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USER'S GUIDE FOR THE URBAN AIRSHED MODEL

Volume IV: User's Manual for the Emissions Preprocessor System

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USER'S GUIDE FOR THE URBAN AIRSHED MODEL

Volume IV: User's Manual for the Emissions Preprocessor System

By

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Notice

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Preface

This user's guide for the Urban Airshed Model (UAM) is divided into five volumes as follows:

Volume I—User's Manual for UAM(CB-IV)
Volume II— User's Manual for the UAM(CB-IV) Modeling System (Preprocessors)
Volume III—User's Manual for the Diagnostic Wind Model
Volume IV—User's Manual for the Emissions Preprocessor System
Volume V—Description and Operation of the ROM-UAM Interface Program System

Volume I provides historical background on the model and describes in general the scientific basis for the model. It describes the structure of the required unformatted (binary) files that are used directly as input to UAM. This volume also presents the formats of the output files and information on how to run an actual UAM simulation. For those user's that already possess a UAM modeling data base or have prepared inputs without the use of the standard UAM preprocessors, this volume should serve as a self-sufficient guide to running the model.

Volume II describes the file formats and software for each of the standard UAM preprocessors that are part of the UAM modeling system. The preprocessor input files are ASCII files that are generated from raw input data (meteorological, air quality, emissions). The preprocessor input files are then read by individual preprocessor programs to create the unformatted (binary) files that are read directly by the UAM. Included in this volume is an example problem that illustrates how inputs were created from measurement data for an application of the UAM in Atlanta. The preprocessers available for generating wind fields and emission inventories for the UAM are described separately in Volumes III and IV, respectively.

Volume III is the user's manual for the Diagnostic Wind Model (DWM). This model is a stand-alone interpolative wind model that uses surface- and upper-level wind observations at selected sites within the modeling domain of interest to provide hourly, gridded, three-dimensional estimates of winds using objective techniques. It provides one means of formulating wind field inputs to the UAM.

Volume IV describes in detail the Emission Preprocessor System (EPS). This software package is used to process anthropogenic area and point source emissions for UAM from countywide average total hydrocarbon, NO_x, and carbon monoxide emissions

available from national emission inventories, such as the National Emissions Data System or the National Acid Precipitation Assessment Program. An appendix to this volume describes the Biogenic Emissions Inventory System (BEIS), which can be used to generate gridded, speciated biogenic emissions. Software for merging the anthropogenic area, mobile, and biogenic emission files into UAM input format is also described in this volume.

Volume V describes the ROM-UAM interface program system, a softare package that can be used to generate UAM input files from inputs and outputs provided by the EPA Regional Oxidant Model (ROM).

Acknowledgements

Since its initial conception in the early 1970s, many individuals have contributed to the development of the Urban Airshed Model. This document reflects the latest methodology and software development and provides a guide for new user's of the model. Based on the past efforts of the orginal developers of the UAM and the authors of the original 1978 user's manual, the first four volumes were written by the following individuals from Systems Applications, Inc.:

Volume I	Ralph E. Morris, Thomas C. Myers, Jay L. Haney
Volume II	Ralph E. Morris, Thomas C. Myers, Edward L. Carr, Marianne C. Causley, Sharon G. Douglas, Jay L. Haney
Volume III	Sharon G. Douglas, Robert C. Kessler, Edward L. Carr
Volume IV	Marianne C. Causley, Julie L. Fieber, Michele Jimenez, LuAnn Gardner

Volume V, containing the ROM-UAM Interface Program Guide, as well as Appendix D in Volume IV (Biogenics Emission Inventory System) were written by the following individuals of Computer Sciences Corporation and EPA's Atmospheric Science Modeling Division:

Volume V	Ruen-Tai Tang, Susan C. Gerry, Joseph S. Newsom, Allan R. Van Meter, and Richard A. Wayland (CSC); James M. Godowitch and Ken Schere (EPA)

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Others at Systems Applications that have contributed to the continued development of the UAM in the last few years include Dr. Gary Whitten and Mr. Gary Moore. The technical editing of this manual was performed by Mr. Howard Beckman. We would like to acknowledge him for his excellent work in reviewing, editing, and clarifying the text of this manual for easier readability. Finally, we would like to acknowledge Rita Beacock, Jo Ann Moennighoff, and Cristi-Ann Griggs for their work in producing the document.

