county FIPS code. Emission records not matched to a spatial surrogate are assigned a default surrogate that you specify in the batch file (see Table 11-8 in Section 11.2.8).

The last step is to apply the spatial allocation factors to the county-level emissions in the inventory. When processing data for ASPEN, this results in tract-level emissions for each tract in that county, for each non-point or mobile source category. When processing data for ISCST3, this results in grid cell emissions, for each grid cell in (fully or partially) that county, for each non-point or mobile source category. AMProc uses the same equation to compute tract-level or grid cell emissions for each source category, j, in a county as shown in equation 11-1.

$$E_{\text{tract or grid cell, county, j}} = E_{\text{county, j}} \times S_{\text{county, tract or grid cell, j}} \quad \text{(eq. 11-1)}$$

Where:

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

$E_{\text{county, j}}$ = emissions from category j in county that contains census tract or grid cell.

$S_{\text{county, tract or grid cell, j}}$ = spatial allocation factor for tract or grid cell in county that corresponds to spatial surrogate assigned to source category j.

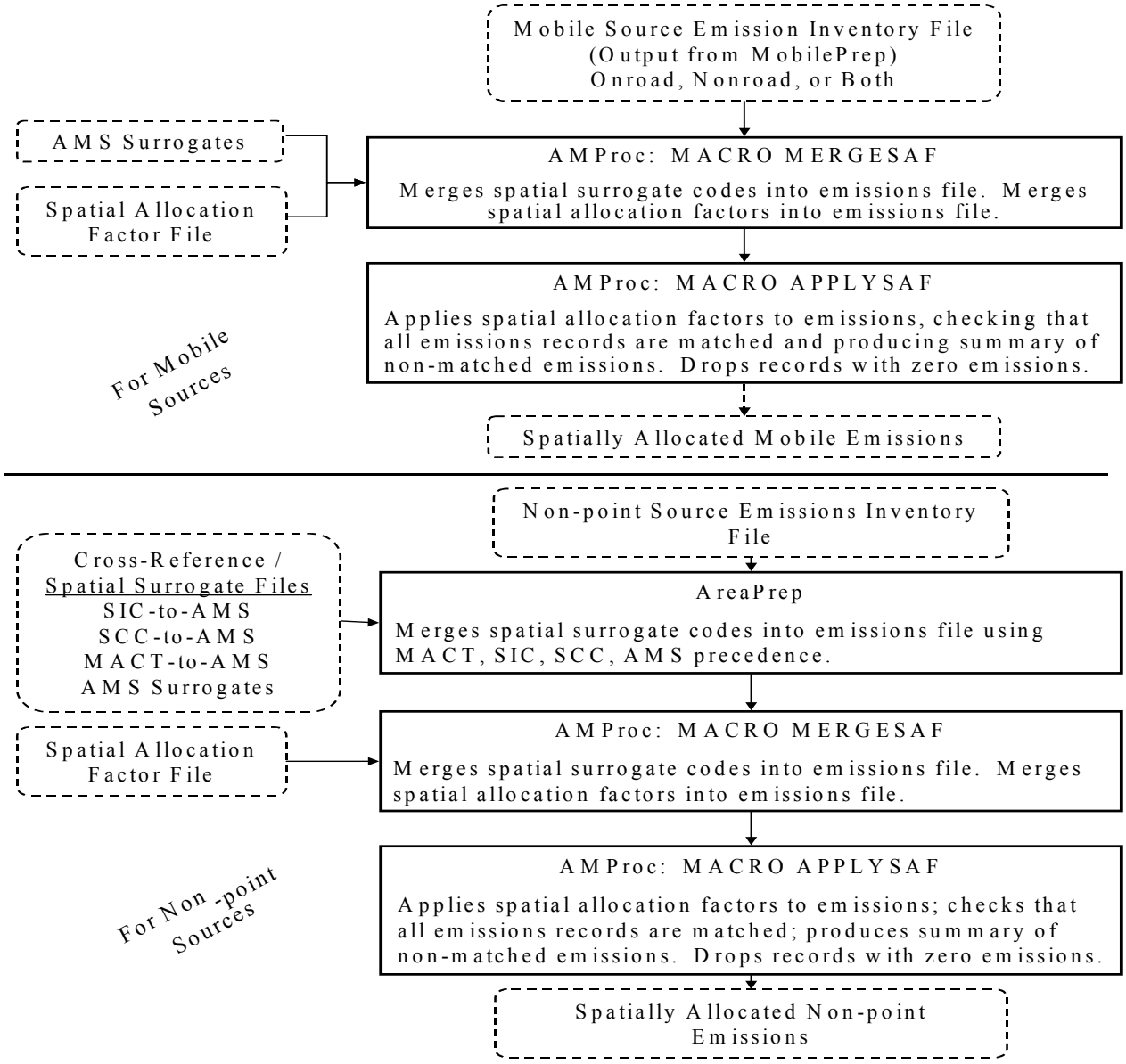


Figure 11-4. The Spatial Allocation Process in AMProc

When processing data for ISCST3, some grid cells will contain area from more than one county. As a result, the emissions for a given grid cell may be split up among two or more counties when using the equation above. AMFinalFormat, the next program used when processing data for ISCST3, sums the emissions for each pollutant, source group, and grid cell (see Section 12.1.4).

AMProc describes the gridded or tract-level emissions based on the needs of ISCST3 or ASPEN by adding the appropriate geographic coordinates to each allocated emission record. The variable CELL links the county level emissions to census tracts (ASPEN) or grid cells (ISCST3). For ASPEN, the CELL variable, a concatenation of the 5-digit state and county FIPS and 6-digit tract ID (see Tables 11-11 and 11-12), is present in every SAF file. For ISCST3, the components of the CELL variable (the row and column of the grid cell) are present in every SAF file.

The ISCST3 model requires that each ISCST3 gridded area source be defined, in part, by the UTM coordinates of the southwest corner of the grid cell. AMProc uses the row and column numbers of the grid cell from the SAF files to calculate these. The column number begins with "1" at the southwest corner of the domain, and iterates upwards for each UTM easting kilometer until the eastern edge of the domain; for example, column 50 would begin 50 UTM easting kilometers from the western edge of the domain. Similarly, row numbers begin with "1" at the southwest corner and iterate upwards for each UTM northing kilometer until the northern edge of the domain. AMProc also creates a CELL variable (6-character) for ISCST3 processing (see Table 11-12) by concatenating the column and row; leading zeros are added when either the column or row are less than "100". For example, CELL variable equal to "001034" represents the first column and thirty fourth row in the domain, or, a grid cell with a southwest corner on the western edge of the domain and 34 kilometers north of the southern edge of the domain.

AMProc uses the column number to calculate the UTM easting coordinate for the southwest corner of the grid cell and the row number to calculate the UTM northing coordinate using Equations 11-2 and 11-3 below. Note that these calculations require information about your modeling domain. You provide this information by assigning the corresponding keywords in the batch file (see Table 11-7 in Section 11.2.8).

$$UTM\text{-}X_{c,r} = X_{origin} + (COLUMN - 1) \times CELLSIZE \quad \text{(eq. 11-2)}$$

$$UTM\text{-}Y_{c,r} = Y_{origin} + (ROW - 1) \times CELLSIZE \quad \text{(eq. 11-3)}$$

Where:

$UTM\text{-}X_{c,r}$ = UTM easting coordinate of southwest corner of grid cell with column c and row r

X_{origin} = UTM easting coordinate (in meters) of southwest corner of modeling domain grid

COLUMN = Column number of grid cell

$UTM\text{-}Y_{c,r}$ = UTM northing coordinate of southwest corner of grid cell with column c and row r

Y_{origin} = UTM northing coordinate (in meters) of southwest corner of modeling domain grid

ROW = Row number of grid cell

CELLSIZE = Width of grid cell (in meters)

When processing emissions for ASPEN, the tract-level emissions are associated with the latitude and longitude of the census tract centroid. AMProc reads these coordinates from the SAF file, and assigns them to the tract-level emissions during the allocation step.

11.1.3 Temporally allocates emissions

AMProc temporally allocates annual non-point and mobile source emissions similarly to the methodology PtTemporal (see Chapter 5) uses for point sources. When processing data for the ASPEN model, AMProc produces eight emission rate estimates for each spatially allocated source in the non-point or mobile source inventory. When processing data for the ISCST3 model, AMProc produces 288 emission rate estimates (24 hours * 4 seasons * 3 day types) for each spatially allocated source in the non-point or mobile source inventory.

Just as PtTemporal (Chapter 5) does for point sources, AMProc produces the emission rate estimates for non-point and mobile source categories using temporal profiles from model-specific ancillary temporal allocation factor (TAF) files. The same TAF files are used for processing the non-point, mobile and point source inventories (taff_hourly.txt, for ASPEN and taff_ISCfactors.txt, for ISCST3).

The one difference between the methodology in AMProc and PtTemporal is the hierarchy of codes used to assign the TAFs to the emission sources. AMProc uses the AMS code to assign TAFs. For non-point sources, this code was assigned in AreaPrep (see Section 9.1.2) 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 MACT code. For mobile sources, AMProc uses the inventory AMS code.

If none of these codes links to a temporal profile, then the emissions are assigned uniform temporal allocation factors that evenly distribute the emissions over the model appropriate time periods (eight 3-hour periods for ASPEN and 288 hour-day-season-specific periods for ISCST3). AMProc produces a list any categories that do not match to a temporal profile (for information about the contents of an AMProc run list file, see Section 11.3.2).

Figure 11-5 shows a flow chart of the temporal allocation process in EMS-HAP for non-point and mobile sources when processing data for ASPEN. Figure 11-6 shows this when processing data for ISCST3.

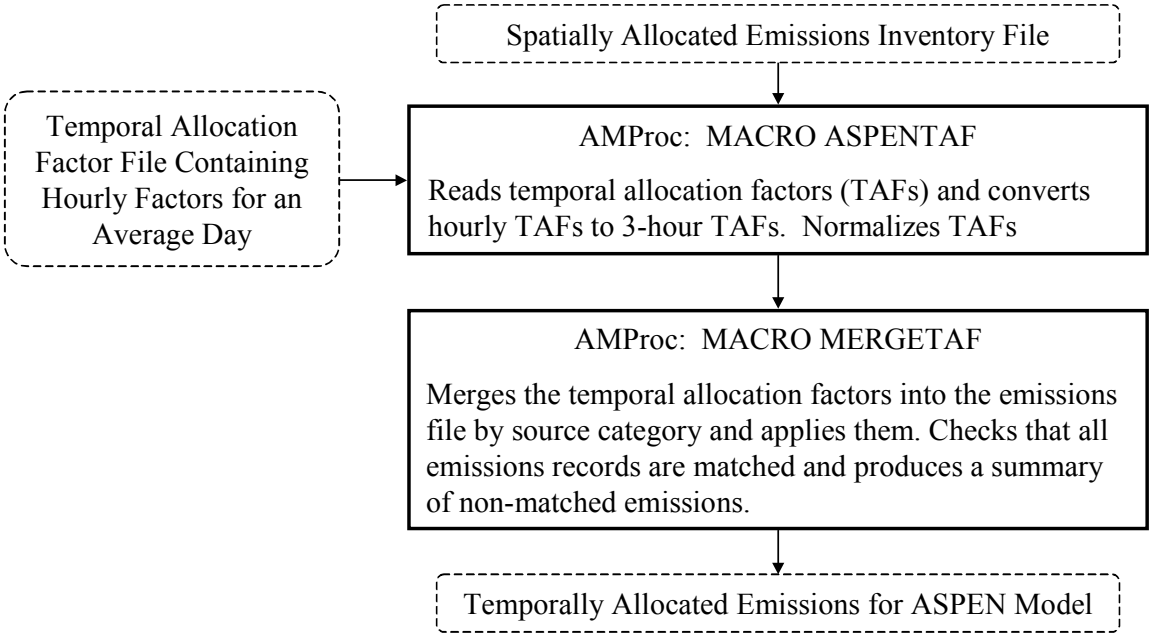


Figure 11-5. Non-point and Mobile Source Temporal Emissions Processing Flowchart when Processing Data for ASPEN

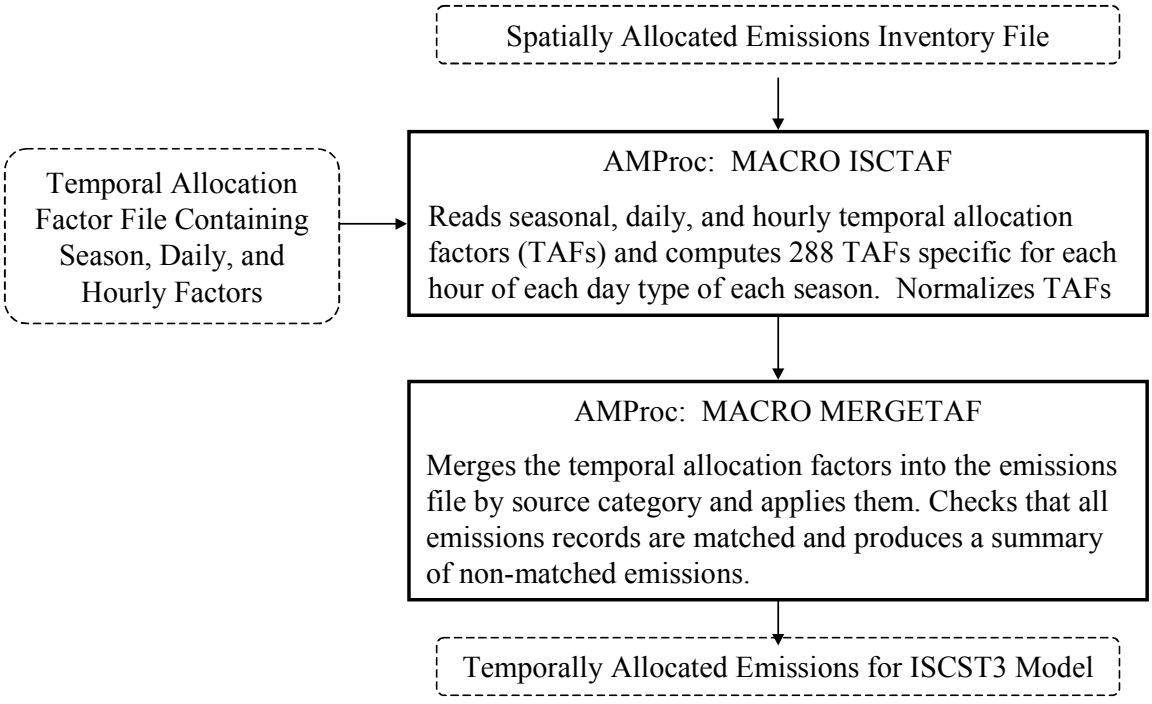


Figure 11-6. Non-point and Mobile Source Temporal Emissions Processing Flowchart when Processing Data for ISCST3

11.1.4 Assigns ASPEN-specific modeling parameters when processing data for ASPEN only

Urban/Rural Dispersion Parameters

The dispersion algorithm in the ASPEN model uses different dispersion parameters and deposition rates for urban and rural sources to account for the effect of land characteristics (e.g., numerous tall buildings) on these mechanisms. 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 (one) indicates an urban tract, and a value of 2 indicates a rural tract. When running the ISCST3 model, the urban/rural designation is made for all of the sources within a model run by a setting within the control option pathway; therefore, an urban or rural designation for each source is not assigned within EMS-HAP when processing for ISCST3.

AMProc reads the urban/rural flags at the tract level from the spatial allocation factor (SAF) files used for ASPEN processing. These files are ancillary input files to the program (see Table 11-6 in Section 11.2.2) and, as discussed in Section 11.1.2, also serve to provide the spatial allocation factors for allocating county-level emissions to the census tracts. The SAF files supplied with EMS-HAP for ASPEN modeling use the same urban/rural designations as those 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. Note this population-based approach is a surrogate for land characteristics, and has no relation to the various population-based methods used for designating counties or tracts as urban/rural used by the census.

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 for ASPEN processing is provided in Figure 35 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 (one) represents a non-stacked vent. ASPEN does not perform plume rise calculations for this case. IVENT is set to 1 (one) for all non-point and mobile sources because stacks are not being processed. When processing data for the ISCST3 model, no distinction is made between different vent types through the use of a vent type variable. By processing non-point and mobile sources as ISCST3 area sources, plume rise calculations with the ISCST3 model are made using the default ISCST3 area source release parameters assigned in AMFinalFormat (see Chapter 12).

11.1.5 Assigns source groups and source type

Source Groups

Both the ASPEN and ISCST3 models can compute concentrations by source groups that can then be used to analyze the relative impacts of different types of emissions sources. The ASPEN model can compute concentrations for up to 10 source groups, while ISCST3 can use up to 100 source groups. AMProc can assign source groups based on a particular source category or combinations of different source categories and/or the designation of the county containing the emission source as urban or rural. Use of the county-level urban/rural designation allows you to group non-point or mobile sources located in urban counties differently from sources located in rural counties. For example, AMProc can assign a unique group to gasoline vehicles in urban counties, which you can then use to compute concentrations separately for gasoline vehicles in urban counties with either ASPEN or ISCST3.

AMProc assigns groups using two ancillary files: (1) a source group assignment file, am_grp.txt (see Section 11.2.4), which contains your selection of how to assign source categories based on category name and how to use the urban/rural information, and (2) an ancillary file, pop_flag.txt, containing urban/rural designations by county. AMProc uses these files to link inventory records, based on the source category name variable (CAT_NAME) and the county-level urban rural designation, to a source group (between 0 (zero) and 9 for ASPEN and between 00 and 99 for ISCST3). AMProc names the source group variable "EMISBIN".

Note that the ability to assign source groups based on urban/rural county designation is not available for point sources. Because of this, and because stationary sources and aircraft emissions could be contained in both point and non-point inventories, you would likely only want to assign groups based on the county-level urban/rural designation for onroad and particular nonroad mobile sources. Note also that the county-level urban/rural designation is different from the tract-level urban/rural dispersion parameter used for ASPEN modeling described in Section 11.1.4. The county-level urban/rural designations in the ancillary file popflg96.txt are based on 1996-based designations from EPA's Integrated Urban Air Toxics Strategy.[9] For purposes of developing the Strategy, a county was considered "urban" if either 1) it includes a metropolitan statistical area with a population greater than 250,000 or 2) the U.S. Census Bureau designates more than fifty percent of the population as "urban."

Source Type

AMProc uses the SRC_TYPE variable only for distinguishing between different types of stationary sources for the purposes of projecting emissions to a future year. If you choose not to project your emissions, AMProc will still assign the SRC_TYPE variable, but not use it.

If you are projecting emissions to a future year, then you should read on regarding how and why AMProc assigns the SRC_TYPE variable.

Your non-point inventory can conceivably contain the following types of sources: "major"[a], "area"[b] and "other"[c]. AMProc assigns a source type to each emission record using the same ancillary file as was used for the source group assignments, am_grp.txt. This file contains a source type for each non-point and mobile source category. AMProc uses the source type variable to distinguish between major and area stationary sources in your inventory when assigning emission reduction information for the purpose of projecting emissions to future years. It is important to distinguish between these because it allows different emission reduction information to be assigned. To properly implement emission projections, AMProc requires, in am_group.txt, a source type of 'A' for area sources and 'M' for major sources.

11.1.6 Projects emissions to a future year

AMProc can project the non-point 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 non-point 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 for mobile sources, you can use AMProc to project their emissions.

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 (for use with either ASPEN or ISCST3) and project emissions for that inventory. To grow your emissions to a future year, AMProc allows you to use growth factors based on the MACT category and/or the SIC code. In addition, AMProc lets you assign SICs or pseudo SICs based on the category name. Emission reduction information can be assigned to the emission records by the MACT code, using the same ancillary files used in point source processing (described in Chapter 6). User-defined emission reduction information can also be assigned by the non-point and mobile source category, MACT code, and/or pollutant.

---

[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..." It is unlikely that major sources will be in the non-point inventory as they are generally inventoried as point sources. Nonetheless , it is a possibility, and in fact the July 2001 version of the 1996 NTI contained some landfills designated as "major" sources.

[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..."

[c] stationary sources in the non-point inventory which are not area or major sources, and may be more appropriately addressed by other programs rather 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.

You control which of the growth and control functions are performed in any given execution of AMProc through setting keywords in the batch file (see Table 11-7 in Section 11.2.8 for details on how to do this). The same projection algorithm is used when processing data for ASPEN or ISCST3. Figure 11-7 shows a flowchart for this algorithm.

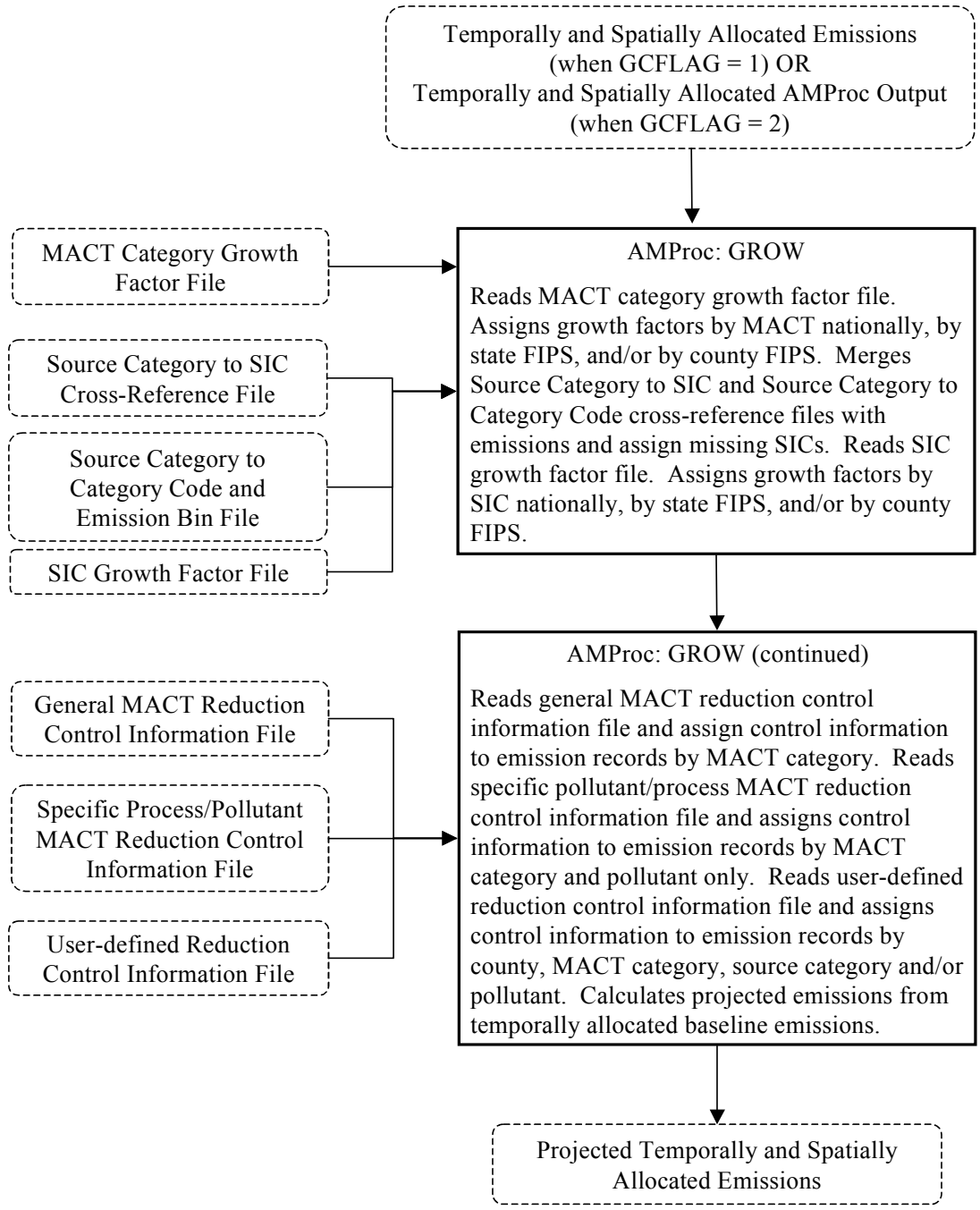


Figure 11-7. Non-point and Mobile Source Growth and Control Projection Flowchart

Projections due to Economic Growth

AMProc assigns growth factors to the emission records based on the MACT category and/or the first two digits of the SIC code or an SIC-"linked" approach based on the category name. Geographic location (county, state or nation) is also used in conjunction with these. SIC-linked growth factors are obtained from the SIC-based growth factor file by linking source category names to 2-digit SIC codes or 4-character 'pseudo-SIC' codes for those non-point categories which would not typically have an SIC code. For example, the source category "Consumer Products Usage," does not have a MACT category or SIC code associated with it. Therefore, we created a new 'pseudo-SIC' code called "POPN" to cross-reference the Consumer Products. The ancillary file that links the category names to the 2-digit or 4-digit pseudo-SIC codes is called area_sic and is discussed in Section 11.2.7.

The growth factor files used in AMProc are the same ones used in the point source processing (PtGrowCntl). One notable difference related to applying the SIC-based growth factors is that in point source processing, the pseudo SICs contained in the SIC growth factor files would not be used for point sources since they can only be assigned based on the source category name through the area_sic.txt ancillary file.

You control how the growth factors are assigned in AMProc through the keywords in the batch file (see Table 11-7 in Section 11.2.8 for details on how to do this). If you choose to assign growth factors by both criteria, AMProc will assign the growth factors by the MACT category first, and then assign growth factors by the SIC to only records without an assignment (i.e., SIC-based growth factors will not replace assigned MACT-based growth factors). AMProc will assign the 2-digit or 4-digit pseudo SIC codes to those records in the inventory with missing SIC codes if you set the keyword SICFLAG to 1 in the batch file (see Table 11-7 in Section 11.2.8). The assigned SIC code is stored in the new variable SETSIC.

Both the MACT-based and SIC-based growth factors can be applied to specific geographic regions: nationally, by state, or by county (see Section 6.2.3 for more details). For both the MACT-based and SIC-based growth factors, AMProc will replace any growth factor assigned nationally by one assigned by a state FIPS. AMProc will replace any growth factor assigned by the state FIPS by one assigned by a county FIPS.

MACT-based and SIC-based growth factor files are specific to both the base year and future year. Each execution of AMProc creates an inventory file containing emissions projected to that one future year. AMProc computes grown, temporally allocated emission rates (eight 3-hour average emission rate when processing data for ASPEN, and 288 hourly specific emission rates when processing data for ISCST3) for each record by multiplying the base year temporally allocated 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 temporally allocated emission rates on each record. Note that any record not assigned a growth factor based either on the MACT category, SIC code or SIC-link will be assigned the default growth factor of one. In these cases, the grown emissions will be unchanged from the base year emissions.

Assignment of MACT-based Emission Reduction Controls

AMProc can assign MACT-based emission reduction information based on the inventory MACT code. AMProc assigns the MACT-based reduction information to the emission records using the same two ancillary files, MACT_gen.txt and MACT_spec.txt, as are used in PtGrowCntl. The use of these files and the emission reduction information they contain are described in more detail in Section 6.1.2.

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

Assignment of User-Defined Emission Reduction Scenarios

Based on the value of the keyword CNTLFLAG in the batch file (see Table 11-7 in Section 11.2.8), you can assign emission reduction information based on your own reduction strategy (user-defined information) to the inventory alone (CNTLFLAG="USER"), or, after the assignment of MACT-based emission reduction information (CNTLFLAG="BOTH"). The assignment of the user-defined reduction information, provided through the ancillary file area_cntl.txt is made independent from the assignment of the MACT-based information. Only after the assignment of all emission reduction information (MACT-based and user-defined), does AMProc determine what reduction efficiencies are used to calculate the projected emissions for each record. The user-defined reduction information can only be assigned when the user-defined application control flag is equal to 1 (one).

Similar to the point source processing, the user-defined reduction information file also contains a replacement flag. This flag is used to determine how the user-defined reduction information will be used to calculate the projected emissions when MACT-based reduction information has been assigned to the same emission record. Set this flag to 'R' when you want the user-defined reduction to replace any assigned MACT-base reductions, and set to 'A' if you want the user-defined reduction to be used in addition to any MACT-based reductions. This decision is made after all reduction information assignments are made.

Through the user-defined reduction information, you can assign emission reduction information by various combinations of the following types of information:

- process (using non-point and mobile source category, and/or MACT code)
- pollutant (using the NTI_HAP variable)
- specific county or county types (using the CNTYCODE variable)

The specific combinations of these variables, used by AMProc to match the emission reduction information to the inventory, are presented in Table 11-1. In cases where an emission inventory record can be assigned to more than one record in the user-defined reduction information file, AMProc follows a specific order of precedence as shown in the table. Note that when you provide reduction information based on the non-point category, AMProc uses, for programming efficiency, a category code (variable CATCODE) rather than the category name. AMProc assigns a CATCODE to each unique category name using the ancillary file am_group.txt (which is also used for assigning source groups and the source type variable as described in Section 11.1.5). You need to assure that the category codes in am_group.txt are unique for each different source category in the inventory for AMProc's growth and control module to run successfully when using user-defined reductions based on source category. You also need to ensure that the category names in the am_group.txt and user-defined reduction file are identical; AMProc does not care about the case of each word, but the actual characters must be the same.

Table 11-1. Specification of User-defined Emission Reduction Information and Order of Precedence

	Information Used to Specify Reduction Information			
Order of Precedence	**Non-point and Mobile Source Category**	**MACT**	**HAP**	**County Code**
1 (most specific information , supercedes all others)	X	X	X	X
2	X	X	X	
3	X		X	X
4	X		X	
5		X	X	X
6		X	X	
7	X	X		X
8	X	X		
9	X			X
10	X			
11		X		X
12 (Least specific information)		X		

In order to assign reduction information to specific counties or to groups of county types, you must assign the CNTYCODE variable to each record in the inventory by the state and county

FIPS code using the popflg96.txt ancillary file. See Section 6.1.3 (last paragraph) for more information.

Calculation of Projected Emissions

AMProc calculates projected emissions similarly to the way PtGrowCntl calculates them for point sources. Refer to Section 6.1.3 for a description of the primary and secondary reduction efficiencies.

Table 11-2 summarizes how the primary and additional reduction variables are assigned in depending on your choices in the batch file and on the value of the replacement flag in the user-defined reduction file.

Table 11-2. Assignment of Primary and Additional Control Variables

Reduction Information File	Value of REPLACE variable	Source of Control Variables Used to Project Emissions	
		Primary Control Variables	Additional Control Variables
MACT-based only	N/A	MACT-based	all set to zero
User-defined only	N/A	User-defined	all set to zero
Both MACT-based and User-defined	R	User-defined	all set to zero
	A	MACT-based	User-defined

After the primary and additional reduction variables have been assigned for each inventory record, the projected emissions are calculated as shown in Table 11-3. Note that unlike in point source processing, there is no baseline control efficiency variable in the non-point or mobile inventory. Thus the variable CNTL_EFF does not factor into the equations in the Table 11-3.

Table 11-3. Equations Used to Apply Primary and Additional Emission Reduction Information

Application of Primary Emission Reduction Information

Projected Emissions from Existing and New Sources

$Projected\ Emissions_{E,P}$ = Grown Emissions x (1-NEWRATE/100) x (1 - EXISTEFF/100) (eq. 11-4)

$Projected\ Emissions_{N,P}$ = Grown Emissions x (NEWRATE/100) x (1 - NEW_EFF/100) (eq. 11-5)

Total Primary Projected Emissions

$Projected\ Emissions_{P}$ = $Projected\ Emissions_{E,P}$ + $Projected\ Emissions_{N,P}$ (eq. 11-6)

Where:

$Projected\ Emissions_{P}$ = projected emissions using primary efficiencies

$Projected\ Emissions_{E,P}$ = grown/controlled emissions from existing sources using primary efficiencies

$Projected\ Emissions_{N,P}$ = grown/controlled emissions from new sources using primary efficiencies

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

NEWRATE = primary percentage of grown emissions attributed to new sources

EXISTEFF = primary control efficiency for existing sources

NEW_ EFF = primary control efficiency for new sources

Application of Additional Emission Reduction Information

Projected Emissions from Existing and New Sources

$Projected\ Emissions_{E,A}$ = $Projected\ Emissions_{P}$ x (1-ADDATE/100) x (1 - ADDXEFF/100) (eq. 11-7)

$Projected\ Emissions_{N,A}$ = $Projected\ Emissions_{P}$ x (ADDRATE/100) x (1 - ADDNEFF/100) (eq. 11-8)

Final Total Projected Emissions

$Projected\ Emissions_{F}$ = $Projected\ Emissions_{E,A}$ + $Projected\ Emissions_{N,A}$ (eq. 11-9)

Where:

$Projected\ Emissions_{F}$ = final projected emissions using additional efficiencies

$Projected\ Emissions_{E,A}$ = grown/controlled emissions from existing sources using additional efficiencies

$Projected\ Emissions_{N,A}$ = grown/controlled emissions from new sources using additional efficiencies

ADDRATE = additional percentage of grown emissions attributed to new sources

ADDXEFF = additional control efficiency for existing sources

ADDNEFF = additional control efficiency for new sources

11.1.7 Converts temporally allocated emissions from tons/year to grams/second for each of the eight 3-hour periods when processing data for ASPEN only

AMProc produces emissions for ASPEN in units of tons per year for each of the eight 3-hour time periods. AMProc converts these emissions to grams per second using the following formula:

$$E_{gps(i)} = E_{tpy(i)} \times (1 \text{ year}/365 \text{ days}) \times (1 \text{ day}/24 \text{ hrs}) \times (1 \text{ hr}/3600 \text{ sec}) \times (907{,}184 \text{ grams/ton}) \quad \text{(eq. 11-10)}$$

where:

$E_{gps(i)}$ = emissions grams/second for time block i (where i represents one of the eight 3-hour time blocks; e.g., time block i=1 represents the midnight to 3 a.m. time period)

$E_{tpy(i)}$ = emissions (tons/year) for time block i

Note that AMProc does not convert emission units for non-point or mobile sources for ISCST3 processing; AMFinalFormat performs this function (see 12.1.5).

11.1.8 Creates ASPEN input files, column formatted text and SAS® files when processing data for ASPEN only

AMProc creates three different types of output files when processing data for ASPEN:

1. The ASPEN input files
2. A column formatted ASCII text file
3. SAS® output files – a core file and an extended file.

ASPEN Input Files

You control whether or not to create the extended SAS® file in your execution of AMProc, based on the value of the keyword SAVEFILE you specify in your batch file (see Table 11-7 in Section 11.2.8). The ASPEN model requires emission data in the form of one ASCII text file for each of the nine possible reactivity classes. Each file contains data for all pollutants having the same reactivity/particulate size class. AMProc creates all nine files in the appropriate format (see Section 4.0 of the ASPEN User's Guide[1] for more details on the required format). Each file consists of a header and body. The elements of the header are:

- A run identifier: You supply this in the batch file (keyword RUNID, see Table 11-7 in Section 11.2.8)
- Species type: AMProc sets this to 0 for gaseous species, 1 for fine particulates, and 2 for coarse particulates.
- 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).

- 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/particulate size classes.

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

Using the run identifier keywords in the batch file, AMProc names the ASPEN input files in the form 'EMISTYPE.USRLABEL.SUBSETG.dRUNDATE.rREACT.inp.' An example file name is 'MV.Base96.NH.d020499.r9.inp,' where 'Base96' is the keyword USRLABEL, 'MV' (note that it would be 'AR' for non-point sources) is the keyword EMISTYPE, 'NH' is the 2-character postal code keyword (SUBSETG), '9' the REACT variable, and '020499' is the keyword RUNDATE. The keyword SUBSETG allows you to process emissions and create ASPEN input files for an individual state (New Hampshire in the example above); if the keyword SUBSETG is not assigned a valid state postal code (or if is left blank), AMProc will assign a value of "US" to SUBSETG, indicating that all emissions will be processed and printed to the ASPEN input files.

Column-Formatted ASCII Files

AMProc creates a single column-formatted ASCII text file containing data written to the ASPEN input emission files. This file provides easy access to the data for quality assurance purposes. The prefix name of this file is based on the keywords EMISTYPE and USRLABEL, specified in your batch file; the suffix is 'dat'. Table 11-8 in Section 11.3.3 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 11-7 in Section 11.2.8) to 0 (zero). Tables 11-9 and 11-10 in Section 11.3.3 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').

11.1.9 Creates SAS® file used as input to AMFinalFormat when processing data for ISCST3

When processing data for ISCST3, AMProc creates an output SAS® file subsequently used as the input to AMFinalFormat. See Table 12-6 in Section 12.2.1 for the format of this file.

11.2 How do I run AMProc?

11.2.1 Prepare your non-point and mobile source emission inventory files for input into AMProc

Non-Point Source Inventory Requirements

The non-point 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 11-4.

Table 11-4. Variables in the AMProc Input Non-point 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 (Required units or values are in parentheses)	Type*
AMS	AMS 10-digit category code or SCC 8-digit category code; assigned in AreaPrep (see Section 8.1.2)	A10
CAS	Unique pollutant code	A10
CAT_NAME	Emissions category name	A90
EMIS	Emissions (tons/year)	N
MACT[a]	MACT code	A4
MATCH	Information on how AreaPrep assigned spatial surrogates and AMS codes;	A4
POL_NAME	Pollutant name	A50
POLLCODE	Pollutant code (same value as CAS); assigned in AreaPrep	A10
SCC	SCC code	A8
SIC[a]	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

[a] used only when AMProc's optional growth and control function is performed

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 11-5.

Table 11-5. 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 (Required units or values are in parentheses)	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
STATE	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 non-point 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.

11.2.2 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 11-6 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 these files; see the table of contents in Appendix A for the list of ancillary files associated with AMProc.

Table 11-6. Ancillary Files for AMProc

Keyword, File Description or File Name	Purpose	Need to Modify?	For-mat
indecay[a]	Provides decay coefficients for 6 stability classes for the eight 3-hour time periods for the 9 reactivity classes for use in the ASPEN model	No	Text
HAP Table	Selects pollutants to be modeled, groups and partitions pollutants, assigns reactivity and particulate size classes used for ASPEN only, adjusts emissions	If you want to change selection or characteristics of pollutants from those in files provided with EMS-HAP or if your inventory includes species that aren't in the HAP tables we supplied.	Text
SAF#, where # is a number between 1-29 (inclusive)[a]	Contains spatial allocation factors for the spatial surrogates available in EMS-HAP for use with ASPEN, also contain urban/rural dispersion flags for each tract for input into ASPEN	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®
HSAF#, where # is a number between 1-highest number for spatial surrogate[b]*	Contains spatial allocation factors for the spatial surrogates available in EMS-HAP for ISCST3 for a specific domain	Develop this file to match your desired domain. Update when more recent data or new sources of data become available	SAS®
taff_hourly.txt[a]	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
taff_ISCfactors.txt[b]	Provides temporal profiles containing seasonal fractions, day fractions, and 24 hourly temporal allocation factors (TAFs) by SCC and/or AMS codes.	If you want to used 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 non-point/mobile inventories	Text
am_grp.txt	Provides ASPEN source group assignments by source category and urban/rural designation. Also contains a category code for each source category and the source type variable to distinguish between "major" and "area" sources for projecting emissions.	If you want to make different source group assignments or have additional /different categories in your non-point/mobile inventories	Text

Table 11-6. Ancillary Files for AMProc
(continued)

Keyword, File Description or File Name	Purpose	Need to Modify?	For-mat
popflg96.txt	Contains county-level urban/rural designations; also contains county code used to apply county-level emissions reductions specified in area_cntl.txt	If you want to use different county-level urban/rural designations; if you want to group counties different ways for specifying different emission reductions at the county level	Text
gfegas_bymactXX_YY (where XX specifies the base year and YY specifies the projection year)	Provides the assignment of year specific growth factors by MACT category and nationally, by state FIPS, or by county FIPS	When growth factors are needed for a different projection year or base year	Text
gfegas_bysicXX_YY (where XX specifies the base year and YY specifies the projection year)	Provides the assignment of year specific growth factors by SIC code and nationally, by state FIPS, or by county FIPS	When growth factors are needed for a different projection year or base year	Text
area_sic.txt	Provides cross-reference between source categories and SIC or pseudo SIC codes for purpose of assigning growth factors by state, county, and SIC code	When additional or different source category to SIC cross-references are needed to assign growth factors	Text
area_cntl.txt	Provides emission reduction strategy information by source category, MACT category, HAP identification code and/or county code (county code is defined in the popflg96.txt file).	Develop if you want to apply user-defined 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

[a] file used when processing data for ASPEN
[b] file used when processing data for ISCST3
* These files are not currently being provided as part of EMS-HAP

11.2.3 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_nonroad.txt)
4. precursor HAP table (haptabl_precursor.txt), which applies to precursors from point, non-point, 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 non-point 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 such that they differ between onroad and nonroad emission types. Select the precursor HAP table if you are processing non-point 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.

11.2.4 Modify the files that assign non-point and mobile source categories to source groups (am_grp.txt and popflag96.txt)

You can modify the emission groups ancillary input file, am_grp.txt, to specify different source groups for different non-point or mobile source categories or by incorporating differences in county urban/rural designation. For example, if you want to determine the contribution of onroad mobile sources in urban areas to your results, then assign a unique source group number (between zero and 9, inclusive, for ASPEN, or zero 00 and 99, inclusive, for ISCST3) in the am_grp.txt to every onroad mobile source category in the urban column, and make sure that no other category (non-point, point, nonroad mobile, rural onroad mobile) uses this number.

If the source categories in your inventory are different from those listed in the am_grp.txt file, then you also need to assign values to the group and catcode variables, and, an "A" or "M" for the source type (SRC_TYPE) variable if the source type is area and other (see footnote in 11.1.5 for definition) or major, respectively. The am_grp.txt file does not require a value for the source type variable, however, values of SRC_TYPE other than "A" or "M" will prevent any available MACT-based emission reductions from being applied.

The format of am_grp.txt is shown in Figure 37 of Appendix A. The variable CAT_NAME in 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 Section 11.2.7). The last column in am_grp.txt is the optional and aforementioned SRC_TYPE variable. The use of the category code makes the growth and control program run more efficiently.

The format of popflag96.txt is shown in Figure 24 of Appendix A. This file contains a county-level urban/rural designation for every county in the contiguous United States. These designations were taken from those developed for the purposes of developing EPA's Integrated Urban Air Toxics Strategy[7], based on the following: a county was considered "urban" if either (based on 1996): 1) it includes a metropolitan statistical area with a population greater than 250,000; or 2) the U.S. Census Bureau designates more than fifty percent of the population as "urban."

This information is used in conjunction with the group assignments for urban and rural sources from the am_grp.txt file to assign source groups to each emission record. In addition, the popflag96.txt file also contains a county code used to assign county-level emission reduction information (see Section 11.2.7).

11.2.5 Modify the file that assigns spatial surrogates to mobile source categories (surrxref.txt)

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 non-point sources (in conjunction with other spatial surrogate assignment files) in AreaPrep (see Section 9.2.3).

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 9-1 in Section 9.1.1 gives a list of the currently available spatial surrogates for EMS-HAP for ASPEN modeling. The format of this file is given in Figure 33 of Appendix A.

11.2.6 Modify the temporal allocation factor file (taff_hourly.txt or taff_ISCfactors.txt)

The temporal allocation factor (TAF) file is a common file used for point, non-point and mobile sources. It provides allocation factors that are applied to emissions sources based on 8-digit Source Classification Codes (SCC) or 10-digit Area and Mobile System (AMS) codes. The TAF file used when processing data for ASPEN, taff_hourly.txt, allocates emissions for each source into average diurnal profiles that are representative of a typical day. Details on the development of the file taff_hourly.txt are presented in Appendix D, Section D.7, and Figure 16a of Appendix A contains the file format. The TAF file used when processing data for ISCST3, taff_ISCfactors.txt, allocates emissions for each source into hourly emissions representing each of three day types in each of four seasons. Details on the development of the file

taff_ISCfactors.txt are presented in Appendix E, Section E.6, and Figure 16b of Appendix A contains the file format. You can change temporal allocation factors for source categories in these files and you can add profiles for additional source categories. For more information on modifying these files, see Section 5.2.3.

11.2.7 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
- gfegas_bymactXX_YY.txt - MACT-based growth factor file to grow from year XX to year YY
- gfegas_bysicXX_YY.txt - SIC-based growth factor file to grow from year XX to year YY
- area_sic.txt - cross-reference file from area or mobile source category to SIC or pseudo SIC
- popflg96.txt - cross-reference file from county FIP code to county reduction code
- MACT_gen.txt - general MACT emission reduction information file
- MACT_spec.txt - pollutant specific MACT emission reduction information file
- area_cntl.txt - user-defined emission reduction information file

The am_grp.txt file (also discussed in 11.2.4) is used to cross-reference a category name from the area_sic.txt and area_cntl.txt files, and from your inventory, to a category code. 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.txt and area_cntl.txt files.

The MACT-based and SIC-based growth factor files are specific to the emission inventory base year, and the year of the projection inventory. They are used in both non-point source processing and point source processing (PtGrowCntl). Possible modification of these files, with the exception of the pseudo-SIC records contained in the gfegas_bysicXX_YY.txt files, is described in Section 6.2.3. We created pseudo-SIC codes (e.g. "POPN") for matching non-point source categories to growth factors from the EGAS4.0 [8] SCC-based growth factor files. These pseudo-SIC codes can't be used for point sources (which is why we didn't explain them in Chapter 6). You can create additional pseudo-SIC codes and use EGAS or a different source of growth factor information to supply growth factors which you can then add to the gfegas_bysicXX_YY.txt files. If you do this, then make sure you modify the area_sic.txt file (discussed below). The file formats of gfegas_bymactXX_YY.txt and gfegas_bysicXX_YY.txt are provided in Figures 20a and 20b of Appendix A.

The area_sic.txt file assigns an SIC code or pseudo SIC code that can be up to 4-digits in length for each emission source category. The SIC code or pseudo-SIC code is used to match the

appropriate SIC-based growth factors from the growth factor file gfegas_bysicXX_YY.txt. You can modify the cross-references in this file or define additional pseudo-SIC codes (as discussed above). If you define pseudo-SIC codes, make sure you include growth factors for them in gfegas_bysicXX_YY.txt. The format for the area_sic.txt file is provided in Figure 38 of Appendix A.

The general MACT reduction information file (MACT_gen.txt) and the specific MACT reduction information file (MACT_spec.txt) are used in both non-point source processing and point source processing (PtGrowCntl). They provide the reduction information needed to calculate the projected emissions for the specified projection year (see Section 6.1.2). Modification of these files is described in Section 6.2.5 and the formats are provided in Figures 22a and 22b of Appendix A.

The user-defined emission reduction information file (area_cntl.txt) is not currently being provided as part of EMS-HAP. If you want to apply your own emission reductions to the inventory, you will need to develop this file. This file allows you to define emission reduction information by any combination of process and pollutant information, specified by the source category, MACT code, and/or NTI-HAP variable. In addition, you can define any of this information for specific counties or groups of counties of your own creation (e.g., urban versus rural counties, counties in a specific metropolitan statistical area, or all counties within a state). The format for the user-defined reduction information file is provided in Figure 39 of Appendix A. Note when specifying reduction information at the county level, the county control codes used in area_cntrl.txt must match the codes in the popflg96.txt file which define the specific counties represented by those codes.

In cases where an emission inventory record is affected by more than one record in your user-defined emission reduction file, a specific order of precedence is followed as presented in Table 11-1 in Section 11.1.6. In general, the more specific information will replace the more general information.

11.2.8 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. Sample batch files for AMProc are shown in Figures 15 and 16 of Appendix B. The best way to prepare your batch file is to use one of the samples we provide and modify it to fit your needs.

Specify your keywords

Table 11-7 shows you how to specify keywords to select which functions you want AMProc to perform. For example, if you want to project your emissions by economic growth based only on the MACT category, set the GROWFLAG keyword to 'MACT'.

Table 11-7. Keywords for Selecting AMProc Functions

AMProc Function	Keyword (values provided cause function to be performed)
Select model for which data is being processed	
Process data for ASPEN model	MODEL = ASPEN
Save extended SAS® file created when processing data for ASPEN only	SAVEFILE = 1
Process data for ISCST3 model	MODEL = ISC
Perform growth and control functions	
Perform growth and control functions only	GCFLAG = 2
Perform growth and control functions with other AMProc functions	GCFLAG = 1
Do not perform growth and control functions	GCFLAG = 0
Assign and apply growth factors (applies only when GCFLAG is not equal to '0')	
Assign growth factors by MACT category only	GROWFLAG = MACT
Assign growth factors by SIC only	GROWFLAG = SIC
Assign growth factors by both MACT category and SIC	GROWFLAG = BOTH
Assign missing SICs (applies only when GROWFLAG = 'SIC' or 'BOTH')	SICFLAG = 1
Assign and apply reduction information (applies only when GCFLAG is not equal to '0')	
Assign MACT-based emission reduction information only	CNTLFLAG = MACT
Assign User-defined emission reduction information only	CNTLFLAG = USER
Assign both MACT-based and User-defined emission reduction information	CNTLFLAG = BOTH
Assign general MACT-based information only (applies only when CNTLFLAG = 'MACT' or 'BOTH')	SPECMACT = 0
Assign both general and process and/or pollutant specific MACT-based information (applies only when CNTLFLAG = 'MACT' or 'BOTH')	SPECMACT = 1
Project Emissions beginning January 1 in the projected year	YEARTYPE = CALENDAR
Project Emissions beginning October 1 in the year prior to the projected year	YEARTYPE = FISCAL
Reassign emission source groups (applies only when GCFLAG is not equal to '0')	REBIN = 1

Table 11-8 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. Further, you can run the program for a single HAP or state and get diagnostic information on a particular census tract when processing for ASPEN or a particular gridcell when processing for ISCST3. 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 as a place holder. (It doesn't need to be real value).

Table 11-8. Keywords in the AMProc Batch File

Keyword	Description of Value
	Run identifiers
RUNID[a]	Run identification used when processing data for ASPEN (at most 60 characters)
EMISLABL	Emissions category description used in titles of tables in list file (up to 60 characters)
RUNDATE[a]	Date, to help identify output files created when processing data for ASPEN (e.g., 011999)
EMISTYPE	Emissions file type (AR for non-point, MV for mobile)
USRLABEL	User-specified label used as prefix for output files and used in titles of tables in list file
	Input Inventory Files
INPEMISS	Input emissions files directory
EMISFILE	Input county-level emissions SAS® file, prefix of file name only
	Ancillary Input files (Prefix of file name provided with EMS-HAP in parentheses)
INPFILES	The ancillary files directory
SAFFILE	Spatial allocation factor SAS® files, prefixes only (safe# for ASPEN data processing or hsaf for ISCST3 data processing, where # is a 1 or 2-digit number)
TAFFILE	Temporal profile text file , prefix only (taff_hourly for ASPEN data processing and taff_ISCfactors for ISCST3 data processing)
INDECAY[a]	Reactivity class decay coefficients for 6 stability classes for eight 3-hour time periods , prefix only (indecay)
HAPTABLE	HAP table file, prefix only (haptabl_point_area, haptabl_onroad, haptabl_offroad, or haptabl_precursor)
SURRXREF	Spatial surrogate assignments by AMS text file, prefix only (surrxref)
EMISBINS	Emission source groups assignment text file, prefix only (am_grp)
CNTYUR	County urban/rural and county control code cross-reference file, prefix only (popflg96)
GFMACT	Growth factors to MACT category and state/county FIPS cross-reference text file, prefix only (gfegas_bymactXX_YY, where XX specifies base year and YY specifies projection year)
GFSIC	Growth factors to SIC and state/county FIPS cross-reference text file, prefix only (gfegas_bysicXX_YY, where XX specifies base year and YY specifies projection year)
SICXREF	Source category to SIC or pseudo SIC cross-reference file, prefix only (area_sic)
MACTGEN	General MACT-based emission reduction information text file, prefix only (MACT_gen)
SPECFILE	Specific MACT-based emission reduction information text file, prefix only (MACT_spec)
USERFILE	User-defined emission reduction information text file, prefix only (area_cntl)
	Program Options
MODEL	ASPEN=process data for ASPEN model; ISC=process data for ISCST3 model
SAVEFILE[a]	1=save large extended 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

Table 11-8. Keywords in the AMProc Batch File (continued)

Keyword	Description of Value
GCFLAG	0=do not project emissions to a future year; 1=project emissions to a future year in conjunction with the other AMProc functions; 2=project without processing emission inventory through other AMProc functions
GROWFLAG	MACT=project emissions due to economic growth by MACT code and geographic region only; SIC=project emissions due to economic growth two-digit SIC and geographic region only; BOTH=project emissions due to economic growth both by MACT code and geographic region and by two-digit SIC and geographic region; NONE = does not project emissions due to economic growth
SICFLAG	1=use SCC to SIC cross-reference file to assign SIC where missing in inventory; 0=don't assign SIC where missing
CNTLFLAG	MACT=project emissions using MACT-based emission reduction information only; USER=project emissions using user-defined emission reduction information only; BOTH=projects emissions using both MACT-based and user-defined emission reduction information NONE=does not project emissions using emissions reductions
SPECMACT	1=Use pollutant specific MACT emission reduction information; 0=don't use pollutant specific MACT emission reduction information
YEARTYPE	CALENDAR = Project Emissions beginning January 1 in the projected year; FISCAL = Project Emissions beginning October 1 in the year prior to the projected year
REBIN	1=Reassign emission groups during growth and control processing; 0=don't reassign them
	Additional Input Data
DEFLTSAF	Default spatial surrogate number, applied when source category not linked to a spatial surrogate
XORIG[b]	UTM easting coordinate of the modeling grid origin (meters)
YORIG[b]	UTM northing coordinate of the modeling grid origin (meters)
CELLSIZE[b]	Width of each grid cell (meters)
GROWYEAR	Year to which emissions are to be grown
	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
ONECELL	The selected single census tract (concatenation of STCOUNTY and tract identification code) or gridcell (concatenation of column and row number) for which diagnostic information is printed
	Output files
OUTFILES	The output file directory
ISCOUT[b]	Output SAS® emissions file for data processed for ISCST3, prefix only
WORK2	Directory for large temporary work files

[a] required only when processing data for ASPEN model; [b] required only when processing data for ISCST3 model

Prepare the execute statement

The last line in the batch file runs the AMProc program. In the sample batch files provided in Figures 15 and 16 of 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.

11.2.9 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'.

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

11.3.1 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.

The log file contains details on the number of records in the intermediate files created and modified during processing. You should check this information to make sure it's 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 number of records should increase after spatial allocation. The number of records decreases when the emissions file is collapsed to the source group level.

11.3.2 Check your SAS® list file

The list file can contain the following information depending on the program control options you specified, such as projecting emissions to a future year:

- 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.
- 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 a default surrogate you choose in the batch file (keyword DEFLTSAF). 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
- List of general MACT reduction information
- Warning message if general MACT reduction information not found in inventory
- List of specific MACT reduction information
- Warning message if specific MACT reduction information not found in inventory
- List of user-defined reduction information
- Warning message if user-defined reduction information not found in inventory
- Summary of reduction information applied to emissions
- 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

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 allocation of emissions
- When writing out the ASPEN emissions files

You can inspect the diagnostics (in the list file) that AMProc provides of the temporal allocation step (non-matched categories to temporal profiles) to see 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.

Similarly, you can inspect diagnostics of the spatial allocation process. 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 and summaries of the problem. The most common cause of non-matches is counties or census tracts/grid cells missing from one or more spatial allocation factor files. Emission records not matched to spatial surrogates are assigned the user-defined surrogate (keyword DEFLTSAF in the batch file).

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 emissions source group assignment file (am_grp.txt) 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 am_grp.txt file, the emission record cannot be matched. 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 allows you to see which source categories need to be added to the source group file.

The county urban/rural designation and county control codes file (popflg96.txt) 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 this ancillary file.

As each of the three emission reduction information files used to project emissions to a future year are read, the information is listed in the AMProc output file. After the information is assigned to the emission records, any emission reduction information not assigned is listed in the output file. This allows you to see exactly what reduction information is being applied to the inventory.

After the projected emissions are computed, a summary of the grown emissions (after application of the growth factor) and the projected emissions (after application of emission reduction controls) for selected time periods is listed in the AMProc output file. Inspection of this information allows you to see precisely how the reduction information was assigned and then applied to the emissions.

11.3.3 Check other output files

When processing data for ASPEN, 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. Table 11-9 shows how AMProc names these files.

You should also, when processing data for ASPEN, check for the existence of the column formatted ASCII file and the core SAS® file. Table 11-9 shows how AMProc names these files. Tables 11-10 and 11-11 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. If you intend to run AMProc again to produce various projected emission inventories, you must create this extended SAS® file when you process the base year emission inventory. This extended SAS® file is the input emission inventory for these subsequent runs. Table 11-9 shows how AMProc names this file and Table 11-12 shows the file format.

If you projected the emissions to a future year, the extended SAS® file will contain the variable CNTLCODE. This variable contains information about what reduction information (general MACT, specific MACT, and/or user-defined) was assigned to the emission record and how the information was combined for the assignment of the primary and additional reduction efficiencies. Reviewing the CNTLCODE variable can help confirm how your reduction strategies were used to project the emissions.

When processing data for ISCST3, you should check for the existence of the output inventory SAS® file which is similar (in that MACT and SIC-level emissions are retained) to the extended SAS® file created when processing data for ASPEN. You input this file into AMFinalFormat, the last non-point and mobile source processing program you run that will create a portion of the SO pathway section of the ISCST3 run stream. If you projected emissions to a future year, you can review the variable CNTLCODE to help confirm how your reduction strategies were used to project the emissions. Table 11-9 shows how AMProc names this file.

Table 11-9. AMProc Output File Names

Output File	File Name (located in OUTFILES directory)
Model input files [a]	EMISTYPE + "." + USRLABEL + "." + SUBSETG + ".D" + RUNDATE + ".r" + REACT + ".inp"
ASCII file [a]	EMISTYPE + USRLABEL + ".dat"
Core Inventory SAS® file [a]	"c" + EMISTYPE + USRLABEL
Extended Inventory SAS® file for ASPEN; Output SAS® file for input to AMFinalFormat for ISCST3	EMISTYPE + USRLABEL

[a] created when processing data for ASPEN model only

Table 11-10. Format of AMProc ASCII Data File Created when Processing Data for ASPEN
(Values in order listed)

Description (Units or values are in parentheses)	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
** Temporally allocated emission values represent projected emissions when you choose to perform EMS-HAP's emission projection capabilities

Table 11-11. Variables Contained in AMProc Core SAS® Output File Created when Processing Data for ASPEN

Variable Name	Description (Units or values are in parentheses)	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	A5
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
** Temporally allocated emission values represent projected emissions when you choose to perform EMS-HAP's emission projection capabilities

Table 11-12. Variables Contained in AMProc Extended SAS® Output File For ASPEN and Output SAS® Created when Processing Data for ISCST3

Variable Name	Description (Units or values are in parentheses)	Type*
AMS [c]	AMS source category code	A10
ADDNEFF [b]	Reduction (%) for new sources to be applied in addition to primary reductions	N
ADDXEFF [b]	Reduction (%) for existing sources to be applied in addition to primary reduction	N
ADD_RATE [b]	Percentage of emissions attributable to new sources for the purpose of applying additional reductions	N
CATCODE	Source category code specified in the source group cross-reference file	A4
CELL	For ASPEN: State and county FIPS codes concatenated with the 6-digit tract ID For ISCST3: 3-character column concatenated with the 3-character row	A11 A6
CNTLCODE [b]	Control code indicating the reductions applied to emissions	A60
EMIS	Baseline annual emissions rate (tons/year)	N
EMISBIN	Source group	N
EXISTEFF [b]	Primary percent reduction for existing sources	N
GF [b]	Growth factor	N
LAT [c]	Census tract centroid location latitude (decimal degrees)	N
LON [c]	Census tract centroid location longitude (negative decimal degrees)	N
MACT	MACT code	A7
NEW_EFF [b]	Primary percent reduction for new sources	N
NEW_RATE [b]	Percentage of emissions attributable to new sources for the purpose of applying primary reductions	N
NTI_HAP	Code identifying HAP on the Clean Air Act HAP list	A3
POLLCODE	Unique pollutant-group code (SAROAD)	N
REACT [c]	Reactivity class	N
REPLACE [b]	User-defined reduction flag (R=replace MACT-based reductions with user-defined reductions; A=apply user-defined reductions in addition to the primary MACT-based reductions)	A1
SETSIC [b]	SIC assigned by cross-reference to category name for use in assigning growth factors	A4
SIC	Standard Industrial Classification (SIC) code	A4
SRC_TYPE	Emission source type	A1

Table 11-12. Variables Contained in AMProc Extended SAS® Output File For ASPEN and Output SAS® Created when Processing Data for ISCST3
(continued)

Variable Name	Description (Units or values are in parentheses)	Type*
STCOUNTY	State/county FIPS code	A5
SURR [c]	Spatial allocation surrogate code	N
TF3HR1-TFHR8 [c]	Temporal allocation factor (dimensionless) for 3-hour time periods 1-8	N
TEMIS1-TEMIS8 [ac]	Emissions rate (tons/year), 3-hour time periods 1-8	N
TEMIS1-TEMIS288 [ad]	Temporally allocated hourly emissions for the four seasons, three day types (weekday, Saturday, Sunday), and 24 hours (tons/hour), calculated in AMProc (see Section 11.1.3)	N
UFLAG [c]	Urban/rural dispersion flag (1=urban, 2=rural)	A1
UTMX [d]	UTM easting coordinate (meters), computed in AMProc (see Section 11.1.2)	N
UTMY [d]	UTM northing coordinate (meters), computed in AMProc (see Section 11.1.2)	N

* Ax = character string of length x, N = numeric
[a] Temporally allocated emission values represent projected emissions when you choose to perform EMS-HAP's emission projection capabilities
[b] Variables included only when emission projections are done (see Section 11.1.6)
[C] Variables included only when processing emissions for ASPEN
[d] Variables included only when emission projections for ISCST3

CHAPTER 12
Non-point and Mobile Source Processing
The Final Format Program (AMFinalFormat) for ISCST3

The flowchart below (Figure 12-1) shows how AMFinalFormat fits into EMS-HAP's mobile and non-point source processing for the ISCST3 model. You don't use this program if you are processing emissions for ASPEN. The non-point or mobile source inventory you input to AMFinalFormat is the output from AMProc (Chapter 11). You use the output of AMFinalFormat to assist you in appending these sources to the SO pathway section of the ISCST3 run stream that was created by PtFinal_ISCST3.

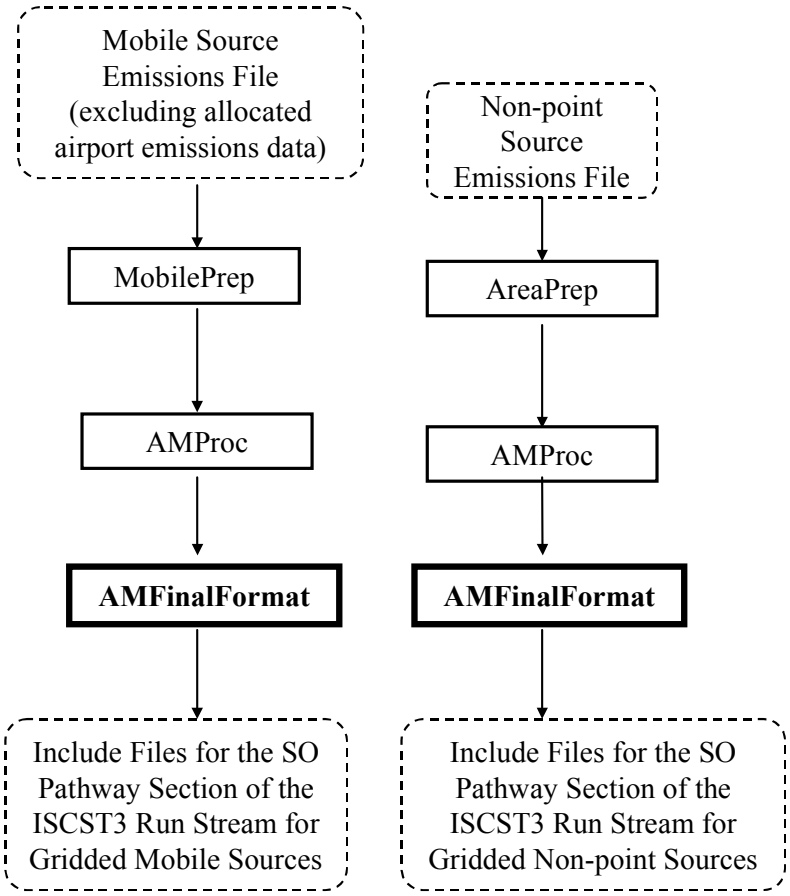


Figure 12-1. Overview of AMFinalFormat within EMS-HAP for Non-point and Mobile Source Processing

12.1 What is the function of AMFinalFormat?

The Final Format Program (AMFinalFormat) for ISCST3 prepares the gridded non-point or mobile source emissions from AMProc for their treatment as ISCST3 area sources in the ISCST3 model. It also creates, for these sources, the include files for the SO pathway section of the ISCST3 run stream file and a text file containing source identification information for the source groups represented. You are responsible for adding both (1) the contents of this source identification information text file, and (2) statements to call the include files, to the existing SO pathway section of the ISCST3 run stream file created from PtFinal_ISCST3.

The specific functions of AMFinalFormat are listed below. You control how the first three functions are performed in any given execution of AMFinalFormat (see Table 12-8 in Section 12.2.4 for details on how to do this).

- Assigns default release parameters to emission sources
- Assigns available pollutant-specific particle size data and gas deposition data
- Assigns available emission source elevation data by modeling grid cell
- Sums category-specific emissions to the emission source group level
- Converts each of the 288 temporally allocated emission rates and baseline emissions to grams/sec-m^2
- Removes emission sources that are outside of modeling domain
- Assigns source identification codes needed for the ISCST3 SO pathway section files
- Adjusts UTM coordinates of emission sources
- Creates include files for the SO pathway section of the ISCST3 run stream
- Creates text files containing source identification information for the source groups for inclusion in the SO pathway section of the ISCST3 run stream

Figure 12-2 shows a flowchart of AMFinalFormat. The following sections describe the above bullets.