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1 INTRODUCTION

This volume of the Urban Airshed Model (UAM) user's guide describes the Emission Preprocessor System (EPS), a software package for processing anthropogenic and biogenic emission information into files that are used as input to the UAM. Recent experience with a wide variety of UAM applications has shown that the original emission preprocessors (developed in the late 1970's) were inadequate for processing large amounts of complex information from a variety of emission sources. Thus, the need for a comprehensive emission processing software package was recognized, and the EPS has been under development during the last few years. The EPS can be used to process anthropogenic emissions. A separate set of programs, Biogenic Emission Inventory System (BEIS), described in Appendix D, can be used to create and process biogenic information based on land use information. The program MERGEMS, part of the EPS, and MERGBIO, part of BEIS, are similar; either of these programs can be used to merge anthropogenic files with biogenic files to create a UAM-compatible emission input file.

After the modeling region of interest has been defined, the emission information is prepared based on EPA State Implementation Plan (SIP) emission inventory requirements. Presently, these requirements include temporal and spatial allocation of aggregate emission totals, episode-specific adjustments based on ambient conditions (e.g., temperature effects), and detailed information for stationary sources that emit at least a specified number of tons per year of pollutant, i.e., 25 tons for volatile organic compounds (VOC) and 100 tons for NO_x (Misenheimer, 1988). The UAM also requires that the VOC emissions be chemically split into the species recognized by the Carbon Bond Mechanism (Version IV).

The six computer programs that process and summarize an anthropogenic emissions inventory for input to the UAM are written in FORTRAN and executed on computer systems with 16 Mbytes of memory.

Chapter 2 provides an overview of the emission preprocessor system (EPS). The relationships between the programs are described and the procedures for creating emissions files for the UAM are summarized.

Chapter 3 describes the input requirements for each of the EPS routines. Example input and output files are provided. This chapter is of value to those interested in installing the EPS on their computer system and also to those who prepare the input files.

Chapter 4 discusses some considerations in preparing an emissions inventory. This will be of primary concern to engineers and others responsible for surveying and developing the necessary inputs to the EPS.

2 OVERVIEW OF THE EMISSIONS PREPROCESSOR SYSTEM

The Emissions Preprocessor System (EPS) for the Urban Airshed Model (UAM) consists of six FORTRAN programs which are executed sequentially to prepare the emissions files required by the UAM. The EPS processes county-wide total emissions contained in national emission data bases into a UAM-compatible inventory. The EPS is currently configured to process data from National Acid Precipitation Assessment Program (NAPAP) files. Although, other emission data bases, such as the National Emission Data System (NEDS), the Flexible Regional Emissions Data System (FREDS), or the SIP Air Management System (SAMS), can be used by EPS, files using data that are not in the NAPAP format will have to be reformatted.

The EPS processes seasonal or annual average emissions, and is able to adjust the longer-term average emission values to create episode-specific estimates based on ambient conditions (e.g., temperature effects). It also can be used to create future-year inventories for UAM simulations that evaluate alternative control strategies. Default input files for information that may be missing from a particular emission data set are provided along with the EPS software. Sample inputs and outputs are included with the descriptions of the EPS programs. The six routines are:

PREPNT: Reformats a point source emissions inventory and prepares it for hydrocarbon speciation by CENTEMS.

PREGRD: Reformats an area source emissions inventory and prepares it for gridding by GRDEMS.

GRDEMS: Allocates the area source emissions prepared by PREGRD to the modeling region cells.

CENTEMS: Allocates emissions for each cell in the modeling region across time and splits THC and NO_x organic compounds into the species recognized by the Carbon-Bond Mechanism (CB-4).

POSTEMS: Merges ground-level emission files to create one input file for the UAM. Provides summary printouts describing emission totals by source categories.

MRGEMS: Merges a biogenic emissions file with the anthropogenic emissions file created by POSTEMS.

Figure 2-1 shows an overview of the EPS. All routines except MRGEMS are used to prepare anthropogenic emission files; MRGEMS is used only when biogenic emissions are included. Note that the UAM preprocessor PTSOURCE is used to process the UAM elevated point source input file created by CENTEMS. The low-level emission files created by CENTEMS may be used directly as input to the UAM. The input and output files associated with each routine are shown in Figure 2-2.