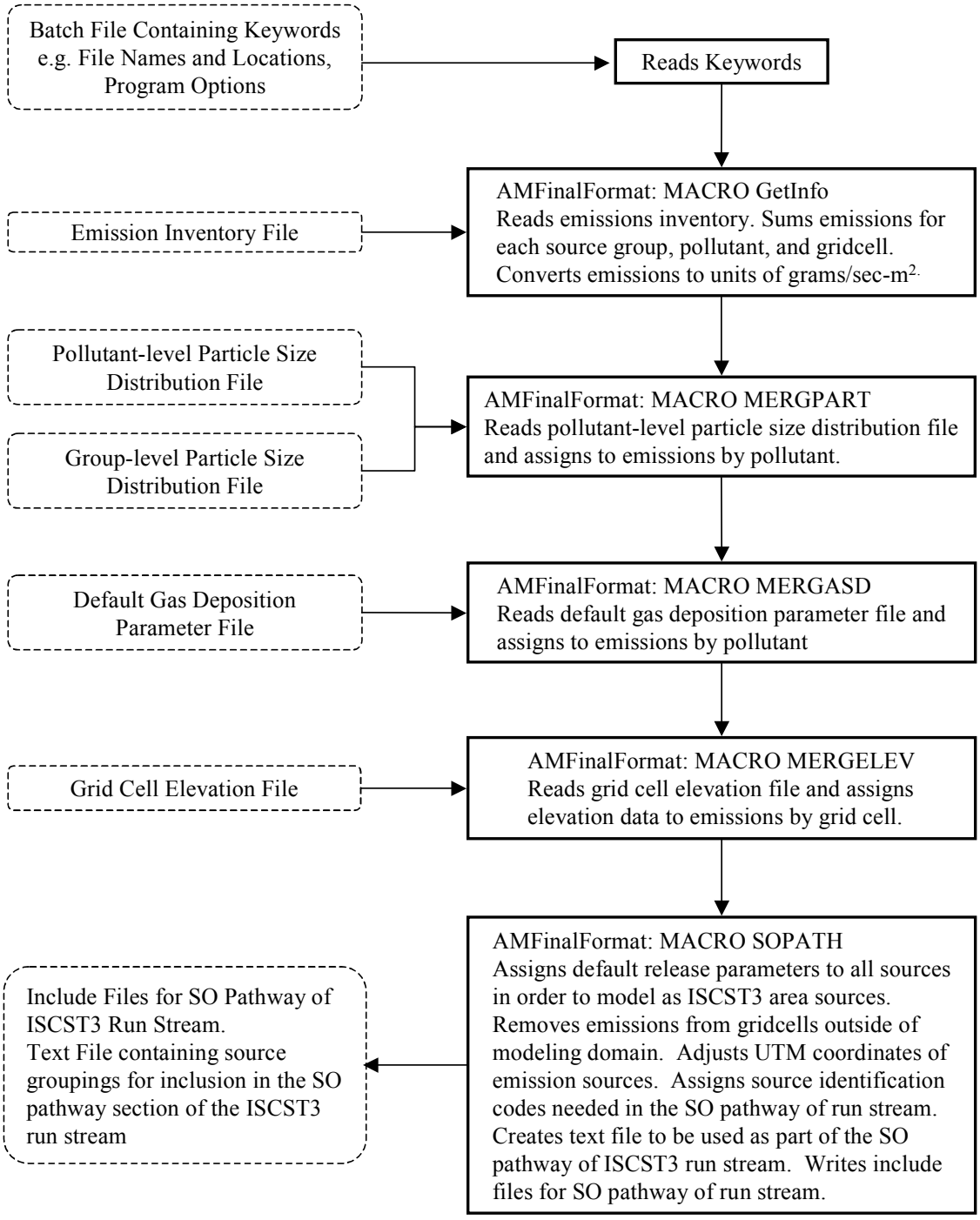


Figure 12-2. AMFinalFormat Flowchart.

12.1.1 Assigns default release parameters to emission sources

The ISCST3 model requires release parameter information for each source to be modeled. All (non-point and mobile) sources processed by AMProc and AMFinalFormat are prepared for ISCST3 modeling as ISCST3 area sources; each grid cell represents an ISCST3 area source. The release parameters are shown in Table 12-1. Of the variable names listed in Table 12-1, only REL_HGT and DELTA_X are required for ISCST3 processing.

AMFinalFormat assigns most of the default release parameters to each grid cell based on the keywords you provide in the batch file (see Table 12-9, Section 12.2.4); the only exception is the variable ROTATE, which is hard-coded in AMFinalFormat as 0 (zero) degrees because the grid cells are square (DELTA_X = DELTA_Y) with no rotation. DELTA_X and DELTA_Y are based your grid cell dimensions. For example, if you are using a 1 by 1 km modeling domain grid, then you would set CELLSIZE=1000 meters, and DELTA_X and DELTA_Y would be 1000 meters.

Table 12-1. Default ISCST3 Area Source Release Parameters

Variable Name	Release Parameter	Keyword Used to Assign Value
REL_HGT	release height (meters)	ARELHGT
DELTA_X	length of X side of source (meters)	CELLSIZE
DELTA_Y	length of Y side of source (meters)	CELLSIZE
ROTATE	orientation angle of rectangle for source (degrees from North)	------- *
SIGMA_Z	initial vertical dimension of plume (meters)	AINPLUM

* A rotation angle of 0 (zero) is hard coded in AMFinalFormat

12.1.2 Assigns available pollutant-specific particle size and gas deposition data

The ISCST3 model includes several different algorithms for deposition, some of which require information in addition to the emission inventory data. The type of deposition and the additional information required are summarized in Table 12-2.

Table 12-2. ISCST3 Deposition Algorithms and Required Information

Type of Deposition	Additional Information Required	Specificity of Information
gravitational settling and removal of particulates in the plume by dry deposition	emission source particle size distribution parameters (particle diameter, mass fraction, and particle density)	by pollutant (SAROAD)
scavenging and removal of particles by wet deposition	liquid and ice scavenging coefficients	by pollutant (SAROAD)
dry deposition and removal of gaseous pollutants	molecular diffusivity, solubility enhancement factor, reactivity parameter, mesophyll resistence term, and Henry's Law coefficient	by pollutant (SAROAD)

Depending on which, if any, of these deposition algorithms you will be using when running the ISCST3 model, you need to provide the appropriate information by using one of two ancillary files. One ancillary file contains the particle size distribution information, and, if necessary, the liquid and ice scavenging coefficients by pollutant as identified by the SAROAD variable (which is the same as the POLLCODE variable discussed in AMProc - AMFinalFormat renames this variable to "SAROAD"). A second ancillary file contains the gas deposition parameters and the liquid scavenging coefficients by pollutant (SAROAD). These two SAROAD-based ancillary files are the same as the SAROAD-based files used by PtFinal_ISCST3 (see Section 8.1.3). Note that unlike PtFinal_ISCST3, AMFinalFormat does not allow you to specify different deposition information by source category.

You control how the particle size distribution file and the gas deposition file are used in AMFinalFormat through the file name keyword DEFPART and the program options keywords GASDEPO and SCAVENG you specify in the batch file (see Table12-9 in Section 12.2.4). If you instruct AMFinalFormat to read scavenging coefficients by setting the keyword SCAVENG to 1, then these coefficients will be read from both the gas deposition and particle size distribution files.

12.1.3 Assigns available emission source elevation data by modeling grid cell

ISCST3 supports both flat and complex terrain modeling. AMFinalFormat provides two options for entering source elevations. You can use an ancillary file to provide elevation data by modeling grid cell or you can enter a single elevation to be used for all sources. If you provide the elevation data, AMFinalFormat assigns them to the inventory using the CELL variable assigned in AMProc (see Section 11.1.2). If you want to use a single elevation for all sources, provide this value through the batch file keyword DEFELEV(see Table 12-9 in Section 12.2.4).

12.1.4 Sums category-specific emissions to the emission source group level

AMFinalFormat sums the temporally allocated emissions (variables TEMIS1-TEMIS288) and baseline emissions (variable EMIS) for each pollutant (variable SAROAD) and emission source group (variable EMISBIN) within each grid cell. This function removes all category-specific information from the input file such as the SCC and AMS by summing to the emission source group level. The emission source group was assigned to the inventory in AMProc, based on your preferences (see Section 11.1.5). This summation process allows AMFinalFormat to provide gridded emissions for each pollutant at the emission source group level. This allows ISCST3 to compute the concentrations by emission source group. This function is performed early on in the program for computational efficiency, as it reduces the size of the inventory file considerably.

12.1.5 Converts each of the 288 temporally allocated emission rates and baseline emissions to grams/sec-m^2

AMFinalFormat converts the temporally allocated emissions (variables TEMIS1-TEMIS288) from tons/hour to grams/sec-m^2 according to Equation 12-1, below. AMFinalFormat also converts the baseline emissions (EMIS) from tons/year to grams/sec-m^2 according to Equation 12-2, below. The variable EMIS_TPY retains the baseline emissions in tons/year (Table 12-10).

$$E_{g/s\text{-}m2(i)} = E_{tons/hour(i)} \times [(1\ hr/3600\ sec) \times (907{,}184 grams/ton)] / (CELLSIZE)^2 \quad \text{(eq. 12-1)}$$

$$E_{g/s\text{-}m2} = E_{tons/year} \times [(1\ year/365\ days) \times (1\ day/24\ hrs) \times (1\ hr/3600\ sec) \times (907{,}184 grams/ton)] / (CELLSIZE)^2 \quad \text{(eq. 12-2)}$$

where:

$E_{g/s\text{-}m2(i)}$= emissions in grams/second/meter^2 for time block i (where i represents one of the 288 time blocks; e.g. time block i=1 represents the first hour of a winter weekday)

$E_{g/s\text{-}m2}$ = emissions in grams/second/meter^2

$E_{tons/hour(i)}$ = emissions in tons/hour for time block i

$E_{tons/year}$ = emissions in tons/year

CELLSIZE = length of grid cell side, keyword CELLSIZE (see Table 12-9 in Section 12.2.4)

12.1.6 Removes emission sources that are outside of modeling domain

AMFinalFormat windows the inventory to exclude any grid cells that are outside of the modeling domain. The CELL variable, created during spatial allocation for ISCST3 in AMProc (see Section 11.1.2), contains the column and row from each grid cell; all grid cells with columns or rows greater than the maximum column or maximum row of your modeling domain are dropped. You provide the modeling domain information through the keywords MAXCOL and MAXROW in the batch file (see Table 12-9 in Section 12.2.4).

12.1.7 Assigns source identification codes needed for the ISCST3 SO pathway section files

AMFinalFormat assigns a source identification code to each emission record for use in the ISCST3 model. This identification code is created from the source group (variable EMISBIN, see Section 11.1.5), the RUN_ID keyword provided in the batch file (see Table 12-9 in Section 12.2.4), and a sequential number. This number is determined by arranging the inventory by pollutant SAROAD code and source group (variable EMISBIN) and numbering the emission records sequentially within each source group (remember that separate run stream and include files are created for each pollutant). The one character RUN_ID is included in the source identification code to allow the ISCST3 model to distinguish between emission sources from different runs of EMS-HAP with different inventories which may have the same source group (e.g., the non-point source inventory and the point source inventory). Without the RUN_ID, the same source identification code could be given to sources from different runs of EMS-HAP for different inventories.

12.1.8 Adjusts UTM coordinates of emission sources

Within the ISCST3 model, only six significant digits are used for the UTM coordinates of any source; it is possible that some sources have the UTM coordinates greater than 1,000,000 meters. To avoid the truncation of such coordinates in the ISCST3 model, AMFinalFormat adjusts all of the coordinates relative to the origin (southwest corner) of the modeling domain. The keyword X_ORIG and Y_ORIG provided in the batch file (see Table 12-9 in Section 12.2.4) are used in the following equations to perform this adjustment.

$$\text{Adjusted UTMX} = \text{UTMX} - \text{X\_ORIG} \quad \text{(Eq. 12-3)}$$

$$\text{Adjusted UTMY} = \text{UTMY} - \text{Y\_ORIG} \quad \text{(Eq. 12-4)}$$

Where:

UTMX = UTM easting coordinate (meters)

X_ORIG = UTM easting coordinate of grid origin

UTMY = UTM northing coordinate (meters)

Y_ORIG = UTM northing coordinate of grid origin

12.1.9 Creates include files for the SO pathway section of the ISCST3 run stream

In order to reduce the size of the SO pathway section of the run stream text files, AMFinalFormat uses the "include file" feature of ISCST3 run streams. The ISCST3 model processes only one pollutant during a run; therefore, AMFinalFormat creates separate include files for each pollutant, as identified by the pollutant SAROAD code. Table 12-3 shows a list of the include files and when they are created, and Table 12-4 shows how AMFinalFormat names them. After AMFinalFormat is complete, for each pollutant (SAROAD), you need to reference these include files in an existing SO pathway section of a run stream text file (use the one created by PtFinal_ISCST3).

Table 12-3. ISCST3 SO Pathway Run Stream Include Files

Include File	Contents	When File is Created
Hourly emission factors	288 temporally allocated emission rates (inventory variables TEMIS1-TEMIS288)	For each SAROAD in inventory
emission source data	each file contains source location coordinates, stack parameters for point sources, release parameters for area and volume sources, and emission rate [set to 1] for each source	For each SAROAD in inventory
particle size distribution data/scavenging coefficients	particle diameter, mass fraction, and particle density and, if provided, liquid and ice scavenging coefficients (see Section 12.1.4)	Only if particle size distribution data is provided
gas deposition parameters	molecular diffusivity, solubility enhancement factor, reactivity parameter, mesophyll resistence term, and Henry's Law coefficient (see Section 12.1.4)	Only if gas deposition data is provided

Table 12-4. ISCST3 Include File Names

Type of Include File	File Name (located in OUTFILES directory)
Hourly emission factors	"hrlyemis_" + RUN_ID + "." + SAROAD
Emission source data	"grid" + EMISBIN + RUN_ID + "." + SAROAD
Particle size distribution data/scavenging coefficients	"particle_" + RUN_ID + "." + SAROAD
Gas deposition parameters	"gasdepo_" + RUN_ID + "." + SAROAD

12.1.10 Creates text files containing source identification information for the source groups for inclusion in the SO pathway section of the ISCST3 run stream

The SO pathway section of the ISCST3 run stream file must contain source group information for every source in the include files. Therefore, in addition to the include files discussed above, AMFinalFormat creates, for each pollutant (SAROAD), a text file containing the range of source identification codes (see Section 12.1.7) for each source group in the include files. Table 12-5 provides the naming convention for these files. For each pollutant modeled with ISCST3, you must add, to an existing SO pathway section of the ISCST3 runstream file, the contents of the source grouping files as well as the references to the include files created by AMFinalFormat. An SO pathway section will exist if the pollutant had sources that made it through PtFinal_ISCST3; that is, if any of the sources in the point source inventory had nonzero emissions in the modeling domain.

Table 12-5. Text File Names Containing Emission Source Groupings

Description	File Name (located in OUTFILES directory)
Source groupings; one record per source group (EMISBIN), one file per pollutant (SAROAD)	"AMcats_" + RUN_ID + "." + SAROAD

12.2 How do I run AMFinalFormat?

12.2.1 Prepare your point source inventory for input into AMFinalFormat

The gridded non-point or mobile source inventory you use for input into AMFinalFormat is the output from AMProc (see Chapter 11). This inventory will contain the necessary variables for AMFinalFormat, as shown in Table 12-6.

Table 12-6. Variables in the AMFinalFormat Input Inventory SAS® File

Variable Name	Data Description (Required units or values are in parentheses)	Type*
ADDNEFF[a]	reduction (%) for new sources to be applied in addition to primary reductions; assigned in AMProc (see Section 11.1.6)	N
ADDXEFF[a]	reduction (%) for existing sources to be applied in addition to primary reductions; assigned in AMProc (see Section 11.1.6)	N
ADD_RATE[a]	percentage of emissions attributable to new sources for the purpose of applying additional reductions; assigned in AMProc (see Section 11.1.6)	N
CATCODE	Source category code specified in the source group cross-reference file	A4
CELL	Modeling domain grid cell, 3-character column concatenated with the 3-character row, assigned AMProc (see Section 11.1.2)	A6
CNTLCODE[a]	control code indicating the reductions applied to emissions; assigned in AMProc (see Section 11.1.6)	A60
EMIS	Baseline pollutant emissions value (tons/year)	N
EMISBIN	Source group, assigned in AMProc (see Section 11.1.5)	N
EXISTEFF[a]	primary percent reduction for existing sources; assigned in AMProc (see Section 11.1.6)	N
GF[a]	growth factor; assigned in AMProc (see Section 11.1.6)	N
MACT	MACT code	A7
NEW_EFF[a]	primary percent reduction for new sources; assigned in AMProc (see Section 11.1.6)	N
NEW_RATE[a]	percentage of emissions attributable to new sources for the purpose of applying primary reductions; assigned in AMProc (see Section 11.1.6)	N
NTI_HAP	code identifying HAP on the Clean Air Act HAP list	A3
POLLCODE	unique pollutant-group code (same as SAROAD variable in point source processing), assigned in AMProc (see Section 11.1.1)	N
REPLACE[a]	user-defined reduction flag (R=replace MACT-based reductions with user-defined reductions; A=apply user-defined reductions in addition to the primary MACT-based reductions); assigned in AMProc (see Section 11.1.6)	A1
SIC	SIC code	A4
SRC_TYPE	code identifying source type, assigned in AMProc (see Section 11.1.5) to apply reduction information by source type, not source group (EMISBIN)	A1
STCOUNTY	5-digit FIPS code (state and county combined)	A5
TEMIS1-TEMIS288	temporally allocated hourly emissions for the four seasons, three day types (weekday, Saturday, Sunday), and 24 hours (tons/hour), calculated in AMProc (see Section 11.1.3)	N
UTMX	UTM easting coordinate (meters), computed in AMProc (see Section 11.1.2)	N
UTMY	UTM northing coordinate (meters), computed in AMProc (see Section 11.1.2)	N

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

[a] variables present only if you selected to project your emissions to a future year when you ran AMProc

12.2.2 Determine whether you need to modify the ancillary input files for AMFinalFormat

An ancillary file is any data file you input to the program other than your emission inventory. Table 12-7 lists the optional ancillary input files for AMFinalFormat and when you may need to modify them.

Table 12-7. Required Ancillary Input Files for AMFinalFormat

Name of File Provided with EMS-HAP	Purpose	Need to Modify?	Format
defpart.txt	Provides the default particle size distribution data by pollutant	If you want to add new pollutants or replace parameter values with new values	Text
defgas.txt	Provides the default gas deposition parameters by pollutant	If you want to add new pollutants or replace parameter values with new values	Text
hstn-elev.txt	Provides terrain elevations (in meters) by modeling domain grid cell	If you want to use elevation data for your domain and grid	Text

12.2.3. Develop the particle size distribution, gas deposition, and terrain elevation files (defpart.txt, defgas.txt, and hstn-elev.txt)

As discussed in Appendix E, the particle size distribution, gas deposition, and terrain elevation files, defpart.txt, sccpart.txt (see section 8.1.3), defgas.txt, and hstn-elev.txt, that we've provided with EMS-HAP are intended for a specific application. Depending on your domain and the pollutants you choose to run, you will likely need to develop your own files. Unless you are modeling the same Houston domain, the hstn-elev.txt file is presented strictly for illustrative purposes. These files are also used in the point source program PtFinal_ISCST3 (see Chapter 8).

The defpart.txt file contains information about particle size distributions that are applied to specific pollutants identified by the SAROAD variable. You can include up to10 particle size classes. You must specify the number of size classes in the file. You can also include liquid and ice scavenging coefficients for each size class, but this is optional. The format for the defpart.txt file is provided in Figure 29 of Appendix A, and Section E.9 (Appendix E) discusses how we developed it.

The defgas.txt file contains gas deposition parameters that are assigned to the inventory by the SAROAD variable. The format for this file is provided in Figure 31 of Appendix A, and Section

E.9 (Appendix E) discusses how we developed it.

The hstn-elev.txt file contains terrain elevation data by grid cell. This information is specific for your modeling domain. You need to develop a new file when your modeling domain changes. The format for this file is provided in Figure 32 of Appendix A, and Section E.10.5 (Appendix E) discusses how we developed it.

12.2.4 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 AMFinalFormat is shown in Figure 17 of Appendix B. The best way to prepare your batch file is to use one of the samples we provide and modify it to fit your needs.

Specify your keywords

Table 12-8 shows you how to specify keywords to select AMFinalFormat functions.

Table 12-8. Keywords for Selecting AMFinalFormat Functions

AMFinalFormat Functions	Keyword (values provided cause function to be performed)
Use particle size distribution data provided	
by pollutant without scavenging data	DEFPART = Prefix of data file; SCAVENG = 0
by pollutant with scavenging data	DEFPART = Prefix of data file; SCAVENG = 1
Use gas deposition parameters provided	
without scavenging data	GASDEPO = YES; SCAVENG = 0
with scavenging data	GASDEPO = YES; SCAVENG = 1
Use elevation data provided	ELEVDAT = Prefix of data file
Create gas deposition include file	GASDEPO = YES

Note that because the keyword SCAVENG applies to both gaseous and particulate pollutants, you don't have the option to use scavenging data for one of these pollutants types without the other.

Table 12-9 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 12-9).

Table 12-9. Keywords in the AMFinalFormat Batch File

Keyword	Description of Value
	Input Inventory Files
IN_DATA	Input SAS® file directory
INSAS	Input inventory SAS® file name, prefix of file name only
	Ancillary Files (Prefix of file name provided with EMS-HAP in parentheses)
REFFILES	Ancillary file directory
DEFPART	Default pollutant-level particle distribution text file, prefix only (defpart); put "NONE" if no file is to be used
DEFGAS	Default pollutant-level gas deposition data text file, prefix only (defgas) put 'NONE' if no file is to be used
ELEVDAT	Gridded terrain elevation data text file, prefix only ; put "NONE" if no file is to be used (hstn-elev)
	Program Options
RUN_ID	Run identification code used to insure unique ISCST3 source ID's; typically used to distinguish between point, non-point, and mobile inventory runs (one character limit)
GASDEPO	YES = create gas deposition include files; NO = do not write gas deposition include files
SCAVENG	1 = scavenging coefficients are included in the DEFPART or DEFGAS files; 0 = scavenging coefficients are not included in the DEFPART or DEFGAS files
	Additional Input Data
DEFELEV	Default elevation value used for all sources (meters); only used if ELEVDAT file prefix is 'NONE'
X_ORIG	UTM easting coordinate of the modeling grid origin (meters)
Y_ORIG	UTM northing coordinate of the modeling grid origin (meters)
CELLSIZE	Width of each grid cell (meters)
MAXCOL	Total number of columns in the modeling grid
MAXROW	Total number of rows in the modeling grid
ARELHGT	Release height above ground (meters)
AINPLUM	Initial vertical dimension of plume (meters)
	Output files
OUTDATA	Output SAS® file directory
OUTSAS	Output inventory SAS® file name, prefix only
OUTFILES	Output directory of SO pathway include files

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 DEFPART to "NONE", you still need to assign a value to keyword SCAVENG in your batch file. The value provided in this circumstance will not be used by the program; it is merely a place holder value for the keyword.

Prepare the execute statement

The last line in the batch file runs the AMFinalFormat program. In the sample batch file provided in Figure 17 of Appendix B, you will see a line preceding the run line that creates a copy of the AMFinalFormat 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 AMFinalFormat 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 AMFinalFormat. In the sample batch file, a work directory is defined on the last line following the execution of AMFinalFormat. For example, the command 'sas AMFinalFormat_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.

12.2.5 Execute AMFinalFormat

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 AMFinalFormat.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, 'AMFinalFormat.bat'.

12.3 How Do I Know My Run of AMFinalFormat Was Successful?

12.3.1 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.

12.3.2 Check your SAS® list file

This program does not create a list file.

12.3.3 Check other output files from AMFinalFormat

To ensure that AMFinalFormat created all necessary include files, as well as the text files containing the source group information for each pollutant, you need to check the output file directory that you specified in the batch file using keyword OUTFILES. For each pollutant, in the gridded mobile or non-point source inventory, AMFinalFormat always creates an emission factors include file, an emission source data file, and a text file listing source identification code ranges for the source groups. The creation of other include files containing particle size distribution data and gas deposition parameters depends on how you set the keywords in your batch file.

In addition to the include files and text file of source groupings, AMFinalFormat automatically creates an output SAS® inventory file, named by keyword OUTSAS. This file contains the variables listed in Table 12-10; some of these variables are only included depending on how you set the keywords in the batch file (see Table 12-9, Section 12.2.4). Note that since the emissions data from the input SAS® inventory file are summed over the source group, pollutant, and gridcell, specific source category information (SCC, SIC, MACT) is not included in this output file. Also note that the units of the temporally allocated emissions values are converted from tons/hour (input file) to grams/sec-m^2, and the units of the baseline emission (EMIS) variable has been converted from tons/year to grams/sec-m^2. The original baseline emissions value in tons/year is retained in the EMIS_TPY variable. Finally, note that the numeric variable POLLCODE is replaced by the character variable SAROAD (name change).

Table 12-10. Variables in the AMFinalFormat Output SAS® File

Variable Name	Data Description (Required units or values are in parentheses)	Type*
ALPHA[c]	Gas deposition parameter: solubility enhancement factor	N
CELL	Modeling domain grid cell, 3-character column concatenated with the 3-character row, assigned AMProc (see Section 11.1.2)	A6
DIFF[c]	Gas deposition parameter: molecular diffusivity (cm^2/sec)	N
EMIS	Baseline pollutant emissions in grams/sec/m^2	N
EMISBIN	Source group, assigned in AMProc (see Section 11.1.5)	N
EMIS_TPY	Annual grid cell baseline emission in tons/year	N
HENRY[c]	Gas deposition parameter: Henry's Law coefficient	N
LIQSCAV[c]	Gas deposition parameter: liquid scavenging coefficient (1/(sec-mm/hr))	N
NUMCAT	Number of particle size classes	N
PDEN1-PDEN10[a]	Particle size distribution parameter: density (grams/cm^3)	N
PDIA1-PDIA10[a]	Particle size distribution parameter: diameter (microns)	N
PFRA1-PFR10[a]	Particle size distribution parameter: mass fraction	N
PICE1-PICE10[b]	Particle size distribution parameter: ice scavenging coefficient (1/(sec-mm/hr))	N
PLIQ1-PLIQ10[b]	Particle size distribution parameter: liquid scavenging coefficient (1/(sec-mm/hr))	N
RSUBM[c]	Gas deposition parameter: mesophyll resistence term (sec/cm)	N
RX[c]	Gas deposition parameter: reactivity parameter	N
SAROAD	Pollutant code (character variable that replaces the assigned value of the numeric input variable POLLCODE)	A5
SELEV	source elevation	N
SRCID	Source identification code (see Section 12.1.7)	A8
TEMIS1-TEMIS288 [d]	Temporally allocated hourly emissions for the four seasons, three day types (weekday, Saturday, Sunday), and 24 hours (tons/hour), calculated in AMProc (see Section 11.1.3)	N
UTMX	UTM easting coordinate (meters), computed in AMProc (see Section 11.1.2)	N
UTMY	UTM northing coordinate (meters), computed in AMProc (see Section 11.1.2)	N

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

[a] variables added only when particle size distribution data are provided; [b] variables added only when liquid/ice scavenging data are provided; [c] variables added only when gas deposition parameters are provided

[d] Temporally allocated emission values represent projected emissions when you choose to perform EMS-HAP's emission projection capabilities

REFERENCES

1. User's Guide: Assessment System for Population Exposure Nationwide (ASPEN, Version 1.1) Model. EPA-454-R-00-017, U.S. Environmental Protection Agency, Research Triangle Park, NC. March 2000.

2. User's Guide for the Industrial Source Complex (ISC3) Dispersion Models: Volume I - User Instructions. EPA-454-/D-95-003a, U.S. Environmental Protection Agency, Research Triangle Park, NC. 1995d.

3. U.S. Environmental Protection Agency. Technology Transfer Network National Air Toxics Assessment. The National-scale Air Toxics Assessment. http://www.epa.gov/ttn/atw/nata/ (Accessed July 2002).

4. Example Application of Modeling Toxic Air Pollutants in Urban Areas. EPA-454-/R-02-003, U.S. Environmental Protection Agency, Research Triangle Park, NC. June 2002.

5. Driver, L.; Pope, A.; Billings, R.; Wilson, D. "The 1996 National Toxics Inventory and Its Role in Evaluating the EPA's Progress in Reducing Hazardous Air Pollutants in Ambient Air", Presented at the 92nd Annual Meeting of the Air & Waste Management Association, St. Louis, MO, June 1999; paper 91-501.

6. Rosenbaum, A.S.; Ligocki, M.P.; Wei, Y.H. "Modeling Cumulative Outdoor Concentrations of Hazardous Air Pollutants, Volume 1: text"; SYSAPP-99-96-33r2, Prepared for the U.S. Environmental Protection Agency, Office of Policy, Planning, and Evaluation, by Systems Applications International, Inc., San Rafael, CA. 1998, pp. 5-3 to 5-4.

7. Rosenbaum, A.S.; Ligocki, M.P.; Wei, Y.H. "Modeling Comulative Outdoor Concentrations of Hazardous Air Pollutants, Volume 1: text"; SYSAPP-99-96-33r2, Prepared for the U.S. Environmental Protection Agency, Office of Policy, Planning, and Evaluation, by Systems Applications International, Inc., San Rafael, CA. 1998, pp. 5-9 to 5-11.

8. U.S. Environmental Protection Agency. Economic Growth Analysis System Version 4.0 and Documentation, from the Technology Transfer Network Clearinghouse for Inventories and Emission Factors. http://www.epa.gov/ttn/chief/emch/projection/egas40/index.html (Accessed May, 2001)

9. U.S. Environmental Protection Agency. Integrated Urban Air Toxics Strategy PO Data System.. http://www.epa.gov/ttn/atw/urban/urbanpg.html (Accessed April 2, 2002)

APPENDIX A
EMS-HAP Ancillary File Formats

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

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	Airport Location Identification Code
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	A42	Airport name
City	A26	
County	A21	
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: **ISC_airport_parameters**

File Type: ASCII Text; Non-header data begins on line #3.

Variables and Structure

Name	Type*	Column	Length	Description
Locid	C	1	4	Airport Location Identification Code
Axlen	N	6	8	length of X side of rectangle for ISCST3 area sources (meters)
Aylen	N	15	8	length of Y side of rectangle for ISCST3 area sources (meters)
Aangle	N	24	4	orientation angle of rectangle for ISCST3 area sources (degrees from North)
Arelhgt	N	29	4	release height above ground for ISCST3 area sources (meters)
Ainplum	N	34	4	initial vertical dimension of plume for ISCST3 area source (meters)
*C = character, N = numeric.				

Sample records

```
ISCarea File to provide ISC area parameters for airport

IAH  5100     5300     0    2    2
HOU  2000     3000     0    2    2
```

Figure 2. ISCST3 Area Source Release Parameter to Airport Assignment File (ISC_airport_parameters.txt)

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 3. 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 4. 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 5. 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 6. 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	Minimum y-value
Segct	N	Segment 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 7. Boundary File (bound6)

File Name: **cntyctr2**

File Type: SAS®

Variables and Structure

Name	Type*	Description
FIPST	N	State FIPS codes.
FIPCNTY	N	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 8. 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				
01043	964600	965200	964400	964900	964300	965700	965300	965400	965000	964100

Figure 9. 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 10. Tract Information File, including location of centroid and urban/rural flag (tractinf)

File Name: **def_scc.txt**

File Type: ASCII Text; Non-header data begins on line #1.

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

File Name: **def_sic.txt**

File Type: ASCII Text; Non-header data begins on line #1.

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

File Name: varlist.txt

File Type: ASCII Text; Non-header data begins on line #1.

Variables and Structure

Name	Type*	Column	Length	Description
Var	C	1	20	Name of variable to be retained in inventory
Keep	C	22	1	Keep flag ('Y' to retain variable)
*C=character, N=numeric				

Sample of File Contents

```
EMISRELPID            N
EMISUNITID            N
EMISPROCID            N
FIPFLAG               Y
LFLAG                 Y
LLPROB                Y
MACT_CODE_ASSIGNMENT  Y
NTI_SITE_ID           N
SITENAME              N
NTI_UNIQUE_ID         N
DEFAULT_DIA_FLAG      N
FLOWRATE              N
DEFAULT_FLWRT_FLAG    N
DEFAULT_HGT_FLAG      N
DEFAULT_VEL_FLAG      N
DEFAULT_TEMP_FLAG     N
UTM_Z                 N
X                     N
XY_TYPE               N
Y                     N
ZIP_CODE              N
EMISSIONTYPE          N
```

Figure 13. Additional Variables File (varlist.txt)

File Name: **haptabl_XXX.txt**

File Type: ASCII Text; Non-header data begins on line #2.