The following steps must be performed before the EPS routines can be executed.

(1) Define the modeling region of interest. Identify grid origins (UTM coordinates), resolution of the grid, cell size, number of cells in the x and y directions, and the dates to be simulated. Discuss with the air quality modeler the number of vertical layers to be modeled, the number of vertical layers below and above the mixing height, and the minimum layer thicknesses.

(2) Prepare an emissions inventory. The emissions inventory should be prepared based on the EPA's requirements for emissions inventory development. As a start, the 1985 NAPAP emissions inventory can be used to prepare a more general set of emissions files. (Chapter 4 includes guidelines on preparing the emissions inventory.)

(3) Determine the elevated plume height cutoff for use in PREPNT.

(4) Run the EPA program MOBILE 4 to estimate mobile source emission factors based on vehicle fleet mix for the specific area to be modeled.

(5) Develop relationships between roadway links and grid cell coordinates. This step is optional.

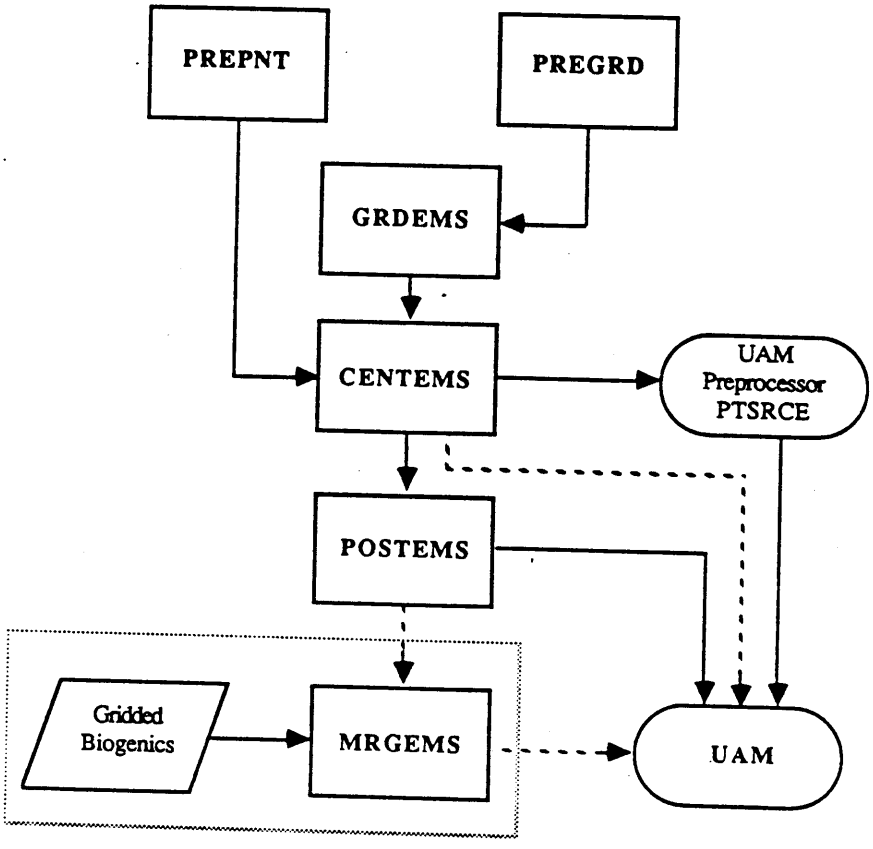

FIGURE 2-1. Overview of the UAM emissions preprocessor system.