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
```

Figure 14. HAP Table File (haptabl_XXX.txt)

Table 1. HAP Table File Used to Process 1996 NTI Point and Non-point Source Emissions Data (haptabl_point_area.txt)

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
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

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

o-Anisidine	Anisidine, o-	90040	7	N	80110	1.0000	149
ANTIMONY TRICHLORIDE	Antimony Compounds, coarse PM	10025919	3	N	80311	0.2402	47
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

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

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
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

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

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
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

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

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
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

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

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
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

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

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
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

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

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
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

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

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
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

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

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
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

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

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
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

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

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
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

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

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	
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

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

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
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

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

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, Non-point and Mobile Precursor Inventory (haptabl_precursor.txt) (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	

Table 2. Precursor HAP Table File: Used to Process Point, Non-point and Mobile Precursor Inventory (haptabl_precursor.txt) (HAP and nonHAP VOCs combined) (continued)

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
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

Table 2. Precursor HAP Table File: Used to Process Point, Non-point and Mobile Precursor Inventory (haptabl_precursor.txt) (HAP and nonHAP VOCs combined) (continued)

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 (haptabl_onroad.txt)

POLLDESC	HAPDESC	POLLCODE	React	Keep	SaroadFactor		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 (haptabl_nonroad.txt)

POLLDESC	HAPDESC	POLLCODE	React	Keep	SaroadFactor		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.
C_flag	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 15. County-level Urban/Rural Flag File (ctyflag)

File Name: **taff_hourly.txt**

File Type: ASCII Text; Non-header data begins on line #3.

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)
Total: All Road Types
```

Figure 16a. Temporal Allocation Factor File Used When Processing Data for ASPEN (taff_hourly.txt)

File Name: **taff_ISCfactors.txt**

File Type: ASCII Text; Non-header data begins on line #3.

Variables and Structure

Name	Type*	Column	Length	Decimals	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.
Daytype	N	13	3		Day type (1=weekday, 2=Saturday, 3=Sunday)
Seatype	N	15	3		Season type (1=spring, 2=summer, 3=fall, 4=winter)
Dayfrac	N	16	7	5	Day type allocation factor
Seafrac	N	23	7	5	Seasonal allocation factor
Hr1 - Hr24	N	42	7	5	Hourly emission allocation factors for the day type and season.
*C=character, N=numeric					

Sample of File Content

```
  10100101  1 10.010990.24858NAPANAPANAPA
0.029190.028330.027380.027690.028570.030070.033930.041030.044900.046400.046560.046640.045770.045530.04
4580.043950.044180.044190.044430.046240.045850.042850.037480.03211
  10100101  1  20.010990.22260NAPANAPANAPA
0.028220.027040.026410.026250.026800.029240.034370.039880.044140.046590.047920.048080.047690.047840.04
7530.047450.047370.046270.044620.044690.044530.040520.035000.02940
  10100101  1  30.011000.19406NAPANAPANAPA
0.031590.030960.031110.031670.033640.037980.044060.047530.049190.049350.049350.048630.048480.047850.04
7060.047210.047850.049660.050290.049350.046420.040900.035530.03120
  10100101  1  40.010990.33476NAPANAPANAPA
0.035720.034610.034060.033750.034220.035880.039350.043370.045820.047080.047080.047230.046760.046360.04
5890.045650.046760.048340.048730.048260.046760.045030.041640.03848
  10100101  2  10.010980.24858NAPANAPANAPA
0.036970.034910.032860.031830.032860.032860.034910.039020.044150.048260.049290.050310.048260.048260.04
6210.046210.047230.047230.047230.048260.049290.047230.044150.03902
  10100101  2  20.010980.22260NAPANAPANAPA
0.039100.036010.033960.032920.031890.032920.033960.037040.042180.046300.049390.050420.050420.049390.04
8350.048350.048350.048350.047330.046300.047330.045270.043210.03806
  10100101  2  30.010960.19406NAPANAPANAPA
0.036970.034910.032860.031830.032860.032860.034910.039020.044150.048260.049290.050310.048260.048260.04
6210.046210.047230.047230.047230.048260.049290.047230.044150.03902
  10100101  2  40.010980.33476NAPANAPANAPA
0.036890.033810.033810.033810.033810.033810.036890.039960.044060.048170.049190.049190.049190.046110.04
5090.045090.049190.052270.050210.048170.046110.044060.040990.03689
  10100101  3  10.010980.24858NAPANAPANAPA
0.040010.037950.036920.036920.036920.036920.037950.041030.043090.045140.045140.046170.046170.045140.04
3090.042060.043090.044110.045140.048210.051290.049240.045140.04001
  10100101  3  20.010970.22260NAPANAPANAPA
0.040010.036920.034880.034880.033850.032830.032830.034880.038980.042060.046170.048210.049240.049240.04
8210.048210.047180.047180.047180.047180.049240.049240.046170.04206
  10100101  3  30.010950.19406NAPANAPANAPA
0.040010.037950.036920.036920.036920.036920.037950.041030.043090.045140.045140.046170.046170.045140.04
3090.042060.043090.044110.045140.048210.051290.049240.045140.04001
```

Figure 16b. Temporal Allocation Factor File Used When Processing Data for ISCST3 (taff_ISCfactors.txt)

File Name: scc2ams.txt

File Type: ASCII Text; Non-header data begins on line #2.

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	24	2	Spatial surrogate code; required for area and mobile source processing
Cat_name	C	28	70	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 17. SCC to AMS Cross-Reference File (scc2ams.txt)

File Name: sic2ams.txt

File Type: ASCII Text; Non-header data begins on line #2.

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

File Name: **mact2scc.txt**

File Type: ASCII Text; Non-header data begins on line #1.

Variables and Structure

Name	Type*	Column	Length	Decimals	Description
MACTCAT	C	1	7		MACT category code
MACTdesc	C	10	70		MACT category description (not used; for descriptive purposes)
SCC	C	83	8		SCC code (not used; for descriptive purposes)
SCCdesc	C	93	80		SCC description (not used; for descriptive purposes)
SCC_AMS	C	177	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 19. MACT Category to SCC or AMS Cross-Reference File (mact2scc.txt)

File Name: gfegas_bymactXX_YY

File Type: ASCII Text; Non-header data begins on line #3.

Variables and File Structure

Name	Type*	Column	Length	Decimals	Description
STATE	C	1	2		State FIPS code
COUNTY	C	4	3		County FIPS code
MACT	C	8	7		MACT category code
GF	N	16	9	4	Growth factor
*C = character, N = numeric.					

Sample of File Contents

```
Growth Factor by State, County, and MACT for 2007
State (2) 1x County (3) 1x MACT (7) 1x GF2007(9.4)
00 000 0201       0.8900
00 000 0302       0.6382
00 000 0303       0.6382
00 000 0409       1.0000
00 000 0412       1.0000
00 000 0414       1.0000
00 000 0415       1.0000
00 000 0705       1.0000
00 000 0802       1.0000
00 000 1609       1.0564
00 000 1631       1.0900
00 000 1704       1.0564
00 000 1801       1.0000
00 000 1802       1.0000
01 000 0101       0.5897
01 000 0202       1.2857
01 000 0203       1.1493
01 000 0204       1.1493
01 000 0205       1.2373
01 000 0207       1.1493
01 000 0208       1.2857
01 000 0304       1.2901
01 000 0305       1.2901
01 000 0308       1.0085
01 000 0309       1.0085
01 000 0310       1.2901
01 000 0401       1.2500
01 000 0402       1.6600
01 000 0403       0.9722
01 000 0406       1.1873
01 000 0407       1.1873
01 000 0408       1.2671
```

Figure 20a. MACT-based Growth Factor File to Grow from Year XX to Year YY (gfegas_bymactXX_YY.txt)

File Name: gfegas_bysicXX_YY

File Type: ASCII Text; Non-header data begins on line #3.

Variables and File Structure

Name	Type*	Column	Length	Decimals	Description
STATE	C	1	2		State FIPS code
COUNTY	C	4	3		County FIPS code
SIC	C	8	4		SIC code
GF	N	13	9	4	Growth factor
*C = character, N = numeric.					

Sample of File Contents

```
Growth Factor by State, County, and SIC for 2007
State (2) 1x County (3) 1x SIC (4) 1x GF2007(9.4)
00 000 88       1.0000
00 000 GEOP     1.0982
00 000 ZERO     1.0000
01 000 01       1.2110
01 000 02       1.2110
01 000 07       1.0177
01 000 08       1.1992
01 000 09       1.1992
01 000 10       1.2500
01 000 12       1.1170
01 000 13       1.2384
01 000 14       1.1070
01 000 15       1.0271
01 000 16       1.0271
01 000 17       1.0271
01 000 20       1.3472
01 000 21       0.9359
01 000 22       1.2664
01 000 23       1.1302
01 000 24       1.4240
01 000 25       1.4993
01 000 26       1.3643
01 000 27       1.0271
01 000 28       1.2586
01 000 29       1.1402
01 000 30       1.1919
01 000 31       1.2609
01 000 32       1.2366
01 000 33       1.2901
01 000 34       1.2936
01 000 35       0.5897
01 000 36       0.7049
```

Figure 20b. SIC-based Growth Factor File to Grow from Year XX to Year YY (gfegas_bysicXX_YY.txt)

File Name: ptscc2sic.txt

File Type: ASCII Text; Non-header data begins on line #1.

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

File Name: MACT_gen.txt

File Type: ASCII Text; Non-header data begins on line #2.

Variables and File Structure

Name	Type*	Column	Length	Dec-imals	Description
MACTcode	C	1	7		MACT category code, right justified
MACTXeff	N	9	6	2	Control efficiency to be applied to existing emission sources
MACTNeff	N	16	6	2	Control efficiency to be applied to new emission sources
MACTrate	N	23	6	2	Percentage of future emission attributed to new sources
Cdate	D	30	4		Expected deadline for affected emission sources to comply with standards; reductions are prorated when cdate falls during the projected year
Apply	C	41	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	43	1		Source control flag: set to M to apply controls only to major sources, set to B to apply controls to both major and area sources
MACT name	C	45	39		MACT category name (for descriptive purposes, not read by PtGrowCntl)
*C = character, N = numeric, D = date in DD/MM/YYYY format.					

Sample of File Contents

```
MACT    MCTXEf MCTNEf MCTrte Compl-date Apply? MACT_src MACTname
0101      0.00   0.00   0.00 05/31/2005 1 M Engine Test Facilities

0105     25.50  25.50   0.00 02/28/2007 1 M Stationary Reciprocating Internal
Combu
0107     61.02  61.02   0.00 02/28/2007 1 M Industrial/Commercial/ Institutional
Bo
0108      7.20   7.20   0.00 08/30/2006 1 M Stationary Combustion Turbines
```

Figure 22a. General MACT Reduction Information File (MACT_gen.txt)

File Name: **MACT_spec.txt**

File Type: ASCII Text; Non-header data begins on line #2.

Variables and File Structure

Name	Type*	Column	Length	Decimals	Description
MACTcode	C	1	7		MACT category code
NTI_HAP	C	9	3		HAP identification code
SAROAD	C	13	5		Not currently used: Pollutant code assigned by PtModelProc
SCC8	C	20	8		8-digit SCC
SCC6	C	29	6		6-digit SCC
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 emission sources
SnewRate	N	51	6	2	Percentage of future emissions attributed to new sources
Apply	C	58	1		Application control flag: set to 1 if controls are to be applied, set to 0 not to apply controls
SApp_Src	C	60	1		Source control flag: set to M to apply controls only to major sources, set to B to apply controls to both major and area sources
PollName	C	62	30		Pollutant name (for descriptive purposes, not read by PtGrowCntl)
ProcName	C	93	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.					

Sample of File Contents

```
MACT    NTI_HAP SAROAD SCC8 SCC6    EffXsp EffNsp SnewRate Apply? MACT_src
0105    37                           26.83  26.83   0.00 1 M
0105    41                           23.95  23.95   0.00 1 M
0105    107                          25.46  25.46   0.00 1 M
0105    128                          26.36  26.36   0.00 1 M
```

Figure 22b. Specific MACT Reduction Information File (MACT_spec.txt)

File Name: **User_Control.txt**

File Type: ASCII Text; Non-header data begins on line #2.

Variables and File Structure

Name	Type*	Column	Length	Dec-imals	Description
ACT_ID	C	1	25		Facility-level activity identification code
MACTcode	C	27	7		MACT category code
SCC	C	35	8		SCC code
SIC	C	44	4		SIC code
NTI_HAP	C	49	3		HAP identification code
SAROAD	C	53	5		Not currently used; Pollutant code assigned by PtModelProc
E_Eff	N	59	6	2	Control efficiency to be applied to existing emission sources
N_Eff	N	66	6	2	Control efficiency to be applied to new, modified, or reconstructed emission sources
N_Rate	N	73	6	2	Percentage of future emissions attributed to new sources
Apply	C	80	1		Application control flag: set to 1 if controls are to be applied, set to 0 not to apply controls
U_Src	C	82	1		Source type: set to M for major sources, A for area source, and B for both types of sources
CntyCode	C	84	4		County code: used to apply reduction information to specific counties
U_Replace	C	89	1		Replacement code: set to R to replace MACT-based controls, set to A to add to MACT-based controls
*C = character, N = numeric.					

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

Figure 23. User-defined Reduction Information File (User_Controls.txt)

File Name: **popflg96.txt**

File Type: ASCII Text; Non-header data begins on line #3.

Variables and Structure

Name	Type*	Column	Length	Description
STCOUNTY	C	4	5	State/county FIPS code
CNTYNAME	C	13	42	County name (not used; for descriptive purposes only)
POPFLG96	C	56	2	Urban/Rural flag
CNTYCODE	C	59	5	County Code
STABBR	C	71	2	2-character state abbreviation
*C=character				

Sample of File Contents

```
STCTY    CNTYNAME                          POPFLG96 CntyCode STABBR
02068    Denali Borough                       R       R       AK
02232    Skagway-Hoonah-Angoon Census Area    R       R       AK
02282    Yakutat Borough                      R       R       AK
01007    Bibb                                 R       R       AL
01011    Bullock                              R       R       AL
01013    Butler                               R       R       AL
01019    Cherokee                             R       R       AL
01021    Chilton                              R       R       AL
01023    Choctaw                              R       R       AL
01025    Clarke                               R       R       AL
01027    Clay                                 R       R       AL
01029    Cleburne                             R       R       AL
01035    Conecuh                              R       R       AL
01037    Coosa                                R       R       AL
01039    Covington                            R       R       AL
01041    Crenshaw                             R       R       AL
01043    Cullman                              R       R       AL
01049    DeKalb                               R       R       AL
01053    Escambia                             R       R       AL
01057    Fayette                              R       R       AL
01059    Franklin                             R       R       AL
01061    Geneva                               R       R       AL
01063    Greene                               R       R       AL
01065    Hale                                 R       R       AL
01067    Henry                                R       R       AL
01071    Jackson                              R       R       AL
01075    Lamar                                R       R       AL
01079    Lawrence                             R       R       AL

01087    Macon                                R       R       AL
01091    Marengo                              R       R       AL
01093    Marion                               R       R       AL
```

Figure 24. County-level Urban/Rural Designations and County Code Assignment File (popflg96.txt)

File Name: **MACT_grp.txt**

File Type: ASCII Text; Non-header data begins on line #1.

Variables and File Structure

Name	Type*	Column	Length	Description
MACTcode	C	1	7	MACT category code
MACT_grp	C	9	1	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 25. Source Group Assignment by MACT Category File (MACT_grp.txt)

File Name: **SCC6_grp.txt**

File Type: ASCII Text; Non-header data begins on line #1.

Variables and File Structure

Name	Type*	Column	Length	Description
SCC	C	1	6	6-digit SCC code
ADD_grp	C	10	1	Source group
SCCrank	N	12	2	Hierarchy rank of 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 26. Source Group Assignment by SCC Code File (SCC6_grp.txt)

File Name: **SIC_grp.txt**

File Type: ASCII Text; Non-header data begins on line #1.

Variables and File Structure

Name	Type*	Column	Length	Description
SIC	C	1	4	SIC code
ADD_grp	C	8	1	Source group
SCCrank	N	10	2	Hierarchy rank of 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 27. Source Group Assignment by SIC Code File (SIC_grp.txt)

File Name: indecay.txt

File Type: ASCII Text; Non-header data begins on line #1.

Variables and Structure

Name	Type*	Column	Length/ format	Description
Reactivity class	N	1	1	Ranges from 1 to 9
Time block	N	3	1	Ranges from 1 to 8
Decay coefficients	C	5	60	Coefficients for stability classes A through F.
*C=character, N=numeric				

Sample File Contents

```
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 2.540E-04 5.010E-04 5.010E-04
7 3 9.000E-05 6.040E-05 3.080E-05 5.610E-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 6.340E-04 8.140E-06 8.140E-06
7 7 3.950E-05 3.950E-05 3.950E-05 2.540E-04 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
8 8 1.230E-05 1.230E-05 1.230E-05 1.230E-05 1.230E-05 1.230E-05
9 1 4.940E-07 4.940E-07 4.940E-07 4.940E-07 4.940E-07 4.940E-07
9 2 4.940E-07 4.940E-07 4.940E-07 4.940E-07 4.940E-07 4.940E-07
9 3 5.900E-06 3.950E-06 1.980E-06 9.850E-07 4.940E-07 4.940E-07
```

Figure 28. Decay Rate File (indecay.txt)

File Name: defpart.txt

File Type: ASCII Text; Non-header data begins on line #2.

Variables and File Structure

Input data is separated by a minimum of one blank; column positions and length are variable and are determined when file is read.

Name	Type*	Description
SAROAD	C	SAROAD code
NUMCAT	N	Number of particle size categories
PDIA1 - PDIA(NUMCAT)	N	Particle size distribution parameter: diameter (microns)
PFRA1 - PFRA(NUMCAT)	N	Particle size distribution parameter: mass fraction
PDEN1 -PDEN(NUMCAT)	N	Particle size distribution parameter: density (grams/cm^3)
PLIQ1 - PLIQ(NUMCAT)	N	Particle size distribution parameter: liquid scavenging coefficient (1/(sec-mm/hr))
PICE1 - PICE(NUMCAT)	N	Particle size distribution parameter: ice scavenging coefficient (1/(sec-mm/hr))
*C = character, N = numeric.		

Sample File Contents

```
SAROAD, # of sizes, list of size distributions, list of mass fractions, list of
densities, liq scaven, ice scaven
80124 1 1.575 1.0 1.0 0.000013
80141 1 1.575 1.0 1.0 0.000013
80193 1 1.575 1.0 1.0 0.000013
80324 1 6.925 1.0 1.0 0.000052
80341 1 6.925 1.0 1.0 0.000052
80393 1 6.925 1.0 1.0 0.000052
80400 1 1.575 1.0 1.0 0.000013
80401 1 6.925 1.0 1.0 0.000052
```

Figure 29. Particle Size Distribution File by SAROAD Code (defpart.txt)

***File Name*: sccpart.txt**

File Type: ASCII Text; Non-header data begins on line #1.

Variables and File Structure

Input data is separated by a minimum of one blank; column positions and length are variable and are determined when file is read.

Name	Type*	Description
SAROAD	C	SAROAD code
SCC	C	SCC code
NUMCAT	N	Number of particle size categories
PDIA1 - PDIA10	N	Particle size distribution parameter: diameter (microns)
PFRA1 - PFRA10	N	Particle size distribution parameter: mass fraction
PDEN1 -PDEN10	N	Particle size distribution parameter: density (grams/cm^3)
PLIQ1 - PLIQ10	N	Particle size distribution parameter: liquid scavenging coefficient (1/(sec-mm/hr))
PICE1 - PICE10	N	Particle size distribution parameter: ice scavenging coefficient (1/(sec-mm/hr))
*C = character, N = numeric.		

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

Figure 30. Particle Size Distribution File by SAROAD Code and SCC (sccpart.txt)

File Name: defgas.txt

File Type: ASCII Text; Non-header data begins on line #2.

Variables and File Structure

Input data is separated by a minimum of one blank; column positions and length are variable and are determined when file is read.

Name	Type*	Description
SAROAD	C	SAROAD code
DIFF	N	Gas deposition parameter: molecular diffusivity (cm^2/sec)
ALPHA	N	Gas deposition parameter: solubility enhancement factor
RX	N	Gas deposition parameter: reactivity parameter
RSUBM	N	Gas deposition parameter: mesophyll resistence term (sec/cm)
HENRY	N	Gas deposition parameter: Henry's Law coefficient
LIQSCAV	N	Gas deposition parameter: liquid scavenging coefficient (1/(sec-mm/hr))
*C = character, N = numeric.		

Sample File Contents

```
SAROAD, diffusivity, alphas, reactivity, mesophyll resistance, Henry's Law coeff,
liquid scavenging.
43218 0.1013  1.0 10.0 6.0882e5  8.4975
43502 0.1720  1.0 10.0 9.4118e-1 1.3136e-5
43505 0.1094  1.0 10.0 2.8941e3  4.0394e-2
43817 0.07492 1.0 10.0 7.8529e4  1.0961
43860 0.1099  1.0 10.0 2.3588e5  3.2923
45201 0.08962 1.0 10.0 1.6382e4  2.2865e-1
```

Figure 31. Gas Deposition Parameter File by SAROAD Code(defgas.txt)

***File Name*: hstn-elev.txt**

File Type: ASCII Text; Non-header data begins on line #2.

Variables and File Structure

Name	Type*	Column	Length	Decimal	Description
COL	N	1	3		Model domain grid cell column number
ROW	N	4	3		Model domain grid cell row number
ELEV	N	7	4		Elevation (meters)
*C = character, N = numeric.					

Sample of File Contents

```
col(3), row(3), elevation(4)           June 20, 2000
  1  1  80
  1  2  81
  1  3  76
  1  4  82
  1  5  79
  1  6  85
  1  7  82
  1  8  88
  1  9  93
  1 10  95
  1 11  89
  1 12  92
  1 13  93
  1 14  95
  1 15  97
  1 16  98
  1 17  98
  1 18 105
  1 19 106
  1 20 110
  1 21 112
  1 22 114
  1 23 115
  1 24 114
  1 25 115
  1 26 113
  1 27 115
```

Figure 32. Terrain Elevation File by Grid Cell (hstn-elev.txt)

File Name: **surrxref.txt**

File Type: ASCII Text; Non-header data begins on line #3.

Variables and Structure

Name	Type*	Column	Length	Description
AMS	C	1	10	AMS code
S_sur	N	14	2	Numeric code representing the spatial surrogate that should be used
Desc	C	18	200	Description of the AMS category
*C=character, N=numeric				

Sample record

```
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 33. Spatial Surrogate Assignment File (surrxref.txt)

File Name: **mact2ams.txt**

File Type: ASCII Text; Non-header data begins on line #2.

Variables and File Structure

Name	Type*	Column	Length	Decimals	Description
MACT	C	1	7		MACT category code
AMS	C	9	10		AMS code or point source SIC code that gives the best fit to temporal allocation data
Surr	N	20	2		Spatial surrogate for spatial allocation
Descript	C	23	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 34. MACT Category to AMS or SCC Code Cross-Reference File (mact2ams.txt)

File Names: **SAFE# (where # is a one or 2-digit number representing the code for the spatial surrogate)**

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_l	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
SAF# (where # = 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

```
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 35. Spatial Allocation Factor to Census Tract File (SAFE#)

File Names: **HSAF# (where # is a one or 2-digit number representing the code for the spatial surrogate)**

File Type: SAS®

Variables and Structure

Name	Type*	Description
FIPS	N	State and county FIPS code
Col	N	Modeling domain grid column number
Row	N	Modeling domain grid row number
HSAFn	N	Spatial allocation factor, defined as the fraction of county level activity that is assigned to each grid cell in the specified county
Ncells	N	number of grid cells in that county in the domain. Not used by EMS-HAP
Uflag_l	A1	Not used by EMS-HAP
*Ax=character string of length x, N=numeric		

Sample record

```
48167         103      1              .     647   1
48167         103      2  0.0006537249      647   1
48201          21     81  0.0000552426     4866   1
```

Figure 36. Spatial Allocation Factor to Grid Cell File (HSAF#)

File Name: **am_grp.txt**

File Type: ASCII Text; Non-header data begins on line #8.

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	N	96	2		Source Group to be used for urban sources
Bin_R	N	99	2		Source Group to be used for rural sources
*C = character, N = numeric.					

Sample of File Contents

```
Acrylic Fibers/Modacrylic Fiber Production              9001 01 01
Adhesives and Sealants                                 9002 01 01
Aerospace Industries                                   9003 01 01
Agricultural Chemicals and Pesticides                  9004 01 01
Agricultural Production                                9005 01 01
Air and Gas Compressors                                9006 01 01
Air and Water Resource and Solid Waste Management      9007 01 01
Alkalies And Chlorine                                  9008 01 01
Aluminum Die-Castings                                  9009 01 01
Aluminum Extruded Products                             9010 01 01
Aluminum Foundries                                     9011 01 01
Aluminum Foundries (Castings)                          9012 01 01
Aluminum Rolling and Drawing, nec                      9013 01 01
Aluminum Sheet, Plate, and Foil manufacturing          9014 01 01
Amino and Phenolic Resins Production                   9015 01 01
Ammunition, Except for Small Arms                      9016 01 01
Analytical Instruments                                 9017 01 01
Animal And Marine Fats And Oils                        9018 01 01
Animal Cremation                                       9019 01 01
Apparel and Accessories, nec                           9020 01 01
Architectural Metal Work                               9021 01 01
Asbestos Products Manufacturing                        9022 01 01
Asphalt Concrete Manufacturing                         9023 01 01
Asphalt Paving: Cutback Asphalt                        9024 01 01
Asphalt Paving: Cutback and Emulsified                 9025 01 01
```

Figure 37. Area and Mobile Source Group and Category Code Assignment File (am_grp.txt)

File Name: **area_sic.txt**

File Type: ASCII Text; Non-header data begins on line #3.

Variables and File Structure

Name	Type*	Column	Length	Decimals	Description
SrceCatName	C	1	90		Category description
SIC	C	91	4		SIC code
SICdesc	C	95	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

Aviation Gasoline Distribution:  Stage I & II                   45   Air transportation

Boat Manufacturing                                              37   Boat building and repairing
```

Figure 38. Non-point source Category to SIC Cross-Reference File (area_sic.txt)

File Name: **area_cntl.txt**

File Type: ASCII Text; Non-header data begins on line #2.

Variables and File Structure

Name	Type*	Column	Length	Decimals	Description
Cat_Name	C	1	90		Category description
MACT	C	92	7		MACT category code
NTI_HAP	C	100	3		HAP identification code
E_eff	N	104	6	2	Control efficiency to be applied to existing emission sources
N_eff	N	111	6	2	Control efficiency to be applied to new, modified, or reconstructed emission sources
N_rate	N	118	6	2	Percentage of future emissions attributed to new sources
CntyCode	C	125	5		County code: used to apply reduction information to specific counties
R_code	C	131	1		Replacement code: set to R to replace MACT-based controls, set to A to add to MACT-based controls
Apply	C	133	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 39. Non-point and Mobile Source Reduction Information File (area_cntl.txt)

APPENDIX B
EMS-HAP Sample Batch Files

Table Of Contents

```
# AirportProc program of EMSHAP when processing data for ASPEN

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

# Provide the model for which this data is being processed (ASPEN or ISCST3)
setenv MODEL ASPEN


# 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 for Processing Data for ASPEN

```
# AirportProc program of EMSHAP when processing data for ISCST3
# For this run, we do not concatenate the point source data set with the allocated aircraft emissions

# Provide the model for which this data is being processed (ASPEN or ISCST3)
setenv MODEL ISC

# 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

# Airport parameters file for modeling as ISC area sources
setenv ISCAREA ISC_airport_parameters

# Define default ISCST3 Airport release parameters for airports not in ISCAREA

# Length (meters) of X side of rectangle for ISCST3 area sources
setenv DEFXLEN 1000
# Length (meters) of Y side of rectangle for ISCST3 area sources
setenv DEFYLEN 1000
# Orientation angle (degrees from north) of rectangle for ISCST3 area sources
setenv DEFANGLE 0
# Release Height (meters) above ground for ISCST3 area sources
setenv DEFRELHT 2
# Initial vertical dimension (meters) of plume for ISCST3 area sources
setenv DEFINPLM 0
```

Figure 2. Sample of AirportProc Batch File for Processing Data for ISCST3

```
# 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 2. Sample of AirportProc Batch File for Processing Data for ISCST3 (continued)

```
# Point Source Processing: The Data Quality Assurance Program (PtDataProc) for ASPEN data processing

#Provide the model for which this data is being processed (ASPEN or ISC)
setenv MODEL ASPEN

# 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 include program to determine a valid FIPS, the lat/lon from UTM, and FIPS from lat/lon (validFIP, #
        ll2utm, and latlon2FIPS)
setenv INC_DIR /data/work14/ecr/EMSHAP/point/Programs/

#   path for ancillary files used by the include 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 3. Sample of PtDataProc Batch File for Processing Data for ASPEN

```
#     If defaulting locations, 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 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

#         Stack Velocity range
setenv DLOWVEL 0.003
setenv DHIVEL 198

#         Stack Temperature Range
setenv DLOWTEMP 273
setenv DHITEMP 1505
```

Figure 3. Sample of PtDataProc Batch File for Processing Data for ASPEN (continued)

```
#     Stack Diameter range
setenv DLOWDIA 0.0762
setenv DHIDIA 15.24

#     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 emssions

#     To select variables: set value of DoSetVar to 1 for yes(or true) and 0 for no (or false)
setenv DOSETVAR 1

#     To select variables in addition to the required variables: set value of
#     UseList to 1 for yes(or true) and 0 for no (or false) and provide the name of the file
setenv USELIST 1
setenv VARLIST varlist_061801


#     To window by zero emissions and valid locations: set value of DoWindow to 1 for yes(or true)
#     and 0 for no (or false)
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.
setenv NOLOCATE nolatlon
setenv ZEROEMIS zeroemis

cp /vail2aspen/dyntel/EMSHAP/PROGRAMS/PtDataProc_JUN19.sas PtDataProc_JUL17.sas

sas PtDataProc_JUL17 -work /data/work14/dyntel/POINT96/
```

Figure 3. Sample of PtDataProc Batch File for Processing Data for ASPEN (continued)

```
# Point Source Processing: The Data Quality Assurance Program (PtDataProc) for ISCST3 data processing
# Defaults locations and stack parameters; windows file

#Provide the model for which this data is being processed (ASPEN or ISC)
setenv MODEL ISC

# 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 text files
setenv REFTEXT /data/work14/ecr/EMSHAP/reffiles/

#   path for include program to determine the UTM from lat/lon and visa versa (ll2utm and utm2ll)
setenv INC_DIR /data/work14/ecr/EMSHAP/point/Programs/

#   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

# UTM zone of ISCST3 model domain
setenv REF_ZONE 11
```

Figure 4. Sample of PtDataProc Batch File for Processing Data for ISCST3

```
#   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

         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
```

Figure 4. Sample of PtDataProc Batch File for Processing Data for ISCST3 (continued)

```
#   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 4. Sample of PtDataProc Batch File for Processing Data for ISCST3 (continued)

```
# Point Source Processing - The Model Specific Program (PtModelProc) for processing data for ASPEN

# Provide the model for which this data is being processed (ASPEN or ISC)
setenv MODEL ASPEN

# 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

cp -p PtModelProc.sas PtModelProc_011300.sas
sas PtModelProc_011300.sas -work /data/work15/dyl/
```

Figure 5. Sample of PtModelProc Batch File for Processing Data for ASPEN

```
# Point Source Processing - The Model Specific Program (PtModelProc) for processing data for ISCST3

# Provide the model for which this data is being processed (ASPEN or ISC)
setenv MODEL ISC

# 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 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 PtISC

#   Provide name of the HAP TABLE text files
# These files contain the correspondence 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


cp -p PtModelProc.sas PtModelProc_011300.sas
sas PtModelProc_011300.sas -work /data/work15/dyl/
```

Figure 6. Sample of PtModelProc Batch File for Processing Data for ISCST3

```
# Point Source Processing - The Temporal Allocation Progam (PtTemporal) for processing data for ASPEN

# Provide the model for which this data is being processed (ASPEN or ISC)
setenv MODEL ASPEN

# 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


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

Figure 7. Sample of PtTemporal Batch File for Processing Data for ASPEN

```
# Point Source Processing - The Temporal Allocation Progam (PtTemporal) for processing data for ISCST3

# Provide the model for which this data is being processed (ASPEN or ISC)
setenv MODEL ISC

# 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 PtISC

#   output SAS® data set name
setenv OUTSAS Temporal

# Provide name of Temporal Allocation File (TAF)
setenv TAF taff-ISCfactors062001

# 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


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

Figure 8. Sample of PtTemporal Batch File for Processing Data for ISCST3

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

# Model for which EMS-HAP is being run: ASPEN or ISC
setenv MODEL ASPEN

#Provide directory paths:

# path for the SAS input datasets
setenv IN_DATA /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/PTGROW/

# path for the SAS output datasets
setenv OUTDATA /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/PTGROW/

# path for the SAS reference datasets
setenv REFSAS /vail2aspen/dyntel/EMSHAP/ANCILLARY/

# path for the reference text files
setenv REFTEXT /vail2aspen/dyntel/EMSHAP/ANCILLARY/

#Provide input and output SAS data set names:

# input SAS data set name
setenv INSAS txbenz_gcinp

# output SAS data set name
setenv OUTSAS ptgrow_asp

########################################## BEGIN G&C
# GROWth option FLAG (MACT, USER, or BOTH)
#    MACT - apply MACT controls only
#    SIC  - apply SIC controls only
#    BOTH - apply both MACT and SIC controls
#    NONE - Do Not apply Growth
setenv GROWFLAG BOTH

# Growth factor file by State/MACT
setenv GFMACT  gfegas_bymact96_07

# Growth option flag (0 no assignment of alternate SIC, 1 assign alternate SIC)
setenv SICFLAG  1

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

# Growth factor file by State/SIC
setenv GFSIC  gfegas_bysic96_07
```

Figure 9. Sample of PtGrowCntl Batch File for Processing Data for ASPEN

```
############### BEGIN CONTROL ######################################
# Control option flag (MACT, USER, or BOTH)
#    MACT - apply MACT controls only
#    USER - apply user-defined controls only
#    BOTH - apply both MACT and user-defined controls
#    NONE - Do Not Controls
setenv CNTLFLAG BOTH

#   If CNTLFLAG IS MACT or BOTH
# The general MACT controls specification file
setenv MACTGEN  MACT_gen_062501

# Growth and control options (0 no MACT specific file, 1 use MACT specific file)
setenv SPECMACT 1

# The pollutant specific MACT controls specification file
setenv SPECFILE MACT_spec_062501

#   If CNTLFLAG IS USER or BOTH
# The user-defined controls specification file
setenv USERFILE  user_controls_050401

# Provide name of county code assignment file in order to assign controls by county
setenv CNTYUR   popflg96_010501

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

# Choose whether to apply reductions based on FISCAL (Oct 1 to Sept 30) or CALENDAR (Jan 1 to Dec 31)
setenv YEARTYPE calendar


cp -p /vail2aspen/dyntel/EMSHAP/PROGRAMS/PtGrowCntl_AUG31.sas PtGrowCntl_AUG31.sas
sas PtGrowCntl_AUG31.sas -work /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/PTGROW/tmp/
```

Figure 9. Sample of PtGrowCntl Batch File for Processing Data for ASPEN (continued)

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

# Model for which EMS-HAP is being run: ASPEN or ISC
setenv MODEL ISC

#Provide directory paths:

# path for the SAS input datasets
setenv IN_DATA /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/PTGROW/ISC/

# path for the SAS output datasets
setenv OUTDATA /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/PTGROW/ISC/

# path for the SAS reference datasets
setenv REFSAS /vail2aspen/dyntel/EMSHAP/ANCILLARY/

# path for the reference text files
setenv REFTEXT /vail2aspen/dyntel/EMSHAP/ANCILLARY/

#Provide input and output SAS data set names:

# input SAS data set name
setenv INSAS txbenz_gcinp

# input SAS data set name
setenv OUTSAS ptgrow_isc

########################################## BEGIN G&C
# GROWth option FLAG (MACT, USER, or BOTH)
#    MACT - apply MACT controls only
#    SIC  - apply SIC controls only
#    BOTH - apply both MACT and SIC controls
#    NONE - Do Not apply Growth
setenv GROWFLAG BOTH

# Growth factor file by State/MACT
setenv GFMACT  gfegas_bymact96_07

# Growth option flag (0 no assignment of alternate SIC, 1 assign alternate SIC)
setenv SICFLAG  1

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

# Growth factor file by State/SIC
setenv GFSIC  gfegas_bysic96_07
```

Figure 10. Sample of PtGrowCntl Batch File for Processing Data for ISCST3

```
############### BEGIN CONTROL ######################################
# Control option flag (MACT, USER, or BOTH)
#    MACT - apply MACT controls only
#    USER - apply user-defined controls only
#    BOTH - apply both MACT and user-defined controls
#    NONE - Do Not Controls
setenv CNTLFLAG BOTH

#   If CNTLFLAG IS MACT or BOTH
# The general MACT controls specification file
setenv MACTGEN  MACT_gen_062501

# Growth and control options (0 no MACT specific file, 1 use MACT specific file)
setenv SPECMACT 1

# The pollutant specific MACT controls specification file
setenv SPECFILE MACT_spec_062501

#   If CNTLFLAG IS USER or BOTH
# The user-defined controls specification file
setenv USERFILE  user_controls_050401

# Provide name of county code assignment file in order to assign controls by county
setenv CNTYUR   popflg96_010501

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

# Choose whether to apply reductions based on FISCAL (Oct 1 to Sept 30) or CALENDAR (Jan 1 to Dec 31)
setenv YEARTYPE calendar


cp -p /vail2aspen/dyntel/EMSHAP/PROGRAMS/PtGrowCntl_AUG31.sas PtGrowCntl_AUG31.sas
sas PtGrowCntl_AUG31.sas -work /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/PTGROW/ISC/tmp/
```

Figure 10. Sample of PtGrowCntl Batch File for Processing Data for ISCST3 (continued)

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

# Provide the model for which this data is being processed (most be set to ASPEN)
setenv MODEL ASPEN

# 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
```

Figure 11. Sample of PtFinal_ASPEN Batch File for Processing Data for ASPEN

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

#      If using SCCs, provide the name of the text file containing the group assignments
setenv SCCGRP SCC6_grp

#   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, extension must be .txt
setenv DECAY indecay

# Provide a file identifier to be included in the name of the ASPEN-formatted text files and ASPEN file header
# Limit of 10 characters is recommended. Additional characters will be truncated from file header, not 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
# 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/PtFinal_ASPEN.sas PtFinal_ASPEN_062000.sas
sas PtFinal_ASPEN_062000.sas  -work  /data/work15/dyl/
```

Figure 11. Sample of PtFinal_ASPEN Batch File for Processing Data for ASPEN (continued)

```
#Point Source Processing - Final Format - For ISCST3 data Processing
#      Assigns source groups for ISCST3
#      Produces ISCST3 - formatted text files

# Provide the model for which the data is being processed (must be ISC)
setenv MODEL ISC

# Provide 1-character model-run identifier.  This ensures that ISCST3
# contains unique source ID's when all EMS-HAP output are fed into it.
setenv RUN_ID A

# Provide directory paths:

#   path for the SAS input dataset
setenv IN_DATA /vail2aspen/dyntel/EMSHAP/ISC/point/

#   path for the SAS output dataset
setenv OUTDATA /vail2aspen/dyntel/EMSHAP/ISC/point/ISCemis/

#   path for the reference text files
setenv REFFILES /vail2aspen/dyntel/EMSHAP/ANCILLARY/

#   path for the output files for input into ASPEN or ISC
setenv OUTFILES /vail2aspen/dyntel/EMSHAP/ISC/point/ISCemis/

# Provide input and output SAS data set names

#   input SAS data set name
setenv INSAS temporal

#   output SAS dataset name
setenv OUTSAS iscpoint

# Select the procedure to be used to assign source groups
# Set value to 1 for yes (or true) and 0 for no (or false)

#   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
```

Figure 12. Sample of PtFinal_ISCST3 Batch File for Processing Data for ISCST3

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

#      If using SCCs, provide the name of the text file containing the group assignments
setenv SCCGRP SCC6_grp

#   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 00 and 99) for those source
#     not assignment by your selected procedure
setenv DFLTGRP 01

# Provide ancillary file that contains default particle distributions:
# SAROAD, # of sizes, list of size distributions, list of mass fractions, list of densities, and liquid scaveng.
setenv DEFPART defpart

# SCC-specific particle distribution file -put "NONE" if it doesn't exist
setenv SCCPART NONE

# Set to yes to call the macro that writes the gas deposition include files
setenv GASDEPO YES

# Provide ancillary file that contains default gas deposition parameters:
# SAROAD, diffusivity, alphas, Reac, Rsubm, Henry's coefficient
setenv DEFGAS defgas

# Set to yes(1) if you want to use scavenging coefficients that may be included in DEFPART and DEFGAS files
setenv SCAVENG 1

# gridcell elevation data
setenv ELEVDAT hstn-elev

# default elevation in meters (used only if ELEVDAT does not exist)
setenv DEFELEV 100

# Set to yes to call the macro that writes the building dimension include files
setenv USEBLDG YES
```

Figure 12. Sample of PtFinal_ISCST3 Batch File for Processing Data for ISCST3 (continued)

```
# Provide Southwest corner UTM coordinates (X_ORIG,YORIG) and number of 1x1 km columns and rows
setenv X_ORIG 214000
setenv Y_ORIG 3250000
setenv CELLSIZE 1000
setenv MAXCOL 106
setenv MAXROW 92

# Part of run-stream for ISC input
setenv OUTNAME ISC

#  Write particle distrubution include files: 1 = particle data by source,
#  2 = particle data by pollutant
setenv PARTMETH 2

cp -p /vail2aspen/dyntel/EMSHAP/PROGRAMS/PtFinal_ISCST3_SEP05.sas PtFinal_ISCST3_SEP18.sas

sas PtFinal_ISCST3_SEP18.sas -work /vail2aspen/dyntel/EMSHAP/ISC/point/
```

Figure 12. Sample of PtFinal_ISCST3 Batch File for Processing Data for ISCST3 (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 13. 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 14. Sample of MobilePrep Batch File

```
# AMProc batch file -Growth and Control

#Provide model for which the data is being processed (ASPEN or ISC)
setenv MODEL  ASPEN

# AMProc RUN IDENTIFICATION INFORMATION.  Run identification for titles
setenv RUNID  'New 1996 NTI Benz AREA G and C Test'

# Description of emissions file
setenv EMISLABL 'New 1996 AREA Benz G and C (SEP 2001)'

# Date identifying this run
setenv RUNDATE  090401

# Emissions type (AR for non-point, MV for mobile)
setenv EMISTYPE AR

# Label for output files
setenv USRLABEL test_aspenGCbenz

# FILE DIRECTORIES
# Ancillary files directory
setenv INPFILES  /vail2aspen/dyntel/EMSHAP/ANCILLARY/

# Input emissions file directory
setenv INPEMISS  /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/AMPROC/

# Output files directory
setenv OUTFILES  /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/AMPROC/ASPENemis/

# INPUT FILES
# Input emissions file name prefix
setenv EMISFILE areaprepbenzTX_test
############################### has different spatsurr than ISC input

# SAF file name prefix
setenv SAFFILE  SAFe

# Default SAF
setenv DEFLTSAF 20

# TAF file name prefix
setenv TAFFILE  taff_hourly

# Decay rates file name prefix
setenv INDECAY  indecay

# Pollutant xref file name prefix
setenv HAPTABLE haptabl_point_area_073101
```

Figure 15. Sample of AMProc Batch File for Processing Data for ASPEN

```
# Spatial surrogate xref file name prefix
setenv SURRXREF surrxref

# Emissions bins file name prefix    nata_am_bins531
setenv EMISBINS  am_grp_060601

# County urban/rural flag xref file name prefix
setenv CNTYUR   popflg96_010501

########################################### BEGIN G&C
# GROWTH and CONTROL
#   option 0 - do not run growth and control
#   option 1 - run growth and control in addition to all other fucntions
#   option 2 - run only growth and control, input data file must be temporally and spatially allocated
setenv GCFLAG  1

# GROWTH option flag (MACT, USER, or BOTH)
#    MACT - apply MACT growth factors
#    SIC  - apply SIC growth factors
#    BOTH - apply both MACT and SIC growth factors
#    NONE - apply no growth factors
setenv GROWFLAG BOTH

# Growth factor file by State/MACT
setenv GFMACT  gfegas_bymact96_07

# Growth option flag (0 no assignment of alternate SIC, 1 assign alternate SIC)
setenv SICFLAG  1

# Source category name to SIC cross reference file
setenv SICXREF  area_sic_060601

# Growth factor file by State/SIC
setenv GFSIC  gfegas_bysic96_07

############### BEGIN CONTROL ######################################
# Control option flag (MACT, USER, or BOTH)
#    MACT - apply MACT controls only
#    USER - apply user-defined controls only
#    BOTH - apply both MACT and user-defined controls
#    NONE - apply no controls
setenv CNTLFLAG BOTH

# The general MACT controls specification file
setenv MACTGEN  MACT_gen_062501

# Growth and control options (0 no MACT specific file, 1 use MACT specific file)
setenv SPECMACT 1

# The pollutant specific MACT controls specification file
setenv SPECFILE MACT_spec_062501
```

Figure 15. Sample of AMProc Batch File for Processing Data for ASPEN (continued)

```
# The user-defined controls specification file
setenv USERFILE  area_cntl_user_042501

# The projection year
setenv GROWYEAR  2007

# Choose whether to apply reductions based on FISCAL (Oct 1 to Sept 30) or CALENDAR (Jan 1 to Dec 31)
setenv YEARTYPE calendar

# Option to reassign emissions groups (1 rebin, 2 don't) (only used if GROWCNTL > 0 and  = 1)
setenv REBIN  0
############################################## END G&C

# QA and OUTPUT FILES
# 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
setenv LDBG  0

# The cell for debug prints (state|county|tract)
setenv ONECELL 41019010098

# Assign temporary work space directory
setenv WORK2  /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/AMPROC/tmp/

cp /vail2aspen/dyntel/EMSHAP/PROGRAMS/AMProc_SEP04.sas AMProc_SEP04.sas

time sas AMProc_SEP04 -work /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/AMPROC
```

Figure 15. Sample of AMProc Batch File for Processing Data for ASPEN (continued)

```
# AMProc batch file --- Growth only ISCST3

#Provide model for which the data is being processed (ASPEN or ISC)
setenv MODEL  ISC

# AMProc RUN IDENTIFICATION INFORMATION
# Run identification for titles
setenv RUNID  'EMS-HAP 1996 c0 NTI AREA - Test'

# Description of emissions file
setenv EMISLABL '1996 NATA AREA c0 (SEP 2001)'

# Emissions type (AR for non-point, MV for mobile)
setenv EMISTYPE AR

# Label for output files
setenv USRLABEL BENZar_c0

# FILE DIRECTORIES
# Ancillary files directory
setenv INPFILES  /vail2aspen/dyntel/EMSHAP/ANCILLARY/

# Input emissions file directory
setenv INPEMISS  /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/AMPROC/ISC/

# Output files directory
setenv OUTFILES  /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/AMPROC/ISC/ISCemis/

# INPUT FILES
# Input emissions file name prefix
setenv EMISFILE areaprep_isctest

# SAF file name prefix
setenv SAFFILE  hsaf

# Default SAF
setenv DEFLTSAF 20

# TAF file name prefix
setenv TAFFILE  taff-ISCfactors062001

# Decay rates file name prefix
setenv INDECAY  indecay

# Pollutant xref file name prefix
setenv HAPTABLE haptabl_point_area_073101

# Spatial surrogate xref file name prefix
setenv SURRXREF surrxref_houston
```

Figure 16. Sample of AMProc Batch File for Processing Data for ISCST3

```
# Emissions bins file name prefix    nata_am_bins531
setenv EMISBINS  am_grp_060601

# County urban/rural flag xref file name prefix
setenv CNTYUR   popflg96_010501

############################################ BEGIN GROWTH&CONTROL
#   option 0 - do not run growth and control
#   option 1 - run growth and control in addition to all other functions
#   option 2 - run only growth and control, input data file must be temporally and spatially allocated
setenv GCFLAG  1

# Growth option flag (0 no growth, 1 apply growth)
# GROWTH option flag (MACT, USER, BOTH, or NONE)
#    MACT - apply MACT growth factors
#    SIC  - apply SIC growth factors
#    BOTH - apply both MACT and SIC growth factors
#    NONE - apply no growth factors
setenv GROWFLAG BOTH

# Growth factor file by State/MACT
setenv GFMACT  gfegas_bymact96_07

# Growth option flag (0 no assignment of alternate SIC, 1 assign alternate SIC)
setenv SICFLAG  1

# Source category name to SIC cross reference file
setenv SICXREF  area_sic_060601

# Growth factor file by State/SIC
setenv GFSIC  gfegas_bysic96_07

############### BEGIN CONTROL ######################################
# Control option flag (MACT, USER, BOTH, or NONE)
#    MACT - apply MACT controls only
#    USER - apply user-defined controls only
#    BOTH - apply both MACT and user-defined controls
#    NONE - apply no controls
setenv CNTLFLAG NONE

# The general MACT controls specification file
setenv MACTGEN  MACT_gen_062501

# Growth and control options (0 no MACT specific file, 1 use MACT specific file)
setenv SPECMACT 1

# The pollutant specific MACT controls specification file
setenv SPECFILE MACT_spec_062501
```

Figure 16. Sample of AMProc Batch File for Processing Data for ISCST3 (continued)

```
# The user-defined controls specification file
setenv USERFILE  area_cntl_user_042501

# The projection year
setenv GROWYEAR  2007

# Choose whether to apply reductions based on FISCAL (Oct 1 to Sept 30) or CALENDAR (Jan 1 to Dec 31)
setenv YEARTYPE calendar

# Option to reassign emissions groups (1 rebin, 2 don't) (only used if GROWCNTL > 0 and  = 1)
setenv REBIN  0
############################################## END G&C

# QA and OUTPUT FILES

# 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
setenv LDBG  0
# The cell for debug prints (3-character column|2-character row)
setenv cell 00101

# Assign temporary work space directory
setenv WORK2  /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/AMPROC/ISC/tmp/

# Assign UTM-X origin of the modeling grid in meters
setenv XORIG        214000

# Assign UTM-Y origin of the modeling grid in meters
setenv YORIG        3250000

# Assign the size (length) of each gridcell in meters
setenv CELLSIZE      1000

# Assign the prefix of the output SAS dataset
setenv ISCOUT       isc_c0ar

cp /vail2aspen/dyntel/EMSHAP/PROGRAMS/AMProc_SEP04.sas AMProc_SEP04c0.sas
time sas AMProc_SEP04c0 -work /vail2aspen/dyntel/EMSHAP/TEST_EMSHAP/AMPROC/ISC/ISCemis/
```

Figure 16. Sample of AMProc Batch File for Processing Data for ISCST3 (continued)

```
# AREA/MOBILE Source Processing - Final Format
#      Produces ISC -formatted text files

# Provide 1-character model-run identifier.  This ensures that ISCST3
# contains unique source ID's when all EMS-HAP output are fed into it.
setenv RUN_ID B

# Provide directory paths:

#   path for the SAS input dataset
setenv IN_DATA /vail2aspen/dyntel/EMSHAP/ISC/area/ISCareaemis/

#   path for the SAS output dataset
setenv OUTDATA /vail2aspen/dyntel/EMSHAP/ISC/area/ISCareaemis/

#   path for the reference text files
setenv REFFILES /vail2aspen/dyntel/EMSHAP/ANCILLARY/

#   path for the output files for input into ISC
setenv OUTFILES /vail2aspen/dyntel/EMSHAP/ISC/area/ISCareaemis/

# Provide input and output SAS data set names

#   input SAS data set name
setenv INSAS iscarea

#   output SAS dataset name
setenv OUTSAS areagrid091801

# Provide ancillary file that contains default particle distributions:
# SAROAD, # of sizes, list of size distributions, list of mass fractions, list of densities, and liquid scavenging
setenv DEFPART defpart

# Set to yes to call the macro that writes the gas deposition include files
setenv GASDEPO YES

# Provide ancillary file that contains default gas deposition parameters:
# SAROAD, diffusivity, alphas, Rx, Rsubm, Henry's coefficient
setenv DEFGAS defgas

# Set to yes(1) if you want to use scavenging coefficients that may be included in DEFPART and DEFGAS files
setenv SCAVENG 1

# gridcell elevation data
setenv ELEVDAT hstn-elev

# default elevation in meters (used only if ELEVDAT does not exist)
setenv DEFELEV 100
```

Figure 17. Sample of AMFinalFormat Batch File for Processing Data for ISCST3

Provide Southwest corner UTM coordinates (X_ORIG,YORIG) and number of 1x1 km columns and rows
setenv X_ORIG 214000
setenv Y_ORIG 3250000
setenv CELLSIZE 1000
setenv MAXCOL 106
setenv MAXROW 92

area source release heights in meters
setenv ARELHGT 2

initial vertical dimension of the area source plume in meters
setenv AINPLUM 1

cp -p /vail2aspen/dyntel/EMSHAP/PROGRAMS/AMFinalFormat_SEP05.sas AMFinalFormat_area_SEP18.sas

sas AMFinalFormat_area_SEP18.sas -work /vail2aspen/dyntel/EMSHAP/ISC/area/tmp/

Figure 17. Sample of AMFinalFormat Batch File for Processing Data for ISCST3 (continued)

APPENDIX C
Preparing the July 2001 Version of the 1996 NTI Point Source Inventory for EMS-HAP

Table of Contents

C.1 Description of Point Sources Preprocessor

The Point Sources Preprocessor is designed to read the modeler's version of the July 2001 version of the 1996 National Toxics Inventory (NTI), and to produce a file suitable for processing through the first point source processing program (PtDataProc) of EMS-HAP. To produce a suitable file, the Point Sources Preprocessor performs the following three functions:

- Excludes emission records from Alaska and Hawaii
- Converts stack parameters from English units to metric units; calculates stack velocity from stack diameter and stack flow rate data when stack velocity is missing
- Creates variables SITE_ID and EMRELPID required by EMS-HAP

Emission records from Alaska and Hawaii are excluded based on the state and county FIPS code (codes 02000 through 02999 for Alaska and code 15000 through 15999 for Hawaii).

The stack diameter and stack height are converted to meters. The stack temperature is converted to Kelvin. The stack velocity is converted to meters/sec. If the stack velocity is missing and data for the stack diameter and stack flow rate are present, then the stack velocity (in meters/sec) can be calculated using the following equation:

StackVel = (FlowRate * 0.028317)/((StackDia**2) * 3.14159 * 60 / 4) eq. C-1

Two essential variables for the processing of data through EMS-HAP are created based on information in the inventory. The SITE_ID, originally designed to identify unique sites, is created by concatenating the 1996 NTI FIPS and SITE_ID fields, separated by a hyphen. The EMRELPID, designed to identify unique emission release points, is created by concatenating the 1996 NTI EMISUNITID, EMISPROCID, and EMISRELPID fields, each separated by a hyphen. By creating these variables in this way, each record in the point source inventory can be identified by the SITE_ID, POLLCODE, and EMRELPID.

C.2 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 site ID (SITE_ID), pollutant code (POLLCODE), and emission release point ID (EMRELPID). Further, all stack parameters within a group of records identified by the FIPS code (FIPS), site ID (SITE_ID), and emission release point ID (EMRELPID) must be the same.

Table C-1. Description of Variables Contained in the Point Source Preprocessor Output File using the 1996 NTI

Variable Name	Data Description (Required units or values are in parentheses)	Format*	Required
CNTL_EFF	baseline control efficiency, expressed as a percentage	N	Yes
DEFAULT_DIA_FLAG	description of basis for default stack diameter in 1996 NTI	A20	No
DEFAULT_FLWRT_FLAG	description of basis for default flowrate in 1996 NTI	A20	No
DEFAULT_HGT_FLAG	description of basis for default stack height in 1996 NTI	A20	No
DEFAULT_TEMP_FLAG	description of basis for default stack temperature in 1996 NTI	A20	No
DEFAULT_VEL_FLAG	description of basis for default stack velocity in 1996 NTI	A20	No
EMIS	pollutant emissions value (tons/year)	N	Yes
EMISPROCID	emission process identification code	A6	No
EMISRELPID	emission release point identification code	A6	No
EMISSIONTYPE	emission type	A2	No
EMISUNITID	emission unit identification code	A6	No
EMRELPID	code identifying a unique emission point within a site	A50	Yes
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	Yes
FIPS	5-digit FIPS code (state and county combined)	A5	Yes
FLOWRATE	stack flowrate	N	No
MACTCODE	process or site-level MACT code	A7	Yes
MACT_CODE_ASSIGNMENT	description of basis for MACT code assignment	A12	No
NTI_SITE_ID	secondary site identification code	A20	No
NTI_UNIQUE_ID	secondary site identification code	A40	No
POLLCODE	unique pollutant code	A10	Yes
SCC	EPA source category code identifying the process	A10	Yes

Table C-1. Description of Variables Contained in the Point Source Preprocessor Output File using the 1996 NTI (continued)

Variable Name	Data Description (Required units or values are in parentheses)	Format*	Required
SIC	Standard Industrial Classification (SIC) code for the site	A4	Yes
SITENAME	Unique site name	A50	No
SITE_ID	code identifying a unique site (concatenation of inventory site id and FIPs code)	A25	Yes
SRC_TYPE	description of the emission source at the site ('major' or 'area')	A15	Yes
STACKDIA	diameter of stack (meters)	N	Yes
STACKHT	height of stack (meters)	N	Yes
STACKVEL	velocity of exhaust gas stream (meters per second)	N	Yes
STKTEMP	temperature of exhaust gas stream (Kelvin)	N	Yes
UTM_Z	universal transverse mercator (UTM) zone	N	Yes
X	longitude (decimal degrees or degrees, minutes, seconds with no separating characters) or UTM easting (meters or kilometers)	N	Yes
XY_TYPE	type of coordinate system used (LAT/LON or UTM)	A7	Yes
Y	latitude (decimal degrees or degrees, minutes, seconds with no separating characters) or UTM northing (meters or kilometers)	N	Yes
ZIP_CODE	zip code of site	A12	Yes

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

APPENDIX D
Preparation of ASPEN-input Files for the 1996 Base Year Using EMS-HAP

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 present 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 non-point (formerly denoted as "area") and three mobile source inventories for input into EMS-HAP, as shown below. Note we use the term "non-point inventory" to describe what was formerly referred to as the area source inventory so as not to conflict with the term "area source" which is also used to describe a type of stationary source based on its size as defined in the Clean Air Act.

	Point Source Inventory	Non-point 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), July 2001 (point) and June 2001 (non-point) 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 and non-point during the summer of 2001, and mobile source files in 2000.

We received the 1996 NTI point source inventory modeler's version as a single flat text file (i.e., it did not need to be linked). The 1996 NTI contains data from the 50 States, the District of Columbia, Puerto Rico and the Virgin Islands. We developed a preprocessing program to read this file and to create the variables necessary for processing through EMS-HAP. This preprocessing program is described in Appendix C. The point source inventory file produced by executing our preprocessing program met all of the data criteria required by EMS-HAP.

We received the 1996 NTI non-point and mobile source inventory modeler's versions as flat text files as well. We received the non-point 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 non-point and mobile source text files and produce SAS® files that met the criteria required by EMS-HAP.

The 1996 NTI point, non-point 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

(Note that since that documentation was prepared, the term "non-point" has been used to describe this county-level, nonmobile inventory in place of the term "area" as is discussed in the beginning of D.1, above)

- 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/nti/index.html.

D.1.2 We used the 1996 NET inventory, speciated for particular VOCs

We received point, non-point 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 non-point 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[5] 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.[6]

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 applying 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.[7] 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.[8] 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's 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.[9]

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 HAPs from diesel vehicles

and equipment to be revised accordingly, but an exploratory analysis indicated that the effect on estimates of other HAPs would not have been large.

We received the diesel PM data as two text files (one for onroad and one for nonroad), each containing estimates of 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 Section 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.[10] We also modeled additional HAPs (not on the list) requested by EPA's OTAQ, and diesel PM. Note that diesel PM is not a listed HAP.

Aircraft Emissions Processing

We processed the 1996 NTI mobile source emissions through a preprocessing program to format them as required by AirportProc. We then processed the output through the AirportProc program. We did not process any point source emissions through AirportProc as we chose not to append the aircraft point sources to the non-aircraft point sources. We ran the point source output from AirportProc (i.e., the point source aircraft inventory) through the point source processing programs in the following order: PtDataProc, PtModelProc, PtTemporal, and PtFinal_ASPEN.

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 the preprocessing program (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, PtModelProc, PtTemporal, and PtFinal_ASPEN.

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; 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.

Non-point Source Processing

We processed the 1996 NTI non-point source inventory through a preprocessing program to read in the non-point source emission data and format it as required by AreaPrep. Due to the size of the non-point source file, we split it into two parts and then ran each separately through AMProc.

D.2.2 We ran it for the precursors to HAPs

The EPA's Cumulative Exposure Project (CEP)[11] 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 for Precursors

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, PtModelProc, PtTemporal, and PtFinal_ASPEN. We used the precursor HAP table (see Section D.6) in PtModelProc.

Point Source Emissions Processing for Precursors

We ran the speciated NET point source inventory through a preprocessing program and then ran it through PtDataProc and PtModelProc, using the precursor HAP table file (see Section D.6). We ran the 1996 NTI through PtDataProc and PtModelProc, also using the precursor HAP table file. We then merged the output of the two separate runs of PtModelProc and ran the resulting precursor inventory through PtTemporal, and PtFinal_ASPEN.

Mobile Source Processing for Precursors

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 these together because both used the same HAP table file (the precursor HAP table).

Non-point Source Processing for Precursors

We merged the non-point NTI emissions that are precursors with speciated non-point NET emissions and ran the resulting precursor inventory through AreaPrep and 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 files for each program we ran. There are additional ancillary files for EMS-HAP (e.g., MACT_gen.txt and MACT_spec.txt, which can be used in PtGrowCntl) that are not in Table D-4 because we did not use them for the base year run. Appendix A contains a complete listing of EMS-HAP's ancillary files.

Some of the ancillary files used for non-point 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; Tables 1 through 4 in Appendix A list the entire contents of all of the HAP table files.

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 compiled by Gregory Rigamer and Associates[12] and the FAA[13] 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, tract radius and centroid data from 1990-based designations made in the CEP[14,15]
	SCCDEFLT	def_scc.txt	developed by averaging stack parameter data for each SCC from June 2000 version of the 1996 point source NTI
	SICDEFLT	def_sic.txt	developed by 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 (SAS files are shown without their extension)	Data Source and Appendix D section which provides more information
Point Source Processing.... continued			
PtModelProc			
	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[16] 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[16] 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 developed by EPA's Office of Research and Development (ORD) See D.7
	SCCLINK	scc2ams.txt	based on EPA's FIRE database[17] See D.8-D.9
	SICLINK	sic2ams.txt	based on SIC definitions[18] See D.8 and D.9
	MACTLINK	mact2scc.txt	based on MACT category definitions[19] See D.8 and D.9
PtFinal_ASPEN			
	DECAY	indecay.txt	derived from the CEP[16]
Non-point 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
	SURRXREF	surrxref.txt	developed using CEP, EMS-95 and OTAQ recommendations See D.8
	SIC2AMS	sic2ams.txt	same as SICLINK in PtTemporal

Table D-4. Ancillary Files Used in EMS-HAP for the 1996 Base Year Run
(continued)

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
Non-point Source Processing.... continued			
	MACT2AMS	mact2scc.txt	same as MACTLINK in PtTemporal
	SURRXREF	surrxref.txt	developed using CEP, EMS-95 and OTAQ recommendations See D.8
Non-point 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[20] 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, non-point), haptabl_onroad.txt (direct emissions, onroad), haptabl_nonroad.txt (direct emissions, nonroad), haptabl_precursor.txt (precursor emissions)	same as MOBHAPS and PTHAPS under PtModelProc
	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[20]
	DECAY	indecay.txt	same as DECAY under PtFinal_ASPEN

* 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 Allocation 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.[12] 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. These 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.[13]

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. Note that the resulting file does not include Alaska airports.

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 non-point 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.[16] 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.[21]

As discussed in Chapter 4, ASPEN uses the following reactivity and particulate size classes:

- 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 between 2.5 and 10 Fm- (REACT=3)

For each reactivity class, the decay coefficients vary by time block (3-hour period) throughout a day and stability class. The decay coefficients are zero for all time blocks and stability classes

for reactivity classes 1, 2 and 3. The decay coefficients for the other reactivity classes are provided in Table D-5 and can be found in the indecay.txt ancillary file provided with the EMS-HAP code. They are also presented in Appendix C of the ASPEN User's Guide[22], however, this reference has an error in reactivity class 7 for time blocks 2, 3, 7, and 8 in stability class D. We used the corrected values to prepare the 1996 ASPEN modeling files, and it is the corrected values that are contained in Table D-5 and in the ancillary file provided with EMS-HAP. Figure 28 in Appendix A contains the format and sample file contents for indecay.txt.