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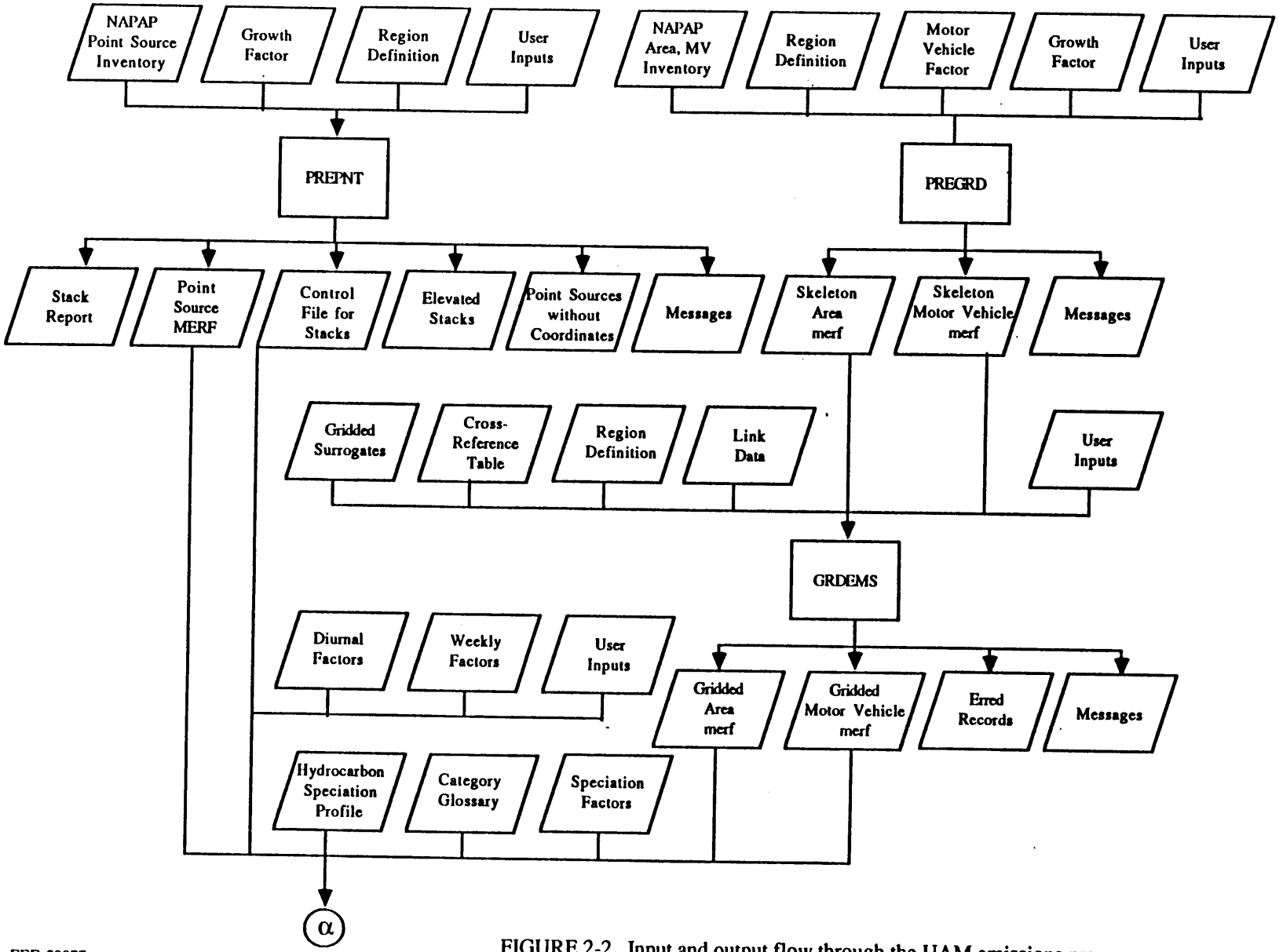

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FIGURE 2-2. Input and output flow through the UAM emissions preprocessor system.