Table D-5. Decay Coefficients by Reactivity Class

Reactivity Class 4 - Medium-low reactivity						
Stability Class	A	B	C	D	E	F
Time Block 1	9.87E-7	9.87E-7	9.87E-7	9.87E-7	9.87E-7	9.87E-7
Time Block 2	9.87E-7	9.87E-7	9.87E-7	9.87E-7	9.87E-7	9.87E-7
Time Block 3	1.18E-5	7.89E-6	3.95E-6	1.97E-6	9.87E-7	9.87E-7
Time Block 4	7.89E-5	5.92E-5	3.95E-5	1.97E-5	9.87E-7	9.87E-7
Time Block 5	6.71E-5	5.13E-5	3.55E-5	1.97E-5	9.87E-7	9.87E-7
Time Block 6	2.37E-5	1.78E-5	1.18E-5	7.89E-6	9.87E-7	9.87E-7
Time Block 7	1.97E-6	1.97E-6	1.97E-6	9.87E-7	9.87E-7	9.87E-7
Time Block 8	9.87E-7	9.87E-7	9.87E-7	9.87E-7	9.87E-7	9.87E-7
Reactivity Class 5 - Medium reactivity						
Stability Class	A	B	C	D	E	F
Time Block 1	2.47E-6	2.47E-6	2.47E-6	2.47E-6	2.47E-6	2.47E-6
Time Block 2	2.47E-6	2.47E-6	2.47E-6	2.47E-6	2.47E-6	2.47E-6
Time Block 3	2.96E-5	1.97E-5	9.87E-6	4.93E-6	2.47E-6	2.47E-6
Time Block 4	1.97E-4	1.48E-4	9.87E-5	4.93E-5	2.47E-6	2.47E-6
Time Block 5	1.68E-4	1.28E-4	8.88E-5	4.93E-5	2.47E-6	2.47E-6
Time Block 6	5.92E-5	4.44E-5	2.96E-5	1.97E-5	2.47E-6	2.47E-6
Time Block 7	4.93E-6	4.93E-6	4.93E-6	2.47E-6	2.47E-6	2.47E-6
Time Block 8	2.47E-6	2.47E-6	2.47E-6	2.47E-6	2.47E-6	2.47E-6
Reactivity Class 6 - Medium-high reactivity						
Stability Class	A	B	C	D	E	F
Time Block 1	4.93E-6	4.93E-6	4.93E-6	4.93E-6	4.93E-6	4.93E-6
Time Block 2	4.93E-6	4.93E-6	4.93E-6	4.93E-6	4.93E-6	4.93E-6
Time Block 3	5.92E-5	3.95E-5	1.97E-5	9.87E-6	4.93E-6	4.93E-6
Time Block 4	3.95E-4	2.96E-4	1.97E-4	9.87E-5	4.93E-6	4.93E-6
Time Block 5	3.35E-4	2.57E-4	1.78E-4	9.87E-5	4.93E-6	4.93E-6
Time Block 6	1.18E-4	8.88E-5	5.92E-5	3.95E-5	4.93E-6	4.93E-6
Time Block 7	9.87E-6	9.87E-6	9.87E-6	4.93E-6	4.93E-6	4.93E-6
Time Block 8	4.93E-6	4.93E-6	4.93E-6	4.93E-6	4.93E-6	4.93E-6

Table D-5. Decay Coefficients by Reactivity Class
(continued)

Reactivity Class 7 - Very high reactivity

Stability Class	A	B	C	D	E	F
Time Block 1	5.01E-4	5.01E-4	5.01E-4	5.01E-4	5.01E-4	5.01E-4
Time Block 2	3.21E-5	3.21E-5	3.21E-5	2.54E-4	5.01E-4	5.01E-4
Time Block 3	9.00E-5	6.04E-5	3.08E-5	5.61E-5	5.01E-4	5.01E-4
Time Block 4	5.93E-4	4.45E-4	2.97E-4	1.49E-4	8.14E-6	8.14E-6
Time Block 5	5.04E-4	3.86E-4	2.67E-4	1.49E-4	8.14E-6	8.14E-6
Time Block 6	1.79E-4	1.34E-4	9.00E-5	6.34E-4	8.14E-6	8.14E-6
Time Block 7	3.95E-5	3.95E-5	3.95E-5	2.54E-4	5.01E-4	5.01E-4
Time Block 8	5.01E-4	5.01E-4	5.01E-4	5.01E-4	5.01E-4	5.01E-4

Reactivity Class 8 - High reactivity

Stability Class	A	B	C	D	E	F
Time Block 1	1.23E-5	1.23E-5	1.23E-5	1.23E-5	1.23E-5	1.23E-5
Time Block 2	1.23E-5	1.23E-5	1.23E-5	1.23E-5	1.23E-5	1.23E-5
Time Block 3	1.48E-4	9.87E-5	4.93E-5	2.47E-5	1.23E-5	1.23E-5
Time Block 4	9.87E-4	7.40E-4	4.93E-4	2.47E-4	1.23E-5	1.23E-5
Time Block 5	8.39E-4	6.41E-4	4.44E-4	2.47E-4	1.23E-5	1.23E-5
Time Block 6	2.96E-4	2.22E-4	1.48E-4	9.87E-5	1.23E-5	1.23E-5
Time Block 7	2.47E-5	2.47E-5	2.47E-5	1.23E-5	1.23E-5	1.23E-5
Time Block 8	1.23E-5	1.23E-5	1.23E-5	1.23E-5	1.23E-5	1.23E-5

Reactivity Class 9 - Low reactivity

Stability Class	A	B	C	D	E	F
Time Block 1	4.94E-7	4.94E-7	4.94E-7	4.94E-7	4.94E-7	4.94E-7
Time Block 2	4.94E-7	4.94E-7	4.94E-7	4.94E-7	4.94E-7	4.94E-7
Time Block 3	5.90E-6	3.95E-6	1.98E-6	9.85E-7	4.94E-7	4.94E-7
Time Block 4	3.94E-5	2.96E-5	1.97E-5	9.85E-6	4.94E-7	4.94E-7
Time Block 5	3.36E-5	2.57E-5	1.78E-5	9.85E-6	4.94E-7	4.94E-7
Time Block 6	1.19E-5	8.90E-6	5.90E-6	3.95E-6	4.94E-7	4.94E-7
Time Block 7	9.85E-7	9.85E-7	9.85E-7	4.94E-7	4.94E-7	4.94E-7
Time Block 8	4.94E-7	4.94E-7	4.94E-7	4.94E-7	4.94E-7	4.94E-7

Tables D-6 and D-7 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.[23] 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).[24, 25]

Table D-6. Average Particulate Size Class Allocation Factors

	Onroad		Nonroad		Stationary (Point and Non-point)	
	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	8	92	8	92	------	------

Table D-7. Gas and Particulate Allocations for Mercury Compounds

Reported as...	Onroad			Nonroad			Stationary (Point and Non-point)		
	coarse %	fine %	gas %	coarse %	fine %	gas %	coarse %	fine %	gas %
Mercury &	0	100	0	0	100	0	0	0	100
Mercuric	_____	_____	_____	_____	_____	_____	0	100	0
Other Mercury Species (including "elemental" mercury)	_____	_____	_____	_____	_____	_____	0	0	100

As seen in Table D-7, 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.[26] All mercury emissions from mobile sources were assigned to particulate mercury group because the EPA's OTAQ indicated that the factors used to estimate these emissions originated from particulate measurements. All other species of mercury in the stationary source (point and non-point) inventories, including the broad compound class 'mercury & compounds,' were assigned to the gaseous group.

Based on recommendations from EPA's Emission Measurement Center[21]:

- 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.

You can see how we grouped those pollutants selected for modeling and other pollutants not selected, but in the NTI, by looking at the first two columns of the HAP tables (see Appendix A, Table 1). The following subsections summarize this information.

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-6, 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 non-point). 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-7).

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-8, have been used by EPA in the CAA 112(c)(6) emission inventory.[27] The groups "PAH, total" and "total POM" are less defined.

Table D-8. 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
		Dibenz[a,h]acridine
		Dibenz[a,j]acridine
		7H-Dibenzo[c,g]carbazole
		Dibenzo[a,e]pyrene
		Dibenzo[a,i]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-9 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-9. 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.[28] 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-10 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-10. 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[29]) • 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[29]) • 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-dioxin • 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 to allow ASPEN modeling of the secondary formation of formaldehyde, acetaldehyde, propionaldehyde, acrolein, methyl ethyl ketone, phosgene and cresol. Table D-11 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 a 1996 national-scale assessment. You will see (by looking at the KEEP variable) that we prepared ASPEN for modeling formaldehyde, acetaldehyde, propionaldehyde and acrolein.

The treatment of secondary HAP formation in EMS-HAP is based on the analytical framework developed in EPA's CEP.[30] 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-11, the reaction rate factor for these species is 1.

Table D-11 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.[30] The overall scaling factor (the three factors multiplied together) is the FACTOR variable in the precursor HAP table.

Table D-11. 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 non-point precursor inventories is the same as the HAP table (for direct emission of HAPs) discussed in Section D.5. A general discussion of the HAP table is also contained 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 inert 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-11.

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 annual emissions from point, non-point 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. There are 24 TAFs for each source category; 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),[31] and was updated to improve allocation factors for some sources in 1995.[32]

- Temporal allocation profiles used in EMS-95 for regional and local ozone modeling.[33]

- Temporal allocation profiles used in the emission processing system (EPS) for the Urban Airshed Model (UAM) of ozone.[34] 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.[31]

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:

$$HF_n = 13 \times \sum_{i=1-4} [(WHF_{n/i} \times WDF_i \times 5) + (SaHF_{n/i} \times SaDF_i) + (SuHF_{n/i} \times SuDF_i)] \times SF_i \quad \text{(eq. D-1)}$$

where

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.[35]

5. For source categories in the emissions inventories processed, which were not in the ORD database, but were in the speciated NET inventory, we assigned profiles from similar categories. Table D-12 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 non-point and all of the mobile source profiles selected for EMS-HAP are summarized in Tables D-13 and D-14 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-12. 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-13. Temporal Allocation of Some Non-point Source Categories in EMS-HAP

NTI Non-point 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-14. 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		

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		
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.

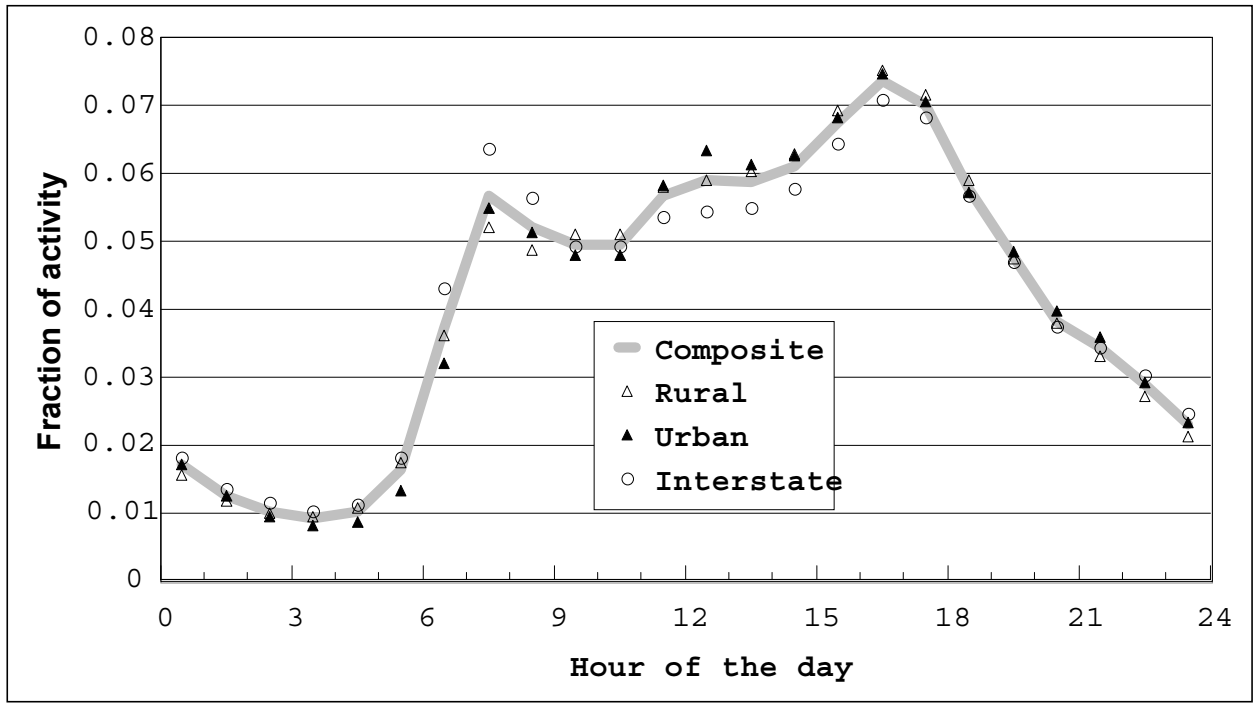
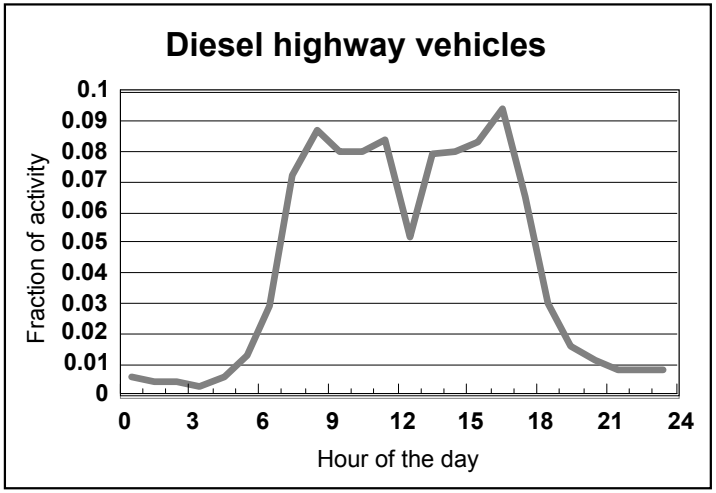
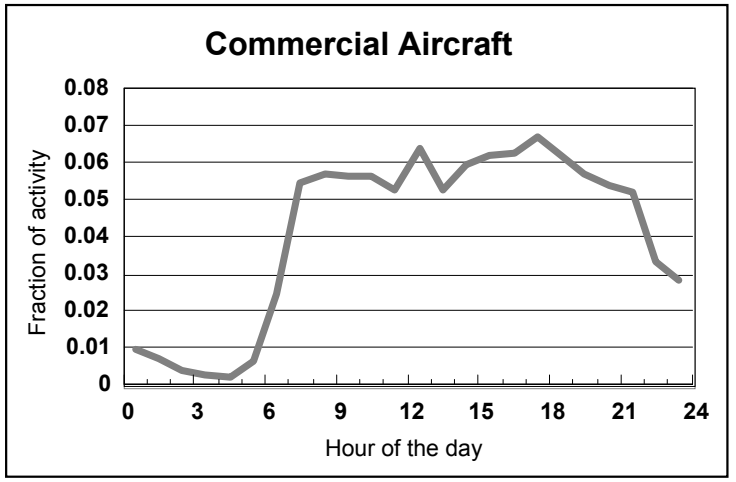
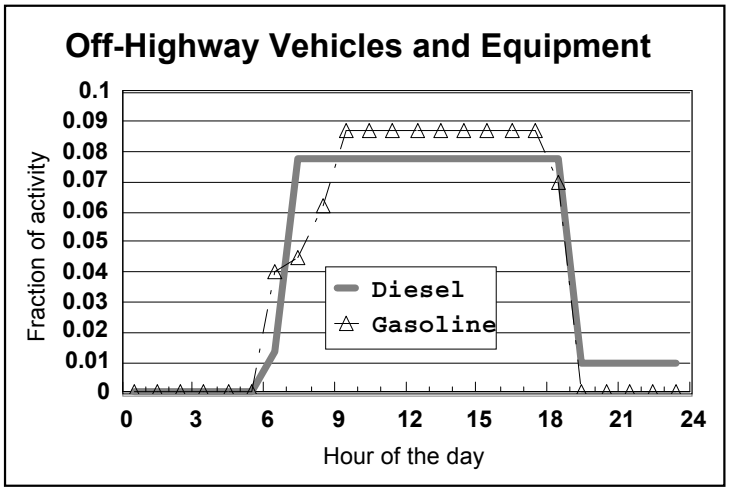


Figure D-1. Composite temporal emission profile for on-road motor vehicles







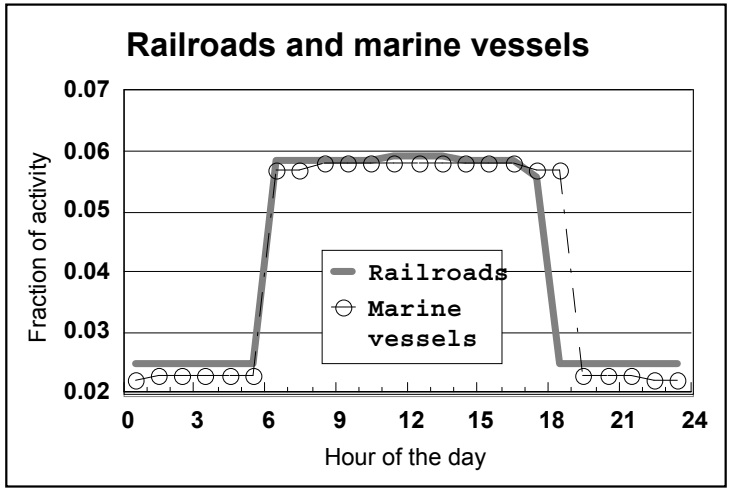


Figure D-2. Temporal profiles for diesel highway vehicles and non-road engines

D.8 How We Assigned Spatial Surrogates for Non-point and Mobile Source Categories

This section discusses how we selected spatial surrogates. We selected from the list of available surrogates presented in Chapter 9, Section 1.1 and again in Table D-19. We discuss the availability of surrogate data in Section D.11. This section discusses our selections within the available choices.

As discussed in Chapters 9 and 11, 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 non-point 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 non-point sources.)

To select spatial surrogates for the various emission categories in the non-point 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 non-point 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-15 compares the spatial surrogates used in EMS-HAP, the CEP, and EMS-95 for some of the non-point source categories in the NTI. Table D-16 shows the surrogates we chose for all of the non-point sources in the 1996 NTI, and the code by which they were matched to surrogates. Table D-17 shows the surrogates we chose for the sources in the 1996 diesel PM inventory. Table D-18 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-15. Spatial Allocation of Some Non-point Source Categories in EMS-HAP as Compared to Other Emission Models

NTI Non-point 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	2	Commercial land
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-16. Surrogates Used for Spatial Allocation of the 1996 NTI Non-point 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 Equipmient 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)

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),

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),

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-17. 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-18. Spatial Allocation of Mobile Source Categories in EMS-HAP as Compared to Other Emission Models

NTI Mobile Source Category	Subcategories, where applicable[a]	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	

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 non-point sources and for assigning temporal profiles to both point and non-point 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 Section 5.1.1 for details). They are also used to assign temporal profiles (see Section 9.1.3) and spatial surrogates (see Section 8.1.2) for non-point 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 non-point 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.[17] For non-point sources, we also reviewed the definition of the emission category in the 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 Section 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 non-point sources with an SIC code but not 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.[18] We also used the SIC definition to select the most appropriate spatial surrogate to represent the category (see Section D.8).

The cross-reference file 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 non-point 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 Section 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),[36] roadway data from the 1990 Topologically Integrated Geographic Encoding and Referencing (TIGER®/Line) files[37] 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.[38] They calculated SAFs from this data using the following equation:

$$SAF_{county,\,i,\,j} = A_{i,\,j} / A_{county,\,j} \qquad \text{(eq. D-3)}$$

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 sum 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-19 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 non-point 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-19. 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]

Code for set of SAFs	Surrogate	Definition	Origin of Data	How we developed the set of SAFs
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)
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[20]

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. We added spatial allocation factors based on a tract area spatial surrogate (SAF26).

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).[39,40] They suggested (as shown in Table D-18) 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. We added "composite" spatial allocation factors which use more than type of land use or population data.

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.[20]

We developed the SAFs for the composite surrogates because we felt the composite surrogates provided a better approach for allocating some of our non-point 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.[39,40] They recommended (as shown in Table D-18) SAF27 for nonroad diesel engines and SAF28 for nonroad gasoline 4-stroke engines.

3. We added Puerto Rico and Virgin Islands spatial allocation factors since these areas were not modeled in the CEP.

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-20 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-21 shows the SAFs we used in this situation.

Table D-20. 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-21. 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 non-point 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. For example, out of the 182 tracts in Denver County, 30 contain zero population. The use of former SAF19 results in high SAF values for these 30 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[41], 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 SAF27 (see Table D-16); we used SAF19 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.

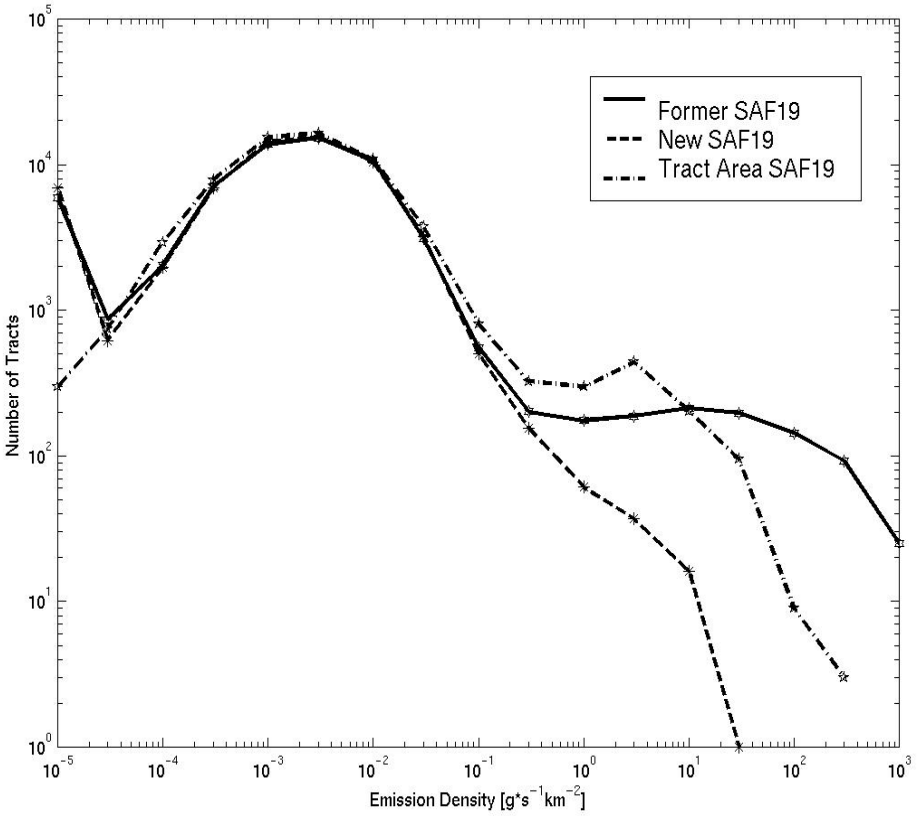


Figure D-3. Nationwide Tract-level Emission Densities Using Three Different Treatments of SAF19

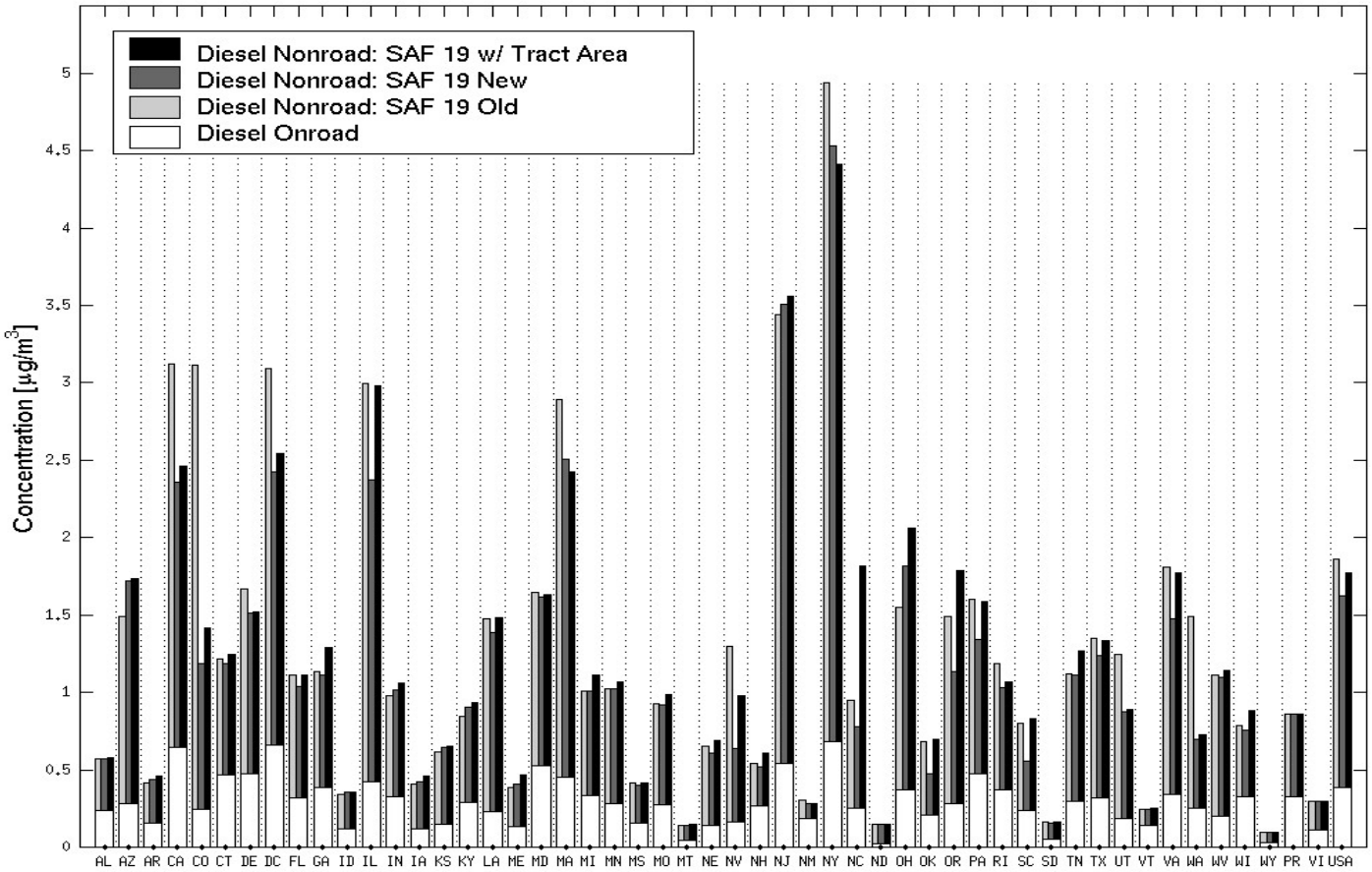


Figure D-4. The Effect of the Three Different Treatments of SAF19 on State-level Mean Concentrations Estimates

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-22. 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-22. Program Options Used to Execute AirportProc

Keyword	Description	Value
ADD2PT	1=append records to output 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-23. 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-23. Because we did not use SCC-based defaults for aircraft emissions, these were defaulted using the global defaults.

Table D-23. 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 PtFinal_ASPEN program options and parameters

When the 1996 NTI and the 1996 NET speciated point source inventories were processed through PtFinal_ASPEN, ASPEN source groups were assigned by the source type only (see Table 7-1 in Section 7.1.1). 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-24 summarizes the program options and parameters we specified in the PtFinal_ASPEN batch file.

Table D-24. Program Options and Parameters Used for PtFinal_ASPEN

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 non-point and mobile source inventories were processed through AMProc, the program options in Table D-25 were specified.

Table D-25. Program Options Used to Execute AMProc

Keyword	Description	Value
SAVEFILE	1= save large SAS®-formatted file with all emissions information on source category level basis for each census tract 0=don't save large SAS® file	1
GROWFLAG	MACT=project emissions due to economic growth by MACT code and geographic region only; SIC=project emissions due to economic growth two-digit SIC and geographic region only; BOTH=project emissions due to economic growth both by MACT code and geographic region and by two-digit SIC and geographic region; NONE = does not project emissions due to economic growth	0
SICFLAG	1=use SCC to SIC cross-reference file to assign SIC where missing in inventory; 0=don't assign SIC where missing	0
CNTLFLAG	MACT=project emissions using MACT-based emission reduction information only; USER=project emissions using user-defined emission reduction information only; BOTH=projects emissions using both MACT-based and user-defined emission reduction information NONE=does not project emissions using emissions reductions	NONE
SPECMACT	1=Use process and/or pollutant specific MACT emission reduction information; 0=don't use process and/or pollutant specific MACT emission reduction information	0
REBIN	1= reassign emission groups during growth and control processing; 0 = don't reassign them	0
LSUBSETP	1= process only one pollutant; 0 = don't process only one pollutant	0
SUBSETP	NTI pollutant code to which to subset	
LSUBSETG	1= process only one state; 0 = don't process only one state	0
SUBSETG	2-character state postal code abbreviation of state to which to subset	US
LCPTIMES	1= print component CPU times; 0 = don't print component CPU times	1
LDBG	1= printout of diagnostic information; 0 = don't	0
LONECELL	1= printout diagnostics for a selected single cell (tract); 0=don't	0
ONECELL	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, non-point and mobile source ASPEN emission files containing the pollutants listed in Table D-26 below. Pollutants in the same reactivity class within the same point, non-point 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-26. 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	80400	methyl tert-butyl ether	43376
acetaldehyde, precursor	80100	diesel PM, coarse {for mobile sources	80401	methylene chloride	43802
acetaldehyde precursor,	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,	80318	formaldehyde, precursor	80180	propionaldehyde, precursor,	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,	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,	80141	manganese compounds, fine	80196	trichloroethylene	43824
chromium compounds,	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		

REFERENCES FOR APPENDIX D

1. U.S. Environmental Protection Agency. Unified Air Toxics Website: The Pollutants. http://www.epa.gov/ttn/atw/pollsour.html (accessed May 2002)

2. Driver, L.; Pope, A.; Billings, R.; Wilson, D. "The 1996 National Toxics Inventory and Its Role in Evaluating the EPA's Progress in Reducing Hazardous Air Pollutants in Ambient Air", Presented at the 92nd Annual Meeting of the Air & Waste Management Association, St. Louis, Missouri, 1999; paper 91-501.

3. "National Air Pollutant Emission Trends Procedures Document, 1900-1996," EPA-454/R-98-008, U.S. Environmental Protection Agency. May 1998.

4. U.S. Environmental Protection Agency. Emission Inventory Guidance. http://www.epa.gov/ttn/chief/nti/index.html (accessed May 2002)

5. U.S. Environmental Protection Agency. Clearinghouse for Inventories and Emission factors. Software. http://www.epa.gov/ttn/chief/software/speciate/index.html

6. Electronic Mail. From Rich Cook, U.S. Environmental Protection Agency, Office of Transportaion and Air Quality to Madeleine Strum, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, September 30, 1999.

7. College of Engineering - Center for Environmental Research and Technology, University of California. 1998. Evaluation of Factor that Affect Diesel Exhaust Toxicity. Submitted to California Air Resources Board, Contract No. 94-312.

8. Gabele, P. 1997. Exhaust Emissions from Four-Stroke Lawn Mower Engines. J. Air & Waste. Manage. Assoc. 47:945-952.

9. U.S. Environmental Protection Agency. Nonroad Vehicle & Emission Modeling. http://www.epa.gov/otaq/nonrdmdl.html (accessed May 2001)

10. U.S. Environmental Protection Agency. Integrated Urban Air Toxics Strategy PO Data System. http://www.epa.gov/ttn/atw/urban/urbanpg.html (accessed May 2002)

11. Rosenbaum, A.S.; Ligocki, M.P.; Wei, Y.H. “Modeling Cumulative Outdoor Concentrations of Hazardous Air Pollutants, Volume 1: Text”; SYSAPP-99-96-33r2, Prepared for the U.S. Environmental Protection Agency, Office of Policy, Planning, and Evaluation, by Systems Applications International, Inc., San Rafael, CA. 1998, p. 2-8.

12. *FAA 5010 Database*. g.c.r. and associates. http://www.gcr1.com/ (accessed 1999).

13. *Statistical Handbook of Aviation, 1996.* Federal Aviation Administration, U.S. Department of Transportation, Washington, DC.

14. Rosenbaum, A.S.; Ligocki, M.P.; Wei, Y.H. “Modeling Cumulative Outdoor Concentrations of Hazardous Air Pollutants, Volume 1: Text”; SYSAPP-99-96/33r2, Prepared for U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation, by Systems Applications International, Inc., San Rafael, CA. 1998, pp. 5-3 to 5-4

15. User’s Guide, Assessment System for Population Exposure Nationwide (ASPEN) Model, Volume 1 - User Instructions”; SYSAPP-98/25r1, Prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, by Systems Applications International, Inc., San Rafael, CA, under subcontract to EC/R Incorporated. 1998, p. 23.

16. Rosenbaum, A.S.; Ligocki, M.P.; Wei, Y.H. “Modeling Cumulative Outdoor Concentrations of Hazardous Air Pollutants, Volume 1: Text”; SYSAPP-99-96/33r2, Prepared for U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation, by Systems Applications International, Inc., San Rafael, CA. 1998, pp. 3-12, 5-9 to 5-10.

17. *Factor Information Retrieval (FIRE) data system (version 6.22)*. U.S. Environmental Protection Agency, Research Triangle Park, NC. October 1999. http://www.epa.gov/ttnchie1/fire.htm.

18. *Standard Industrial Classification Manual*. Executive Office of the President, Office of Management and Budget, Washington, DC. 1987.

19. “Initial List of Categories of Sources Under Section 112(c)(1) of the Clean Air Act Amendments of 1990.” *Federal Register*. **57**:(137). Pp. 31576-31592.

20. Electronic Mail. From Laurel Driver, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards (OAQPS) to Madeleine Strum (OAQPS), August 13, 1999.

21. Personal Communication with Robin Segall and Rima Dishakjian, both from the U.S. Environmental Protection Agency's Emissions Measurement Center, July-August, 1999.

22. User's Guide: Assessment System for Population Exposure Nationwide (ASPEN, Version 1.1) Model. EPA-454-R-00-017, U.S. Environmental Protection Agency, Research Triangle Part, NC. March 2000, Appendix C, page C-7.

23. Rosenbaum, A.S.; Ligocki, M.P.; Wei, Y.H. "Modeling Cumulative Outdoor Concentrations of Hazardous Air Pollutants, Volume 1: Text"; SYSAPP-99-96/33r2, Prepared for U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation, by Systems Applications International, Inc., San Rafael, CA. 1998, pp. 4-11.

24. Electronic Mail. From Joseph Somers, U.S. Environmental Protection Agency, Office of Mobile Sources (OMS) to Chad Bailey (OMS), Pamela Brodowicz (OMS), Rich Cook (OMS), Betsy McCabe (OMS) and Madeleine Strum (OAQPS), August 12, 1999.

25. EPA-AA-AQAB-94-2 Draft Users Guides to PART5: A Program for Calculating Particle Emissions from Motor Vehicles, February 1995. Table 4, page 66.

26. EPA-452/R-97-005 Mercury Study Report to Congress, Volume III: Fate and Transport of Mercury in the Environment, December 1997, p. ES-5.