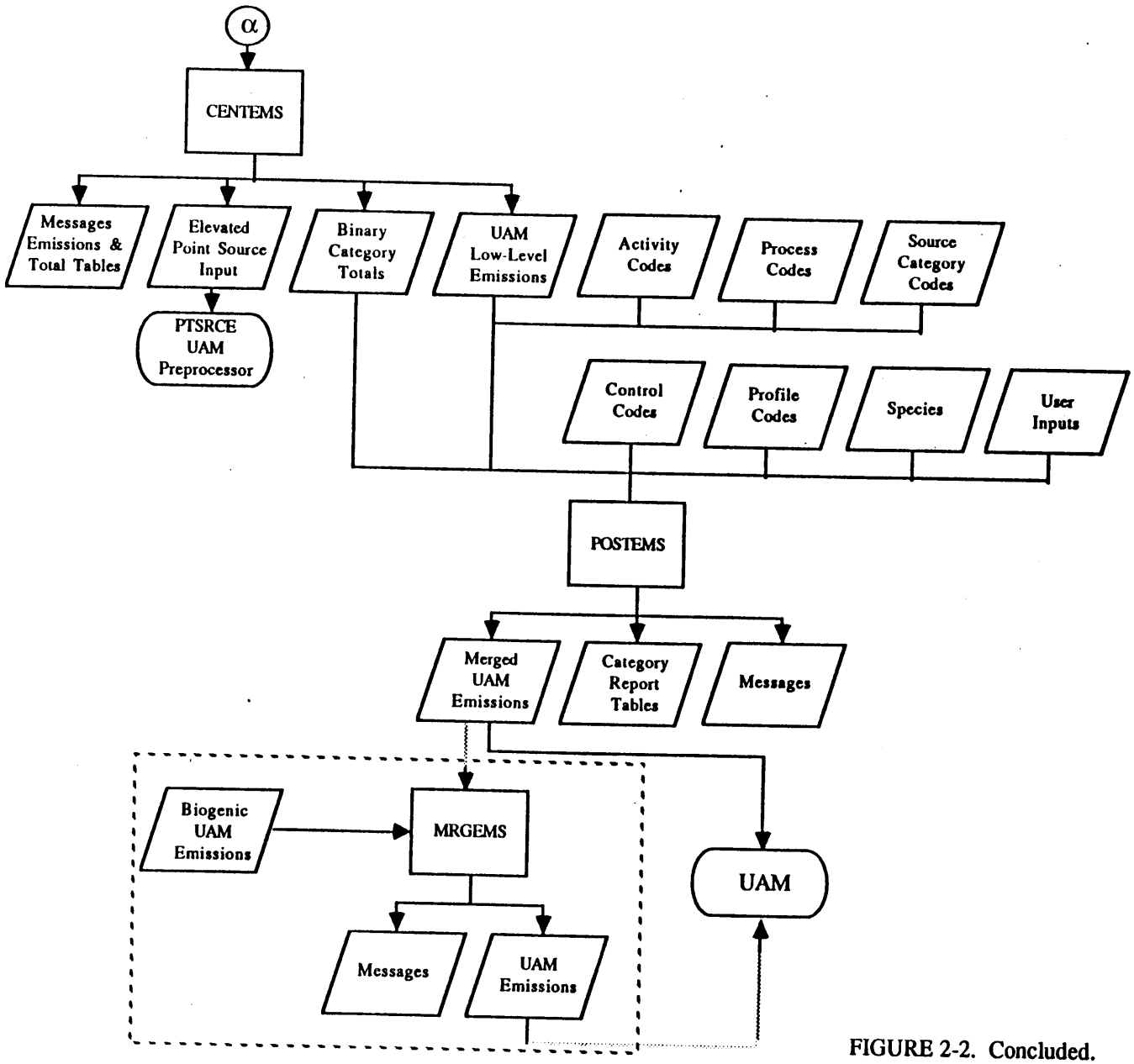

FIGURE 2-2. Concluded.

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(6) Develop surrogate data for allocating area sources to grid cells (see Section 4).

(7) Prepare inventory of biogenic emissions if they are to be included in the model.

The EPS programs are executed in the following order:

(1) PREPNT, to prepare files of point source emissions for CENTEMS.

(2) PREGRD, to prepare files of area and mobile emissions for GRDEMS.

(3) GRDEMS, to prepare files of stationary and mobile source emissions for CENTEMS.

(4) CENTEMS, to prepare the file of elevated point source emissions for the UAM preprocessor PTSRCE and to prepare the UAM low-level emissions files for input to the UAM.

(5) POSTEMS (optional), to merge separate files of low-level emissions (area, motor vehicle, and low-level point sources) and prepare tabulations of total emissions by categories.

(6) MRGEMS, to include biogenic emissions.

The EPS produces two input files for the UAM: EMISSIONS (low-level emissions) and PTSOURCE (elevated emissions).

Note: The UAM preprocessor program PTSRCE generates the UAM elevated point source emissions file. This preprocessor is run after preparing the meteorological input files REGIONTOP, DIFFBREAK, TEMPERATURE, METSCALARS, and WINDS. The PTSRCE program must be rerun if any of the five meteorological files are revised. (See Volume II of the user's guide.)