27. 1990 Emissions Inventory of Section 112(c)(6) pollutants; polycylic organic matter (POM) 2,3,7,8-Tetrachlorodibenzo-p-dioxin, 2,3,7,8-Tetrachlorodibenzo furan, polychlorinated biphenyl compounds (PCB's), mercury, and alkylated lead, Final Report; U.S. Environmental Protection Agency, Research Triangle Park, N.C., 1998.

28. Ven den Berg, M.; Birnbaum, L.; Bosveld, A.; et.al. "Toxicity Equivalence Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife", Environ. Health Persp. 1998, 106(12), 775-792.

29. Electronic Mail. From Robin Segall, U.S. Environmental Protection Agency, OAQPS Air to Madeleine Strum (OAQPS), September 1, 1999.

30. Rosenbaum, A.S.; Ligocki, M.P.; Wei, Y.H. “Modeling Cumulative Outdoor Concentrations of Hazardous Air Pollutants, Volume 1: Text”; SYSAPP-99-96/33r2, Prepared for U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation, by Systems Applications International, Inc., San Rafael, CA. 1998, pp. 4-11.

31. Fratt, D.B.; Mudgett, D.F.; Walters, R.A. The 1985 NAPAP *Emissions Inventory: Development of Temporal Allocation Factors*. EPA-600/7-89-010d, U.S. Environmental Protection Agency, Research Triangle Park, NC. April 1990.

32. Moody, T.; Winkler, J.D.; Wilson, T.; Kirsteter, S. *The Devlopment and Improvement of Temporal Allocation Factor Files*. EPA-600/R-95-004. U.S. Environmental Protection Agency, Research Triangle Park, NC. January 1995.

33. Janssen, Mark. *EMS-95 User’s Guide*. Lake Michigan Air Directors (LADCo). (http://www.ladco.org/emis.guide/ems95.html). August 1998.

34. Causley, M.C.; Fieber, J.L.; Jiminez, M.; Gardner, L. *User’s Guide for the Urban Airshed Model, Volume IV: User’s Manual for the Emissions Preprocessor System*, U.S. Environmental Protection Agency, Research Triangle Park, NC, 1990; EPA-450/4-90-007D.

35. Federal Aviation Administration APO Data System. http://www.apo.data.faa.gov (accessed June 7, 1999).

36. United States Census Bureau Home Page. http://www.census.gov (accessed February 1999).

37. United States Census Bureau. http://www.census.gov/geo/www/tiger/t92top.html (accessed February 1999).

38. *Land Use and Land Cover Digital Date From 1:250,000- and 1:100,000-Scale Maps, Data Users Guide 4.* U.S. Department of the Interior, U.S. Geological Survey, Reston, VA, 1990.

39. Email from Chad Bailey, U.S. U.S. Environmental Protection Agency, Office of Transportaion and Air Quality (OTAQ) to Rich Cook (OTAQ) and Pamela Brodowicz (OTAQ), June 8, 1999.

40. Email from Chad Bailey, U.S. Environmental Protection Agency, Office of Transportaion and Air Quality (OTAQ) to Madeleine Strum, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, July 21, 1999.

41. User's Guide: Assessment System for Population Exposure Nationwide (ASPEN, Version 1.1) Model. EPA-454-R-00-017, U.S. Environmental Protection Agency, Research Triangle Park, NC. March 2000, Page 3-11.

APPENDIX E
Preparation of the Source Pathway Section of the ISCST3 Run Stream for the 1996 Base Year Using EMS-HAP

Table of Contents

List of Tables

List of Figures

Appendix E
Preparation of the Source Pathway Section of the ISCST3 Run Stream for the 1996 Base Year Using EMS-HAP

This appendix describes how we processed inventories, containing 1996 emission data, to create the source (SO) pathway section of the ISCST3 run stream for an air toxics assessment of a modeling domain encompassing Houston, Texas. The emission inventories were processed through some preconditioning programs and EMS-HAP.

The 1990 Clean Air Act (Section 112) lists a number of hazardous air pollutants (HAPs) and provides a process to add and delete pollutants from the list. There are currently 188 HAPs.[2] The EPA's Integrated Urban Air Toxics Strategy[3] refers to 33 "urban" HAPs. We created ISCST3 SO run stream files for the direct emissions of 15 HAPs and direct emissions of diesel particulate matter (PM).

Section E.1 discusses the emission inventories we used, and how we preconditioned them for EMS-HAP processing. Section E.2 describes how we ran the EMS-HAP programs to create the SO pathway section for the ISCST3 run stream. Sections E.3 through E.9 present the ancillary input files we used, and discusses how we created the key ancillary files for EMS-HAP (e.g., the spatial and temporal allocation factor files). Section E.10 presents the EMS-HAP program options we selected. Section E.11 lists the pollutants in the ISCST3 run stream files resulting from our run of EMS-HAP.

The Houston domain in our study is 92 km x 106 km in area, with a southwest corner in Fort Bend county at (UTMX = 214000, UTMY = 3250000) in UTM zone 15. A spatial surrogate map in Section E.8 shows the entire domain with county borders and major highways superimposed.

E.1 How We Prepared the Houston Domain Emission Inventories for Input Into EMS-HAP

We prepared point, non-point, and mobile source inventories for input into EMS-HAP for the Houston domain. Note we use the term "non-point inventory" to describe what was formerly referred to as the area source inventory so as not to conflict with the term "area source" which is also used to describe a type of stationary source based on its size as defined in the Clean Air Act. The emissions data for directly emitted HAPs were obtained from the February 2000 (mobile), July 2001 (point) and June 2001 (non-point) versions of the 1996 National Toxics Inventory (NTI)[3]. The diesel PM inventories were developed as part of the rulemaking for Heavy-Duty Engine and Vehicle Standards and Highway Diesel fuel Sulfur Control Requirements. No HAP precursor emission data were processed for input into ISCST3. The actual inventory files we began with were output inventory files (SAS® format) from EMS-HAP pre-processing steps and EMS-HAP programs that had been previously run for preparation of the ASPEN input files as discussed in Appendix D.

E.1.1 How We Prepared the Houston Domain Point Source Inventory for Input into EMS-HAP Point Source Programs

EMS-HAP point source processing programs are used for preparing emission sources that have known locations for input into the dispersion model. Prior to running EMS-HAP point source programs for ISCST3, we had to prepare the input emissions data. We used the point source output from PtDataProc (run for ASPEN), the non-point output from AreaPrep (also run for ASPEN) and the mobile inventory that had been prepared for input into EMS-HAP for the ASPEN run.

We performed the following three tasks to prepare these inventories for input into EMS-HAP's point source processing programs:
(1) We extracted the Houston Domain point source data and corrected erroneous or missing geographic coordinates;
(2) We extracted the Houston Domain landfill emissions from the non-point inventory and prepared them for EMS-HAP's point source processing programs, where they are modeled as ISCST3-area sources with known locations; and,
(3) We concatenated Houston-domain point sources from the 1996 point source NTI (from task 1) with the landfill ISCST3 area sources (from task 2) and aircraft emission ISCST3 area sources from EMS-HAP's AirportProc program.

These three preparation tasks are described in greater detail in the subsections below.

We extracted the Houston Domain point source data and corrected erroneous or missing point source locational coordinates

With the aid of the Texas Natural Resource Conservation Commission (TNRCC), we performed a quality check of the location data for point sources located within eight counties that encompass the Houston domain. These counties are shown in Table E-1.

Table E-1. Texas Counties Encompassing the Houston Domain

County Name	County FIPS
Chambers	071
Galveston	167
Brazoria	039
Fort Bend	157
Waller	473
Montgomery	339
Liberty	291
Harris	201

We extracted the data for these counties from the output of the PtDataProc program used to prepare data for the ASPEN model (see Appendix D, Sections D.2.1, D.3, and D.11.2). We analyzed the records where the LFLAG was set to 'county', indicating that the location of the site was defaulted. PtDataProc defaults site locations because of incorrect or missing location coordinates, either in UTM (northing, easting, or zone) or in latitude and longitude. We visually inspected the inventory coordinates of the defaulted sites; and in many cases, it was readily apparent which inventory coordinate was erroneous. We sent TNRCC a list of the remaining sites where visual inspection of the inventory coordinates did not lead to confident assignment of site location. TNRCC supplied the correct coordinates for these remaining sites. All corrected location coordinates, obtained by TNRCC or by visual inspection, are summarized in Table E-2. The last four sites in Table E-2 were corrected by visual inspection of the inventory coordinates. These changes to the inventory were implemented through a program written specifically for the conditioning of the NTI point source inventory to the Houston area called HOUSTON_ISCpreproc. The program was also used to concatenate the landfill and aircraft emissions with the other point sources.

Table E-2. Corrected Location Coordinates of Point Sources in Houston Domain

		Corrected Point Source Inventory Location Variables			
Site Name	**ACT-ID**	**XY_TYPE**	**UTM_Z**	**X**	**Y**
Simpson Paper	48201-12359	'UTM'	15	285900	3289700
Champion International	48201-12405	'UTM'	15	296363	3307528
BASF Corporation	48039-12765	'UTM'	15	266202	3210415
Ethyl Corporation	48201-50029	'UTM'	15	290143	3291068
Ethyl Corporation	48201-50027	'UTM'	15	290143	3291068
Hoescht Celanese	48201-12733	'UTM'	15	300334	3278837
Occidental Chemical	48201-12749	'UTM'	15	298400	3290970
Texaco Chemical Company	48339-12759	'UTM'	15	270737	3355860
Rolling Environmental Services	48201-15980	'UTM'	15	297414	3290047
Huntsman Petrochemical Corporation	48201-53638	NC	NC	NC	3275.68
Ethyl Corporation	48201-50000	NC	NC	NC	3292.29
Exxon Comp USA	48201-50253	NC	15	NC	NC
Citgo Pipeline Company	48201-47361	NC	15	NC	NC

where NC = no change

We extracted landfill emissions for the Houston Domain from the non-point inventory and prepared them for EMS-HAP's point source processing programs to be modeled as ISCST3-area sources with known locations

ISCST3 area sources (which should not be confused with "area source" as defined by the Clean Air Act) are used to model low level or ground level emission releases with no plume rise. ISCST3 area sources are created in two very different ways by EMS-HAP. The first type of ISCST3 area source is gridded (discussed in E.1.2); the second type is not gridded because it is a source with unique areal data.

Landfills were prepared to be modeled as ISCST3 area sources of the second type by finding their exact locations and sizes, and allocating the county-level emissions in the NTI's non-point inventory to these exact landfill locations. Note that had these emissions been inventoried with known locations (i.e., as point sources), most of these steps would not have been necessary. It would only have been necessary to provide the additional variables, such as areal dimensions, which are needed to process these emissions as ISCST3 area sources.

To assign locations to the county-level landfill emissions data, we first removed all records from the non-point inventory with category names of 'MUNICIPAL LANDFILLS' and 'MAJOR BIN MUNICIPAL LANDFILLS.' We used a program, HOUSTON_areaPREprep1 written specifically for preconditioning the NTI non-point inventory to the Houston area. The input inventory to this program was the output of the EMS-HAP program AreaPrep, which was used for the National (ASPEN) run.

Landfill location data were obtained from the TNRCC. We received a spreadsheet describing the location (by latitude and longitude and by county) and land area (in acres) of each landfill in Texas. We selected the landfills in the Houston domain by county and converted the land area from acres to square meters. Because the counties contained more than one landfill, we calculated an allocation factor as the ratio between the area of a specific landfill and the total area of all landfills in the county. This was done in a program written specifically for the processing of the landfill data. This program, landfills2point, merges the landfill area data with the county-level landfill emissions data from the NTI non-point source inventory. Emissions are apportioned to each landfill within that county using the allocation factor calculated earlier. For Harris county, only open landfills were used for apportioning county-level emissions; however, both open and closed landfills were used in all surrounding counties because some of these counties contained county-level landfill emissions but only closed (no open) landfills. For Harris county, we assumed that the emissions from open landfills were much more significant than emissions from closed landfills. In a more ideal emission inventory, landfill emissions would be provided at actual landfill locations in the point source inventory rather than aggregated to the county level in the non-point inventory.

We also created, using the landfills2point program, the point source inventory variables (see Table 3-6 for variable descriptions) necessary to process the landfill emissions data using the EMS-HAP point source programs. Table E-3 summarizes the variables and their assigned values.

Table E-3. Necessary Point Source Inventory Variables Assigned by landfills2point

Variable Name	Values assigned
ACT_ID	from 7-digit code unique to each landfill; first 3 digits begin with '500'
EMIS	from allocation factor and county-level emissions, where allocation factor is based on landfill area (tons/year)
EMRELPID	concatenation of ACT_ID and '-0' for "Major Bin Municipal Landfills" (from cat_name variable in county-level inventory -see Table 9-3), or concatenation of ACT_ID and '-1' for "Municipal Landfills"
EMRELPTY	assigned '01' to represent fugitive source
FIPS	5-digit concatenation of state and *corrected* county variables. The county variable provided in the landfills data set does not provide county FIPS; county FIPS were obtained by comparing coordinates with maps
MACTCODE	obtained from non-point source inventory
POLLCODE	obtained from non-point source inventory
SCC	obtained from non-point source inventory
SIC	obtained from non-point source inventory
SITE_ID	same as ACT_ID
SRC_TYPE	set equal to 'area' for Municipal Landfills, and 'major' for Major Bin Municipal Landfills
STACKDIA	initialized as missing (zero)
STACKHT	initialized as missing (zero)
STACKVEL	initialized as missing (zero)
STKTEMP	initialized as missing (zero)
UTM_Z	initialized as zero
X	set to longitude of landfill
XY_TYPE	set to 'LATLON'
Y	set to latitude of landfill
ZIP_CODE	initialized as missing

Required point source inventory variables not assigned by landfills2point (e.g., CNTL_EFF) are automatically assigned values of missing when landfills are concatenated with the point source inventory in the preconditioning program HOUSTON_ISCpreproc (discussed below).

Additional point source variables are required by EMS-HAP's point source processing programs

in order to process the landfills as ISCST3 area sources. These variables, and the values we assigned,[5] are summarized in Table E-4.

Table E-4. Assignment of ISCST3 Area Source Variables for Processing Landfill Emission Sources as ISCST3 Area Sources with the Point Source Inventory

Variable Name	Data Description (Required units or values are in parentheses)	Value[5]
AANGLE	Orientation angle of rectangle for ISCST3 area sources (degrees from North)	0
AINPLUM	Initial vertical dimension of plume for ISCST3 area source (meters)	0
ARELHGT	Release height above ground for ISCST3 area sources (meters)	2
AXLEN	Length of X side of rectangle for ISCST3 area sources (meters)	sqrt(area)
AYLEN	Length of Y side of rectangle for ISCST3 area sources (meters)	sqrt(area)
ISCTYPE	ISCST3 source code (iscpoint, iscvolume, or iscarea)	'iscarea'

Note that while EMS-HAP point source programs require the presence of all variables in Table E-3, many of them are not used for processing ISCST3 area sources (landfills). For example, ISCST3 area sources do not use stack parameters; EMS-HAP point source programs simply carry along this extraneous information with the remainder of the point source inventory.

We concatenated Houston-domain point sources from the 1996 point source NTI with the landfill ISCST3 area sources and aircraft emission ISCST3 area sources from EMS-HAP's AirportProc program

The point source inventory pre-conditioning program HOUSTON_ISCpreproc extracted the counties composing the Houston domain from the NTI point source inventory. In addition, this program concatenated the resulting inventory with the prepared landfill emissions produced by the program landfills2point (discussed in the above subsection), and the airport emissions produced by the EMS-HAP program AirportProc, which we ran with ISCST3 as the model option.

The resulting point source inventory was input into PtDataProc.

E.1.2 How We Prepared the Houston Domain Non-Point and Mobile Source Inventories for Input into EMS-HAP

The non-point and mobile source inventories are provided as county-level emissions. If we can determine exact locations of these county level emissions, then we model them as ISCST3 area sources with specific dimensions, and prepare them for ISCST3 with EMS-HAP's point source processing programs. In our study, we did this for landfills and airports, as discussed in E.1.1. All other county level emissions from the non-point and mobile source inventories were allocated

through spatial surrogates and modeled as gridded ISCST3 area sources using EMS-HAP's non-point and mobile source processing programs (AreaPrep, MobilePrep, AMProc, and AMFinalFormat). We chose 1x1 km grid cells (see Section E-8) for the Houston domain. The choice of this grid size is based on previous modeling experience and is a compromise between the spatial resolution of the surrogate data and computer resources available.

We performed the following four tasks to prepare the inventories for input into EMS-HAP's non-point and mobile source processing programs:
1) We removed landfill emission records from the non-point inventory (discussed in E.1.1) using the preconditioning program HOUSTON_areaPREprep1.
2) We extracted the counties in the Houston domain from the non-point inventory; the preconditioning program in step 1 also accomplished this task.
3) We removed the aircraft emissions from the mobile source inventory (discussed in E.1.1) using the EMS-HAP program AirportProc.
4) We extracted the counties in the Houston domain (Table E-1) from the mobile source inventory using the preconditioning program MOBILE_pre-PREP. The input to MOBILE_pre-PREP was the county-level mobile output (i.e., all mobile emissions except for the allocated aircraft emissions) from AirportProc.

E.2 How We Ran EMS-HAP

Table E-16 in Section E.11 contains a list of the pollutants we modeled with EMS-HAP. The list includes the direct emissions of HAPs and diesel PM. Sections E.2.1 through E.2.4 describe how we processed the aircraft, point source, mobile source, and non-point source inventories through EMS-HAP for the Houston domain.

E.2.1 Aircraft Emissions Processing

We used the same AirportProc input emissions for ISCST3 as we did for ASPEN processing (see Section D.2).

Similar to EMS-HAP for ASPEN, we did not input any point source emissions into the AirportProc program. Instead, to save resources, we extracted Houston domain airport and point source emissions from the national AirportProc (output) and point source inventories, respectively, and *then* concatenated them in the pre-conditioning program HOUSTON_ISCpreproc. AirportProc also assigned ISCST3 area source parameters to the aircraft emissions (see E.4 for parameter values). Aircraft emissions (and landfills) have specific coordinates, so, while they are ISCST3 area sources, they are processed through EMS-HAP's point source programs.

E.2.2 Point Source Processing

We used the point source output file from the preconditioning program HOUSTON_ISCpreproc (see E.1.1) as input for the point source processing programs in the following order: PtDataProc,

PtModelProc, PtTemporal, and PtFinal_ISCST3.

PtFinal_ISCST3 produced the necessary SO pathway section of the ISCST3 run stream, including the various include files pertaining to ISCST3 point, area and volume sources that have known locations (non-gridded) as discussed in Chapter 8 of the User's Guide.

E.2.3 Mobile Source Processing

The output from MOBILE_pre-PREP (see E.1.2) was run through EMS-HAP's MobilePrep program. Then, a second preconditioning program, Mobile_addDPM, was used to concatenate the diesel PM emissions inventory to the mobile source inventory. Two sets of Houston domain mobile emissions (including diesel PM) are output from Mobile_addDPM, an onroad, and a nonroad mobile source inventory. We then separately processed the nonroad and onroad mobile source data through AMProc and AMFinalFormat. Separate processing was necessary because the coarse-fine particulate matter splits for some of the metals in these two inventories are different, thereby requiring the utilization of two different HAP tables (see Section D.5).

AMFinalFormat created the necessary include files for the gridded mobile sources and a text file with source group information. It did not create the SO Pathway section (as is discussed in Chapter 12). We pasted the text file with the source group information to the SO Pathway Section created from PtFinal_ISCST3 and added the appropriate include file references.

E.2.4 Non-point Source Processing

We processed the non-point source output file from the preconditioning program HOUSTON_areaPREprep1 (discussed in E.1.1 and E.1.2), which contains all non-point sources except for the landfills, through AMProc and then AMFinalFormat.

AMFinalFormat created the necessary include files for the gridded non-point sources and a text file with source group information. It did not create the SO Pathway section (as is discussed in Chapter 12). We pasted the text file with the source group information to the SO Pathway Section created from PtFinal_ISCST3 and added the appropriate include file references.

E.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 the ISCST3 SO files are provided as a part of EMS-HAP. Table E-5 lists the ancillary input files for each program we ran. Some of the ancillary files used for non-point and mobile source processing are the same as those used for point source processing. Many of the ancillary files are the same as those used in the ASPEN processing (see Appendix D). File formats, descriptions, and sample data for each of these files are provided in Appendix A. Tables 1 through 4 in Appendix A list the full contents of all of the HAP table files used in the ASPEN processing. The HAP table files used in the ISCST3 processing differ from the HAP table files used in the ASPEN processing only in the value of the 'keep' variable (see

section 4.2.3) because fewer pollutants were modeled in the ISCST3 urban study.

Table E-5. Ancillary Files Used in EMS-HAP for the 1996 Base Year Run for the Houston Domain

EMS-HAP Program	Batch File Keyword	File Name (SAS® files are shown without an extension)	Data Source, and where applicable, Appendix E or Appendix D section which provides more information
Aircraft Emissions Processing			
AirportProc			
	AIRALLC	apt_allc	Based on data compiled by Gregory Rigamer and Associates[6] and the FAA.[7] See D.4
	ISCAREA	ISC_airport_parameters	Dimensions were estimated from map of Houston area and plume release heights were recommended by PES.[5] See E.4
Point Source Processing			
PtDataProc and its "include" programs: utm2ll and ll2utm			
	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
PtModelProc			
	MOBHAPS	haptabl_nonroad.txt (direct emissions)	Same file used for ASPEN except for value of "keep" variable.- See D.5
	PTHAPS	haptabl_point_area.txt (direct emissions)	Same file used for ASPEN except for value of "keep" variable.- See D.5

Table E-5. Ancillary Files Used in EMS-HAP for the 1996 Base Year Run for the Houston Domain (continued)

EMS-HAP Program	Batch File Keyword	File Name (SAS® files are shown without an extension)	Data Source, and where applicable, Appendix E or Appendix D section which provides more information
PtTemporal			
	TAF	taff_ISCfactors.txt	Primarily from temporal allocation database developed by EPA's Office of Research and Development (ORD). See E.7
	SCCLINK	scc2ams.txt	Based on EPA's FIRE database[8]. See D.8 and D.9
	SICLINK	sic2ams.txt	Based on SIC definitions published by the Office of Management and Budget[9]. See D.8 and D.9
	MACTLINK	mact2scc.txt	Based on MACT category definitions[10]. See D.8 and D.9
PtFinal_ISCST3			
	DEFPART	defpart.txt	Pollutant-level particle size and liquid scavenging data based on particulate size class. See E.9
	SCCPART	sccpart.txt	Discussed in Section 8.2.4 but not developed/used for Houston domain run; format is provided in Appendix A
	DEFGAS	defgas.txt	Pollutant-level gas deposition parameters obtained from previous ISCST3 modeling of these pollutants. See E.9
	ELEVDAT	hstn-elev.dat	Based on USGS Digital Elevation Model terrain data. See E.10.3
Non-point Source Processing			
AreaPrep			
	TAFFILE	taff_ISCfactors.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 ASPEN assignments and additional surrogate information See E.7

Table E-5. Ancillary Files Used in EMS-HAP for the 1996 Base Year Run for the Houston Domain (continued)

EMS-HAP Program	Batch File Keyword	File Name (SAS® files are shown without an extension)	Data Source, and where applicable, Appendix E or Appendix D section which provides more information
Non-point and Mobile Source Processing			
AMProc			
	SAFFILE	hsaf1, hsaf2, ...	Spatial allocation factors derived primarily ASPEN spatial surrogate files, also used data from TNRCC.[11] See E.8
	TAFFILE	taff_ISCfactors.txt	Same as TAF under PtTemporal
	SURRXREF	surrxref.txt	Same as SURRXREF under AMProc
	HAPTABLE	haptabl_point_area.txt (direct emissions, non-point) , haptabl_onroad.txt (direct emissions, onroad), haptabl_nonroad.txt (direct emissions, nonroad)	Same as MOBHAPS and PTHAPS under PtModelProc
	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[12]; used to assign groups (from EMISBINS file) based on whether county is rural or urban.
AMFinalFormat			
	DEFPART	defpart.txt	Same as DEFPART in PtFinal_ISCST3
	DEFGAS	defgas.txt	Same as DEFGAS in PtFinal_ISCST3
	ELEVDAT	hstn-elev.dat	Same as ELEVDAT in PtFinal_ISCST3

* '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.

E.4 How We Developed the Airport ISCST3 Area Source Parameters Ancillary File (ISC_airport_parameters.txt)

Airport dimensions, AXLEN, AYLEN, and AANGLE were estimated from a map of the Houston metropolitan area. Release height and initial vertical dimension parameters ARELHGT and AINPLUM respectively, were assumed based on typical values for elevated area source releases.[5] The airport-specific values assigned to the required ISCST3 area source variables is summarized in Table E-6.

Table E-6. Assignment of ISCST3 Area Source Variables for Houston Area Airports

Variable Name	Data Description (Required units or values are in parentheses)	Assigned Value[5]	
		George Bush Intercontinental Airport	William P. Hobby Airport
AANGLE	Orientation angle of rectangular for ISCST3 area sources (degrees from North)	0	0
AINPLUM	Initial vertical dimension of plume for ISCST3 area source (meters)	2	2
ARELHGT	Release height above ground for ISCST3 area sources (meters)	2	2
AXLEN	Length of X side of rectangle for ISCST3 area sources (meters)	5100	2000
AYLEN	Length of Y side of rectangle for ISCST3 area sources (meters)	5300	3000
ISCTYPE	ISCST3 source type (iscpoint, iscvolume, or iscarea)	'iscarea'	'iscarea'

E.5 How We Selected HAPs

For modeling the direct emissions of HAPs, we used three separate versions of the HAP table pertaining to: (1) point and non-point sources, (2) onroad mobile sources, and (3) nonroad mobile sources. The HAP tables used when processing data for ISCST3 and for ASPEN were nearly the same. You can find the details of the development of these tables in Appendix D, Section D.5. Appendix A (Tables A-1, A-3, and A-4) contains a complete listing of each of these files. The assignment of the KEEP variable, which determines which pollutants were selected for modeling, was the only change when processing data for the Houston domain. Pollutants that were modeled are shown in Table E-16 (section E.11).

E.6 How We Developed the Temporal Allocation Factor Files (taff_ISCfactors.txt)

EMS-HAP uses the same ancillary input file, taff-ISCfactors.txt, to temporally allocate point, non-point, and mobile sources. This file contains temporal allocation factors (TAFs) based on the source category. These factors provide the hourly variation of emissions for each season (winter, spring, summer, and fall) and day type (weekday, Saturday, and Sunday). For each source category, there are 24 hourly factors for each of the 4 seasonal factors and 3 day type factors. As with the TAF file developed for processing data for the ASPEN model, we used the database developed by ORD[13] as a starting point, because it is the most complete database. As discussed in D.7, this database was originally developed for regional emission modeling studies under the National Acid Precipitation Assessment Program (NAPAP); its development is documented in an EPA report.[14]

The ORD temporal database for point and non-point sources is currently in the format required for processing data for ISCST3. We made some changes and additions to the data for processing mobile sources as follows:

1. Similar to the process used in developing the TAF file for processing data for ASPEN, the aggregated highway vehicle TAFs were developed by taking the average of three separate ORD profiles for rural non-interstate, urban non-interstate, and interstate roadways (see Equation D-2 in Section D.7 for more details).

2. Light duty diesel vehicles were not specifically addressed in the ORD temporal database. As done in the TAF file used for processing data for ASPEN, Light Duty Diesel Vehicles and Light Duty Diesel Trucks were assigned a similar profile as Heavy Duty Diesel Vehicles.

3. Motorcycle TAFs were changed from uniform (ASPEN) to the Light Duty Gasoline Vehicles (LDGV) profile because we felt that motorcycle emissions would better approximate the diurnal variation of the LDGV profile.

4. For airports, the TAF file used for processing data for ASPEN contained 3 primary non-uniform TAF profiles: 1) one for general and commercial aircraft (see Figure D-2), based on commercial aircraft landings and takeoffs[15]; 2) a flatter profile for military aircraft, and 3) for other aircraft type (i.e., Air Taxi), a uniformly high profile from 6am to midnight with very low activity between midnight and 6am. For ISCST3 TAFs, we considered using ORD[13] TAFs, which contain day-of-week and seasonal factors. However, for airports, all ORD[13] hourly profiles were of the third type just mentioned; that is, all ORD[13] aircraft TAFs had a uniformly high profile from 6am to midnight with very low activity between midnight and 6am. We felt that the ASPEN TAFs used for commercial aircraft[15] (see Figure D-2) were more realistic; therefore, for aircraft in the ISCST3 TAF file, we used the hourly ASPEN TAFs and assigned no seasonal or day-of-week variation. The end result is that the ISCST3 commercial aircraft TAF has the same hourly shape as the ASPEN TAF in Figure D-2 for every season and day-of-week type. We could have preserved the NAPAP seasonal weightings (there were no day-of-week variations for any of the aircraft TAFs in the ORD

file); this would have resulted in 4% greater emissions in spring and summer and 8% fewer emissions in the winter.

5. For the broad nonroad diesel engine mobile category, we used the non-uniform profile from the TAF file developed for processing data for ASPEN.

Plots of TAF profiles for the mobile onroad, and for many of the mobile nonroad source categories, are provided in Figures E-1 and E-2. Unlike the TAF profiles used for processing data for ASPEN, provided in Figures D-1 and D-2 (see Section D.7), these temporal profiles often possess seasonal and day-of-week variation in addition to diurnal variation.

Figure E-1. Plots of Onroad Temporal Allocation Patterns

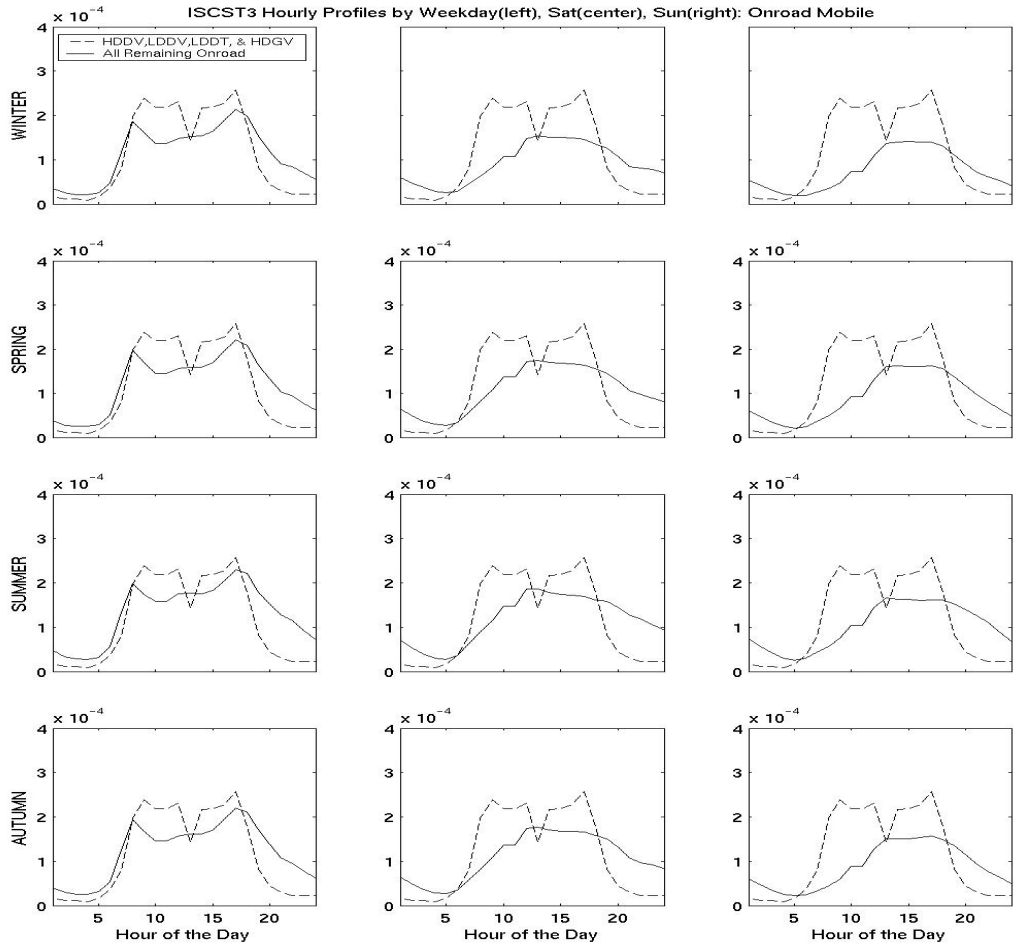
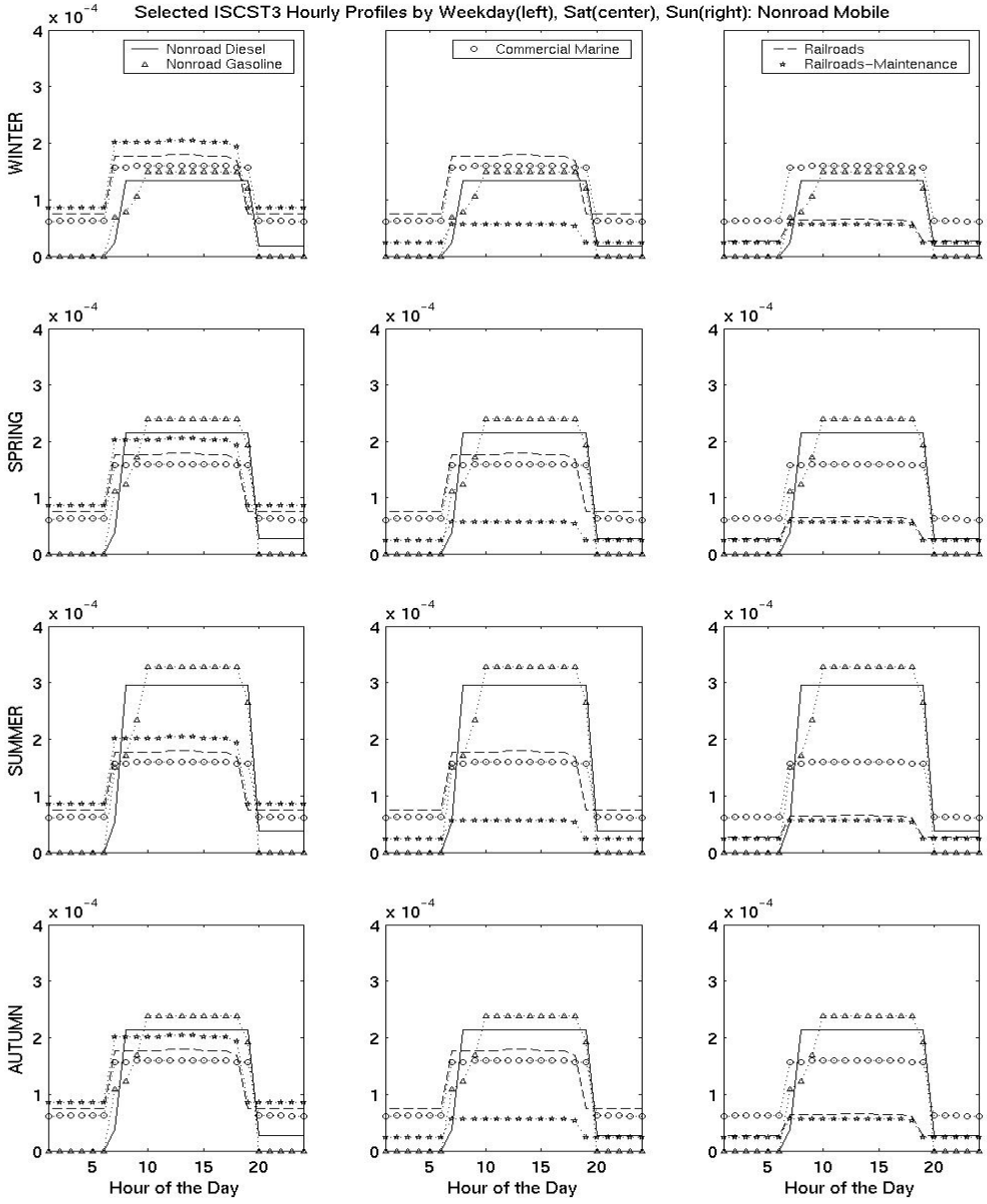


Figure E-2. Plots of Nonroad Temporal Allocation Patterns



E.7 How We Assigned Spatial Surrogates for Non-point and Mobile Source Categories

We assigned non-point and mobile source spatial surrogates for ISCST3 in a similar fashion to ASPEN (see Sections D.8 and D.9), with two exceptions: 1) we reassigned source categories from inverse population density surrogates, and 2) we created new surrogates for onroad mobile sources.

As discussed in Sections E.8 and E.10, EMS-HAP uses a file to link AMS and SCC codes to spatial surrogates. After investigating preliminary Houston domain benzene emission density maps of non-point and nonroad mobile emissions, we concluded that the assignment of dominant AMS and SCC codes to spatial surrogates based on inverse population density was not correct. Table E-7 provides the source categories and new surrogate assignments for spatial surrogates reassigned from inverse population density surrogates to other more suitable surrogates for ISCST3. We reassigned three categories to new surrogates created for Rural Areas (code 53), Commercial Aviation (code 60), and Onshore Oil and Gas Production (code 66).

Table E-7. Non-point and Nonroad Mobile Source Categories Assigned to New Surrogates for ISCST3 Modeling of the Houston Domain

Category Name Assigned to Inverse Population Surrogate for ASPEN Modeling	Code Used to Obtain Spatial Surrogates	Surrogate Code Used for Houston Domain	Surrogate Name
INSTITUTIONAL/COMMERCIAL HEATING: POTW DIGESTER	2103010000	53	Rural Area
ALL OFF-HIGHWAY VEHICLE: DIESEL	2270000000	20	Population
OFF-HIGHWAY DIESEL, CONSTRUCTION AND MINING EQUIPMENT	2270002000	20	Population
OFF-HIGHWAY DIESEL, AIRPORT GROUND SUPPORT EQUIPMENT	2270008000	60	Commercial Aviation
PUBLICLY OWNED TREATMENT WORKS	2630000000	6	Commercial and Industrial Land
OPEN BURNING: SCRAP TIRES	2830000000	6	Commercial and Industrial Land
MEDICAL WASTE INCINERATION	50200504	3	Industrial Land
HAZARDOUS WASTE INCINERATION	50300501	3	Industrial Land
ONSHORE OIL AND GAS PRODUCTION	2310000000	66	Onshore Oil and Gas Production

The onroad mobile categories previously assigned to the surrogates for Roadway Miles (code 22) and Roadway Miles/Population (codes 24 and 25) were reassigned to 9 new vehicle class surrogates. These new surrogates (codes 30 through 38) are based on a county-level weighting of the roadway miles data based on the roadway types used by a specific vehicle class. These new surrogates are discussed in more detail in the next section.

E.8 How We Developed the Spatial Allocation Factors

When processing data for ASPEN, the spatial allocation factors (SAFs) are developed and used for allocating county-level emissions to census tracts. To process data for ISCST3, the county-level emissions are allocated to 1 by 1 km grid cells. We started with the SAFs used to process data for ASPEN (see Table D-18 in Section D.10) and assigned these SAFs to 1x1 km grid cells using the Geographic Information System (GIS) data. New spatial allocation factors for use in the Houston domain were also developed for several categories, and are listed in Table E-8. Table D-18 lists the ASPEN-based spatial surrogates; these same surrogate names and codes are apportioned to 1x1 km spatial surrogates for the Houston, TX domain.

We developed the new onroad spatial surrogates (codes 30 through 38 in Table E-8) using county-level, Census Feature Class Code (CFCC)-specific TIGER data from the Bureau of Census[15], and a DOT BTS (Department of Transportation Bureau of Transportation Statistics) vehicle split fraction table.[16] For example, for code 30, light duty gasoline vehicles (LDGV), the surrogate for row i and column j in a county is based on the following formula:

$$SAF30_{county,\,i,j} = sum(A_{county,i,j,k} * LDGV_k)|_k \qquad \text{(eq. E-1)}$$

where

$SAF30_{county,\,i,j}$ = the spatial allocation factor for LDGV at row i and column j within a county. (For any spatial surrogate, the values for all of the cells in a given county will sum to 1.0 if the entire county is gridded)

$A_{county,i,j,k}$ = TIGER cfcc-specific roadway fraction k at row i and column j within each county. For example, the sum of all interstate roadway fractions "$A_{county,i,j,interstate}$", for each county, is 1.0 if the entire county is gridded, and possibly less than 1.0 if only part of the county is gridded.

$LDGV_k$ = DOT BTS vehicle split (cfcc-specific) LDGV surrogate; sums to 1.0 over all cfcc-types (i.e., interstate, major arterial, local roads...)

$sum(...)|_k$ = sum of all elements by variable k (cfcc type here)

Columns and rows simply index the southwest corner of the UTMX and UTMY (respectively) coordinates for each grid cell in the domain. Variables XORIG and YORIG in the AMProc batch file (see Table E-14) provide the SW corner of the first row and column. Each successive

column has a UTMX position to the east of the previous column; each sucessive row has a UTMY position to the north of the previous row.

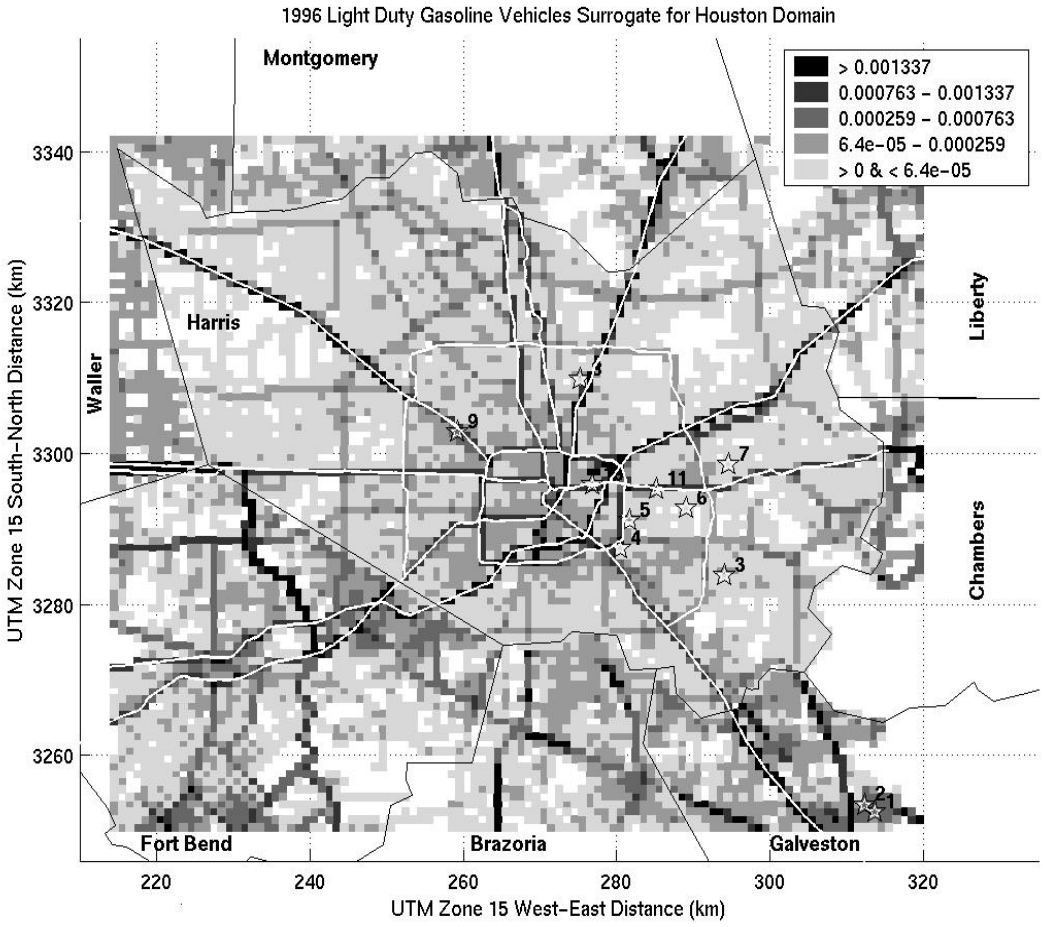
Figure E-3, a plot of surrogate code 30 for LDGV, shows that most of the onroad mobile emissions are now assigned to the major roads. Major roadways superimposed as white lines, monitor observations as numbered stars, and county names and boundaries are provided for reference. For each source category, county-level emissions are allocated to 1 by 1 km grid cells by multiplying the surrogate value by the county-level emissions for that source category. Harris county resides completely within our domain; therefore, the sum of all 1 by 1 km surrogates is 1.0 (meaning 100% of county-level emissions are allocated) for each SAF in Harris county.

The three new non-point and nonroad mobile source surrogates (53, 60, and 66) in Table E-8 were provided by TNRCC[11]; these three surrogates are based on USGS information. These three spatial surrogates were originally 2x2 km grid surrogates; we partitioned them (with equal weighting), into four individual 1x1 km surrogates of equal value.

Table E-8. Additional Spatial Allocation Factors Developed for Processing Houston Domain Data for ISCST3

Code for set of SAFs	Surrogate Definition	Origin of data
30	Light Duty Gasoline Vehicles	1990 -TIGER Line data[16] and 1996 DOT BTS vehicle splits[17]
31	Light Duty Gasoline Trucks 1	1990 -TIGER Line data[16] and 1996 DOT BTS vehicle splits[17]
32	Light Duty Gasoline Trucks 2	1990 -TIGER Line data[16] and 1996 DOT BTS vehicle splits[17]
33	Heavy Duty Gasoline Vehicles	1990 -TIGER Line data[16] and 1996 DOT BTS vehicle splits[17]
34	Motorcycles	1990 -TIGER Line data[16] and 1996 DOT BTS vehicle splits[17]
35	Light Duty Diesel Vehicles	1990 -TIGER Line data[16] and 1996 DOT BTS vehicle splits[17]
36	Light Duty Diesel Trucks	1990 -TIGER Line data[16] and 1996 DOT BTS vehicle splits[17]
37	Heavy Duty Diesel Vehicles	1990 -TIGER Line data[16] and 1996 DOT BTS vehicle splits[17]
53	Rural Area	1990 -TNRCC[11]; uses USGS land use/land cover data
60	Commercial Aviation	1990 -TNRCC[11]; uses digitized USGS general highway maps, weighted by activity
66	Onshore Oil and Gas Production	1990 -TNRCC[11]; uses digitized oil and gas maps of Texas

Figure E-3. Distribution of Spatial Surrogate 30: Light Duty Gasoline Vehicles



E.9 How We Created the Deposition Files for Particles and Gases

When processing data for the Houston domain through EMS-HAP, we used the ancillary files defpart.txt and defgas.txt to assign pollutant-level particle sizes and gas deposition parameters.

We assigned size distributions for particulate toxics based on their particulate size classification for ASPEN modeling as fine or coarse particulates (see D.5.) For pollutants we modeled as coarse particulates in ASPEN, we assigned a single particulate size 6.925 microns, which is the mass mean diameter between 2.5 and 10 microns. For pollutants we modeled as fine particulates in ASPEN, we assigned a single particulate size of 1.575 microns, the mass mean diameter between 0 and 2.5 microns.

The formula for mass mean diameter is computed based on Equation 1-54 in the ISC2 Model

User's Guide[18]:

$$\text{mean mass diameter (d)} = ([d_1^3+d_1^2d_2+d_1d_2^2+d_2^3]/4)^{1/3} \quad \text{(eq. E-2)}$$

where

d_1 = lower bound diameter. Equal to 0μm for fine particulates, and 2.5μm for coarse particulates

d_2 = upper bound diameter. Equal to 2.5μm for fine particulates, and 10μm for coarse particulates

We used an aerodynamic density of 1 (g/cm^3) for all particulates. The precipitation scavenging coefficients are based on Figure 1-11 of the ISCST3 User's Guide[19]. Values of the particulate parameters we used are summarized in Table E-9.

Table E-9. Particle Size Distributions and Precipitation Scavenging Coefficients for Houston Domain

Pollutant	SAROAD	Mean Particle Diameter (μg)	Mean Particle Density (g/cm^3)	Precipitation Scavenging Coefficient (hr/s-mm)
Cadmium, fine	80124	1.575	1.0	0.000013
Cadmium, coarse	80324	6.925	1.0	0.000052
Chromium, fine	80141	1.575	1.0	0.000013
Chromium, coarse	80341	6.925	1.0	0.000052
Diesel PM, fine	80400	1.575	1.0	0.000013
Diesel PM, coarse	80401	6.925	1.0	0.000052
Lead, fine	80193	1.575	1.0	0.000013
Lead, coarse	80393	6.925	1.0	0.000052

We used the gas deposition parameters given in Table E-10. These were obtained from the EPA report "Dispersion Modeling of Toxics Pollutants in Urban Areas."[20] Mesophyll Resistance were obtained by dividing Henry's Law constant by a factor[21] of 0.34. Chemical scavenging coefficients, necessary for estimating wet deposition, were not available for the gaseous pollutants. Dry deposition parameters for 1,3-dichloropropene were also not available.

Table E-10. Gas Deposition Parameters for Houston Domain

Pollutant	SAROAD	Diffusivity (cm^2/sec)	Alpha	Reactivity Parameter	Mesophyll Resistance (s/cm)*	Henry's Law coefficient	Henry's Law constant (Pa-m^3/mol)**
Acrolein	43505	0.1094	1.0	10.0	2,894	0.0404	98.4
Benzene	45201	0.0896	1.0	10.0	16,382	0.2287	557
1,3-Butadiene	43218	0.1013	1.0	10.0	608,820	8.4975	20,700
Formaldehyde	43502	0.1720	1.0	10.0	0.9412	1.314×10^{-5}	0.032
Tetrachloroethylene	43817	0.07492	1.0	10.0	78,529	1.0961	2,670
Vinyl Chloride	43860	0.1099	1.0	10.0	235,880	3.2923	8,020

* Mesophyll Resistance = (H/0.034)
** Henry's Law Coefficient = H/(R*293), where R=ideal gas constant (8.314 Pa-m3/K-mol)

E.10 Program Options and Parameters

This section presents the options used to run EMS-HAP for the Houston domain. Several of the EMS-HAP programs contain options for determining which specific functions to perform and choices of how to run those functions. 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 ISCST3 input files. We only present programs we ran that have options.

E.10.1 AirportProc program options and parameters

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 E-11. The allocated aircraft emissions inventory was then added to the point source using the pre-processing program HOUSTON_ISCpreproc (discussed in E.1.1).

Table E-11. Program Options and Parameters Used for AirportProc

Keyword	Description	Value
MODEL	ISC = run EMS-HAP for ISCST3 model and ASPEN = run EMS-HAP for ASPEN model	ISC
ADD2PT	1=append records to output 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

E.10.2 PtDataProc program options and parameters

When the 1996 NTI point source inventories were processed through PtDataProc, point source locations were converted to UTM coordinates. When processing data for ISCST3, no location defaulting procedures are performed; however, EMS-HAP performs quality checks and assigns values to the variable LLPROB (see section 3.1.1) when converting inventory location units to UTM coordinates.

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 E-12. 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 E-12.

Table E-12. Program Options and Parameters Used for PtDataProc

Keyword	Description	Value
MODEL	ISC = run EMS-HAP for ISCST3 model and ASPEN = run EMS-HAP for ASPEN model	ISC
REF_ZONE	UTM zone for ISCST3 model domain	15
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
DOSCCDEF	SCC to default stack parameters correspondence text file prefix (def_scc.txt)	1
DOSICDEF	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 without UTM coordinates 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
DHITEMP	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
DFLTDIA	Default stack diameter (in meters)	1

E.10.3 PtFinal_ISCST3 program options and parameters

When the 1996 NTI point source inventories were processed through PtFinal_ISCST3, source groups were assigned by the source type only (see Table 8-1 in Section 8.1.1). Assignments were not made by MACT category, 6-digit SCC, or SIC. The default source group was group 1; however, no records contained a missing source type so this default source group was never applied. We used a pollutant-level particle size distribution file (see Section E.9). We used scavenging coefficients included in the pollutant-level particle size distribution file but not in the gas deposition file (see Section E.9). We used a gridded elevation file (see Figure A-32 for file format) that covered the entire Houston domain. This terrain elevation data is made available through the U.S. Geological Survey (USGS) web site[22]. We set a default elevation of 100 meters, but it was never applied because we used the aforementioned gridded elevation file.

The Houston domain in our study is 92 km x 106 km in area, with a southwest corner in Fort Bend county at (UTMX = 214000, UTMY = 3250000) in UTM zone 15. The spatial surrogate map in Section E.8 (Figure E-3) shows the entire domain with county borders and major highways superimposed.

With the PtFinal_ISCST3 program options we specified in Table E-13, EMS-HAP created, for each pollutant in the inventory (see Table E-16 in Section E.11), an ISCST3 SO run stream file and include files that contain:

- emission factors and source locations and parameters
- emission source data
- particle size distribution parameters
- gas deposition parameters
- building dimensions data

Table E-13. Program Options and Parameters Used for PtFinal_ISCST3

Keyword	Description	Value
MODEL	ISC = run EMS-HAP for ISCST3 model and ASPEN = run EMS-HAP for ASPEN model	ISC
DOSOURCE	0 =do not assign source group by source type; 1 =assign source group by source type	1
DOMACT	1 =do not assign source group by MACT category; 1 =assign source group by MACT category	0
DOSCC	0 =do not assign source group by SCC; 1 =assign source group by SCC	0
DOSIC	0 =do not assign source group by SIC; 1 =assign source group by SIC	0
DFLTGRP	Default source group (01 through 99)	01
DEFPART	Pollutant-level particle distribution text file prefix; put 'NONE' if no file is to be used	defpart
SCCPART	SCC-level particle distribution text file prefix; put 'NONE' if no file is to be used	NONE
GASDEPO	YES=create gas deposition include files	YES
DEFGAS	Default pollutant-level gas deposition data text file prefix; put 'NONE' if no file is to be used	defgas
SCAVENG	0 =scavenging coefficients are not included in DEFPART or DEFGAS files; 1 =scavenging coefficients may be included in DEFPART or DEFGAS files	1
ELEVDAT	Gridded terrain elevation data text file prefix; put 'NONE' if no file is to be used	hstn-elev
DEFELEV	Default source elevation (in meters); used only if ELEVDAT='NONE'	100
RUN_ID	Run identification code used to insure unique ISCST3 source ID's	A
USEBLDG	YES =write building dimension include files	YES
PARTMETH	0 =do not create particle distribution include files; 1 =create particle distribution include files by SCC; 2 =create particle distribution include files by pollutant	2
X_ORIG	UTM easting coordinate of the SW corner of modeling grid origin (meters)	214000
Y_ORIG	UTM northing coordinate of the SW corner of modeling grid origin (meters)	3250000
CELLSIZE	Width of each grid cell (meters)	1000
MAXCOL	Total number of columns in the modeling grid	106
MAXROW	Total number of rows in the modeling grid	92

E.10.4 AMProc program options and parameters

When the 1996 NTI non-point and mobile source Houston TX ISCST3 inventories were processed through AMProc, the program options and parameters in Table E-14 were specified.

Table E-14. Program Options and Parameters Used for AMProc

Keyword	Description	Value
MODEL	ISC = run EMS-HAP for ISCST3 model and ASPEN = run EMS-HAP for ASPEN model	ISC
GCFLAG	0 =don't perform growth and control calculations; 1 =perform growth and control calculations; 2 =run growth and control only, using a temporally and spatially allocated emissions file (Because the growth and control calculation were not made, keywords GROWFLAG, SICFLAG, CNTLFLAG, SPECMACT, GROWYEAR, and REBIN had no effect on run)	0
XORIG	UTM easting coordinate of the SW corner of modeling grid origin (meters)	214000
YORIG	UTM northing coordinate of the SW corner of modeling grid origin (meters)	3250000
CELLSIZE	Width of each grid cell (meters)	1000
LSUBSETP	0 =don't process only one pollutant; 1 =process only one pollutant (Because all pollutants were processed, keyword SUBSETP had no effect on run)	0
LSUBSETG	0=don't process only one state; 1 =process only one state (Because all states were processed, keyword SUBSTG had no effect on run)	0
LCPTIMES	1 =print component CPU times; 0=don't print component CPU times	1
LDBG	0 =don't print out diagnostic information; 1 =print out of information	0
LONECELL	0 =don't print out diagnostics for selected single cell; 1 =print out diagnostics (Because no single cell diagnostics were printed, keyword ONECELL had no effect on run)	0

E.10.5 AMFinalFormat program options and parameters

We processed the 1996 NTI non-point source, onroad mobile source, and nonroad mobile source inventories through AMFinalFormat to produce the source pathway section of the ISCST3 run stream. We used a pollutant-level particle size distribution file (see Section E.9). We used scavenging coefficients included in the pollutant-level particle size distribution file but not in the gas deposition file (see Section E.9). We used a gridded elevation file (see Figure A-32 for file format) that covered the entire Houston domain. This terrain elevation data is made available through the U.S. Geological Survey (USGS) web site[21]. We set a default elevation of 100 meters, but it was never applied because we used the aforementioned gridded elevation file.

The Houston domain in our study is 92 km x 106 km in area, with a southwest corner in Fort Bend county at (UTMX = 214000, UTMY = 3250000) in UTM zone 15. The spatial surrogate map in Section E.8 (Figure E-3) shows the entire domain with county borders and major highways superimposed.

With the AMFinalFormat program options we specified in Table E-15, EMS-HAP created, for each pollutant in the inventory (see Table E-16 in Section E.11), include files that contain:

- emission factors and source locations and parameters
- emission source data
- particle size distribution parameters
- gas deposition parameters

As discussed in Section 12.1.10, for each pollutant, AMFinalFormat also produces a file listing the source groups for all sources in the emissions inventory. The user adds this source group information, as well as the additional statements to call the include files created from AMFinalFormat, to the existing SO pathway section of the ISCST3 run stream file created from PtFinal_ISCST3.

Table E-15. Program Options and Parameters Used for AMFinalFormat

Keyword	Description	Value
DEFPART	Pollutant-level particle distribution text file prefix; put 'NONE' if no file is to be used	defpart
GASDEPO	YES =create gas deposition include files	YES
DEFGAS	Default pollutant-level gas deposition data text file prefix; put 'NONE' if no file is to be used	defgas
SCAVENG	0 =scavenging coefficients are not included in DEFPART or DEFGAS files; 1 =scavenging coefficients are included in DEFPART or DEFGAS files	1
ELEVDAT	Gridded terrain elevation data text file prefix; put 'NONE' if no file is to be used	hstn-elev
DEFELEV	Default source elevation (in meters); used only if ELEVDAT='NONE'	100
RUN_ID	Run identification code used to insure unique ISCST3 source ID's	B for non-point N for onroad F for nonroad
ARELHGT	Release height above ground (meters)	2
AANGLE	Orientation angle of grid cell rectangular (degrees from North)	0
AINPLUM	Initial vertical dimension of plume (meters)	1
X_ORIG	UTM easting coordinate of the SW corner of modeling grid origin (meters)	214000
Y_ORIG	UTM northing coordinate of the SW corner of modeling grid origin (meters)	3250000
CELLSIZE	Width of each grid cell (meters)	1000
MAXCOL	Total number of columns in the modeling grid	106
MAXROW	Total number of rows in the modeling grid	92

E.11 Pollutant-specific Files Created for the 1996 Base Year EMS-HAP Run of the Houston Domain

Using the methodology discussed in E.1 through E.10, we created an SO pathway section of the ISCST3 run stream file that includes point, non-point, and mobile source include files for each of the pollutants listed in Table E-16 below.

Table E-16. List of Pollutants for which Run Stream Files Were Created

Pollutant	SAROAD in EMS-HAP
acrolein	43505
benzene	45201
1,3 butadiene	43218
cadmium compounds, fine	80124
cadmium compounds, coarse	80324
chromium compounds, fine	80141
chromium compounds, coarse	80341
1,3-dichloropropene	80152
diesel PM, fine {for mobile sources only}	80400
diesel PM, coarse {for mobile sources only}	80401
formaldehyde	43502
lead compounds, fine	80193
lead compounds, coarse	80393
tetrachloroethylene (perc.)	43817
vinyl chloride	43860

REFERENCES FOR APPENDIX E

1. User's Guide for the Industrial Source Complex (ISC3) Dispersion Models: Volume I - User Instructions. EPA-454-/D-95-003a, U.S. Environmental Protection Agency, Research Triangle Park, NC. 1995d.

2. U.S. Environmental Protection Agency. Unified Air Toxics Website: The Pollutants. http://www.epa.gov/ttn/uatw/pollsour.html

3. U.S. Environmental Protection Agency. Integrated Urban Air Toxics Strategy PO Data System. http://www.epa.gov/ttn/uatw/urban/urbanpg.html

4. Driver, L.; Pope, A.; Billings, R.; Wilson, D. "The 1996 National Toxics Inventory and Its Role in Evaluating the EPA's Progress in Reducing Hazardous Air Pollutants in Ambient Air", Presented at the 92nd Annual Meeting of the Air & Waste Management Association, St. Louis, Missouri, 1999; paper 91-501.

5. Personal Communication from Roger Brode, Pacific Environmental Services, October 2000.

6. *FAA 5010 Database*. g.c.r. and associates. http//www.gcr1.com .

7. *Statistical Handbook of Aviation, 1996.* Federal Aviation Administration, U.S. Department of Transportation, Washington, DC.

8. *Factor Information Retrieval (FIRE) data system (version 6.22)*. U.S. Environmental Protection Agency, Research Triangle Park, NC. October 1999. http://www.epa.gov/ttnchie1/fire.htm.

9. *Standard Industrial Classification Manual*. Executive Office of the President, Office of Management and Budget, Washington, DC. 1987.

10. "Initial List of Categories of Sources Under Section 112(c)(1) of the Clean Air Act Amendments of 1990." *Federal Register*. **57**:(137). Pp. 31576-31592.

11. Appendix to the Houston Attainment State Implementation Plan, Adopted: May 6, 1998, Rule Log No. 1997-184-SIP-AI, TNRCC. Provided by Jim MacKay.

12. Electronic Mail. From Laurel Driver, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards (OAQPS) to Madeleine Strum (OAQPS), August 13, 1999.

13. Moody, T.; Winkler, J.D.; Wilson, T.; Kirsteter, S. *The Devlopment and Improvement of Temporal Allocation Factor Files*. EPA-600/R-95-004. U.S. Environmental Protection Agency, Research Triangle Park, NC. January 1995.

14. Fratt, D.B.; Mudgett, D.F.; Walters, R.A. The 1985 NAPAP *Emissions Inventory: Development of Temporal Allocation Factors*. EPA-600/7-89-010d, U.S. Environmental Protection Agency, Research Triangle Park, NC. April 1990.

15. Federal Aviation Administration APO Data System. http://www.apo.data.faa.gov (accessed June 7, 1999).

16. United States Census Bureau: 1990 TIGER. http://www.census.gov/geo/www/tiger/index.html

17. Houston area vehicle split fractions table -1996 United State Department of Transportation (DOT) Bureau of Transportation Statistics (BTS).

18. U.S. Environmental Protection Agency. User's Guide for the Industrial Source Complex (ISC2) Dispersion Models, Volume II - Description of Model Algorithms. EPA-450/4-92-008b, Research Triangle Park, 1992.

19. U.S. Environmental Protection Agency. User's Guide for the Industrial Source Complex (ISC3) Dispersion Models, Volume II - Description of Model Algorithms. EPA-454/B-95-003b, Research Triangle Park, 1995.

20. U.S. Environmental Protection Agency. Dispersion Modeling of Toxic Pollutants in Urban Areas: Guidance, Methodology and Applications. EPA-454/R-99-021, Research Triangle Park, 1999.

21. Wesely, M.L., P.V. Doskey., and J.D. Shannon, 2002. Deposition Parameterizations for the Industrial Source Complex (ISC3) Model, Draft, ANL/ER/TM-nn, DOE/xx-nnnn, Environmental Research Division, Argonne National Laboratory, Argonne, IL.

22. USGS Digital Elevation Model (DEM) terrain data. http://edcwww.cr.usgs.gov/doc/edchome/ndcdb/ndcdb.html

TECHNICAL REPORT DATA
(Please read Instructions on reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA 454/B-02-001		

4. TITLE AND SUBTITLE	5. REPORT DATE
User's Guide for the Emissions Modeling System for Hazardous Air Pollutants (EMS-HAP) Version 2.0	August 2002
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Diane Linderman,(EC/R, Inc.); Richard Mason (DynCorp Systems and Solutions LLC) and Madeleine Strum (EPA)	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO.
	11. CONTRACT/GRANT NO. EPA Contract Nos. 68D98006 (EC/R) and IAG47939482-01 (DynCorp)
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Emissions, Monitoring & Analysis Division Research Triangle Park, NC 27711	13. TYPE OF REPORT AND PERIOD COVERED User's Guide
	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES
EPA Work Assignment Manager: Madeleine L. Strum

16. ABSTRACT

This user's guide provides documentation for the Emissions Modeling System for Hazardous Air Pollutants (EMS-HAP, Version 2.0), also referred to as EMS-HAP. It replaces EMS-HAP version 1.1. The key differences in Version 2 are the added functionality to process emissions for the ISCST3 air quality model and added flexibility in estimating future-year emissions.

This guide describes the EMS-HAP program functions and ancillary files, and it provides the user instructions for running the model to prepare toxic emissions for input into either the Assessment System for Population Exposure Nationwide (ASPEN, Version 1.1) or the Industrial Source Complex Short Term (ISCST3) dispersion model. EMS-HAP is an emissions processor for either ASPEN or ISCST3 and performs the steps needed to prepare toxic emission inventories for these models. These steps include spatial allocation of county-level non-point and mobile source emissions to either census tracts or grid cells and temporal allocation of annual emissions to hourly emission rates. In addition, EMS-HAP can project future year emissions by adjusting the baseline emissions to account for growth and the emission reductions resulting from emission reduction scenarios including the implementation of the Maximum Achievable Control Technology (MACT) standards. Appendix D discusses how the EMS-HAP ancillary files were developed, and how EMS-HAP was run to process the 1996 National Toxics Inventory (NTI) for ASPEN for a national scale air toxics assessment. Appendix E discusses how EMS-HAP was used to process toxic emissions data from the 1996 NTI for ISCST3 for an urban scale assessment.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution Emission Models Emission Processing National Toxics Inventory National Air Toxics Assessment Urban Scale Modeling Air Toxics		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(Report)*	21. NO. OF PAGES
Release Unlimited	Unclassified	436
	20. SECURITY CLASS *(Page)*	22. PRICE
	Unclassified	