3 DESCRIPTION OF THE EMISSIONS PREPROCESSOR ROUTINES

This chapter describes the six routines of EPS. The description of each routine is followed by tables describing the formats of the input files for the routines as well as examples of both input and output files. All examples are from files prepared for an application of the UAM to the Atlanta region for an ozone episode on 3 June 1984 using a 1985 emissions inventory. Some examples show only parts of a file; ellipses indicate where a file has been truncated. In each of the tables that describe the input files, column numbers are given for formatted lines and an asterisk (*) indicates free format.

PROCEDURES FOR CREATING EMISSION FILES FOR UAM APPLICATIONS

To illustrate the general procedures for creating the emission files used by the UAM, an example data set has been created. These data are consistent with the June 3-4, 1984 example used to illustrate the creation of meteorological and air quality files described in volumes 2 and 3.

Prior to executing the EPS programs for the example inventory included in this chapter, the following steps were completed.

(1) The region of interest was determined. The region definition file contains this information (see Exhibit 3-3). For the Atlanta region the origin is located at (660., 3665.) UTM coordinates, in zone 16. Each grid cell is 4 x 4 kilometers. The region is 40 x 40 cells. There are five vertical layers, two below and three above the break. The lower layers cannot be less than 50 meters thick, while the upper layers cannot be less than 150 meters thick. The vertical layer information is contained in the PREPNT user input file (see Exhibit 3-1).

(2) The NAPAP 1985 emissions inventory was used for emission inputs.

(3) The cutoff height for plumes from point sources was determined to be 25 meters.

(4) The EPA program MOBILE4 was run to estimate emission factors for mobile sources. This information is contained in the motor vehicle adjustment file input to PREGRD (see Exhibit 3-12).

(5) Atlanta region roadway links were digitized and converted to UTM coordinates. Airports were also included.

(6) Surrogates were developed to allocate area sources.

(7) A biogenic emissions inventory was prepared.

Following the above steps, the EPS programs were executed in the following order:

(1) PREPNT, to prepare the point source emissions inventory for speciation of hydrocarbons.

(2) PREGRD, to prepare files of area and motor vehicle emissions for GRDEMS.

(3) GRDEMS, to grid area emissions in preparation for hydrocarbon speciation.

(4) GRDEMS, to grid motor vehicle emissions in preparation for hydrocarbon speciation.

(5) CENTEMS, to speciate area emissions and prepare a file of low-level area emissions (in UAM format) for POSTEMS.

(6) CENTEMS, to speciate motor vehicle emissions and prepare a file of motor vehicle emissions (in UAM format) for POSTEMS.

(7) CENTEMS, to speciate point source emissions and to prepare a file of low-level point source emissions (in UAM format) for POSTEMS and a file of elevated point source emissions for the PTSRCE preprocessor.

(8) POSTEMS, to merge the file of area, motor vehicle, and low-level point source emissions from CENTEMS and to calculate totals.

(9) MRGEMS, to merge the UAM-formatted files of area, motor vehicle, and low-level point source emissions produced by POSTEMS with a UAM-formatted biogenic emissions file.

DESCRIPTION OF PREPNT

The program PREPNT prepares a point source inventory for hydrocarbon speciation by CENTEMS. Latitudinal and longitudinal coordinates for each point source or facility are converted to Universal Transverse Mercator (UTM) coordinates, which in turn are converted to modeling region grid cell locations. An identification code is assigned to each stack within a facility and the emissions are allocated to each stack. Temporal profile codes are assigned based on the operation data for the point source or facility. Optionally, control factors can be applied to each pollutant by Source Industrial Classification (SIC) code. Emissions reported in units of tons per year are converted to kilograms per day and projected to future levels based on projected industrial growth. The emissions information is written to a file for input to the CENTEMS program.

PREPNT calculates a plume rise for each point source, based on several stack parameters, to determine if the source should be treated as an elevated point source. For those sources that do not have sufficient plume rise or for which there is no stack information, the emissions are treated as ground-level emissions. A file containing a list of the point sources to be treated as elevated sources and their relevant stack parameters is created and input to the CENTEMS program.

PREPNT requires four input files (Figure 3-1). The formats for the four input files are presented in Tables 3-1 to 3-4. Examples of each file, Exhibits 3-1 to 3-4, immediately follow each table.

The first file, the user input file, contains information on plume height cutoff, default stack parameters, optional emission controls by Source Industrial Classification (SIC) code, a title for the emissions file, the start time and date, the end time and date, and the plume mixing height (Table 3-1 and Exhibit 3-1).

The second input file is the growth factors file (Table 3-2 and Exhibit 3-2). This file is also input to the PREGRD program. The first two lines are used by PREPNT to assign growth factors by SIC codes. Notice that in the Exhibit 3-2 all growth factors

are 1.0; that is, there is no growth. For a future-year episode these factors are adjusted to reflect demographic changes (see Chapter 4, section on Projecting Future Year Inventories).

The third input file defines the modeling region by specifying the UTM origin, UTM zone, number of counties, number of grid cells in the east-west and north-south direction, grid cell size, and the angle of rotation. This file also includes lists of county codes, both FIPS and AEROS, and control codes for each county in the modeling region (Table 3-3 and Exhibit 3-3).

The fourth input file, the point source emissions inventory, is based on the NAPAP emissions inventory format (Table 3-4 and Exhibit 3-4). The emissions inventory is allocated to counties or statistical metropolitan areas. Emissions information of total hydrocarbon compounds (THC), nitrogen oxides (NO_x), carbon monoxide (CO), sulfur oxides (SO_x), and particulate matter (TSP) are contained in this file for each source by facility. The source location, stack parameters, and seasonal operation factors are also part of this file. The variable PTSCOMST indicates the number of processes that share a common emission stack.

PREPNT creates six output files (Figure 3-1):

(1) A file listing point source emissions in model emissions record format (merf). The model emissions record format is a standard ASCII format used by programs downstream from PREPNT and PREGRD. Each line contains a Source Industrial Classification (SIC) code, a Source Classification Code (SCC), temporal profile, cell location, and emissions of the five pollutants TOC, NO_x, CO, SO_x, and PM. This file is input to CENTEMS (Exhibit 3-5).

(2) A file of the parameters for all stacks in the region. This report also shows which stacks will be treated as elevated sources and where default values have been substituted for missing data (Exhibit 3-6).

(3) A file listing all elevated stacks, i.e., those with calculated plume rise greater than the cutoff height specified in the user input file (Exhibit 3-7).

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(4) A control file containing parameters for the elevated stacks. This file is input to CENTEMS (Exhibit 3-8).

(5) A message file describing the region definition, emission controls by Source Industrial Classification (SIC) code, the number of elevated stacks, and emissions totals before and after application of growth factors (Exhibit 3-9).

(6) A file listing point sources for which location information is missing. This file is in the same format as the NAPAP input file and will generally be empty. Any point sources listed in this file must be examined by the user to determine their location. If locations can be determined, the corresponding records should be corrected in the NAPAP input file and the PREPNT program should be rerun.

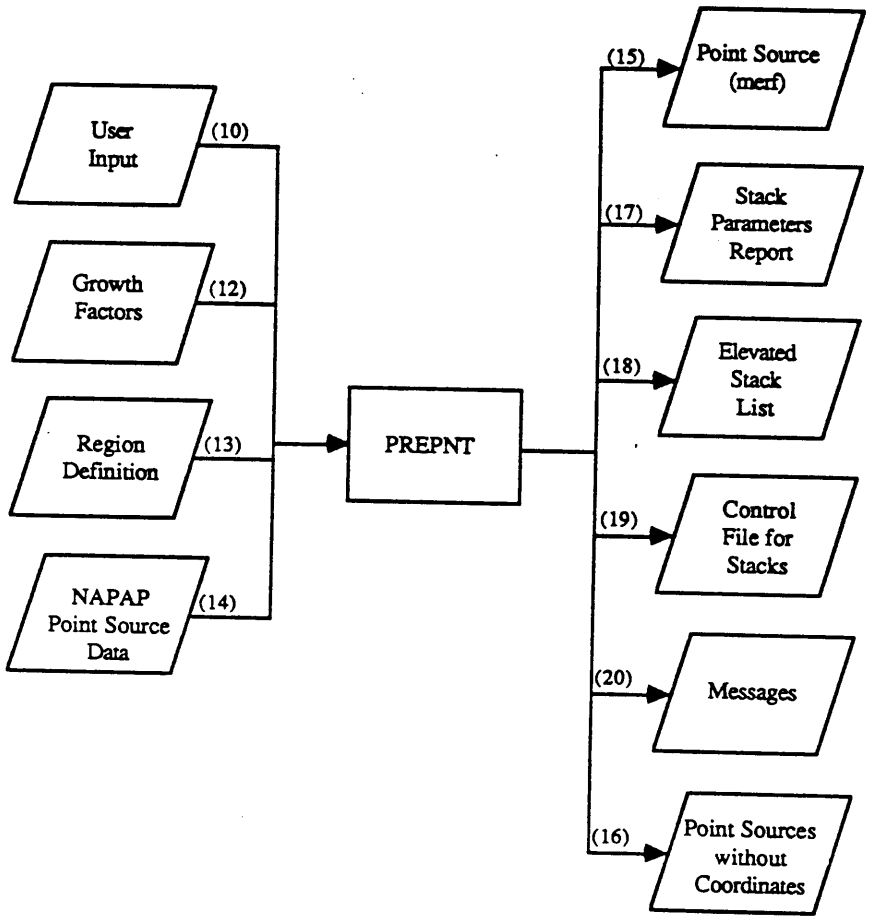

FIGURE 3-1. Input and output files used by PREPNT. (Numbers in parentheses refer to FORTRAN units used.)

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TABLE 3-1. User input file (unit 10) used by the PREPNT program. (See Exhibit 3-1)

Line	Variable	Columns	Type	Description
1	HEADER	1-80	A	Heading for plume rise cutoff section
2	HSW	*	R	Plume height cutoff (m)
3	HEADER	1-80	A	Heading for default stack parameters section
4	DFEAST	*	R	Default easting (UTM)
5	DFNRTH	*	R	Default northing (UTM)
6	DFHT	*	R	Default stack height (m)
7	DFDIAM	*	R	Default stack diameter (m)
8	DFVEL	*	R	Default gas velocity (m/s)
9	DFTEMP	*	R	Default stack temperature (K)
10	DFFLOW	*	R	Default gas volumetric flow rate (m^3/s)
11	HEADER	1-80	A	Heading for control factors by SIC section
12+	ISIC	1-4	A	SIC code (-999 = end of section)
	CTL(1)	5-9	R	Remaining CO fraction (1.0 - CO control factor)
	CTL(2)	10-14	R	Remaining NO_x fraction
	CTL(3)	15-19	R	Remaining SO_x fraction
	CTL(4)	20-24	R	Remaining THC fraction
	CTL(5)	25-29	R	Remaining TSP fraction
13	HEADER	1-80	A	Heading for stack control data section
14	TITLE	1-80	A	Run title

continued

TABLE 3-1. Concluded.

Line	Variable	Columns	Type	Description
15	JDAY1	*	I	Beginning Julian date
	ITIM1	*	I	Beginning time
	JDAY2	*	I	Ending Julian date
	ITIM2	*	I	Ending time
16	NBELOW	*	I	Number of z levels below mixing height
17	NABOVE	*	I	Number of z levels above mixing height
18	DIFFHT(1)	*	R	Ground level (must be 0.0 m)
	DIFFHT(2)	*	R	Minimum mixing height (m)
	DIFFHT(3)	*	R	Maximum mixing height (m)

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```
Plume rise cutoff for elevated stack treatment (in meters):
25.
Default stack parameters:
0.0       UTM easting
0.0       UTM northing
3.0       stack height (m)
0.2       stack diameter (m)
4.0       stack velocity (m/s)
294.0     stack temperature (K)
0.0       stack flowrate (cubic m/s)
Additional control factors by SIC:
-999
Data for stack control (in.ptsrce) file:
ATLANTA - ELEVATED POINT SOURCES
84155      000      84155      2400
2       number of z levels below break
3       number of z levels above break
0.  50.  150.   break heights
```

EXHIBIT 3-1. Example of user input file to PREPNT.

TABLE 3-2. Growth factors file used by the PREPNT and PREGRD programs. Lines 1 and 2 are used by PREPNT; lines 3 and 4 are used by PREGRD. (See Exhibit 3-2)

Line	Variable	Columns	Type	Description
1	HEADER	1-80	A	Heading for Source Industrial Classification (SIC) and growth factor section
2+	SIC2	4-5	A	First two digits of SIC code (-9 = end of section) 0 = population growth MV = SIC 371 (motor vehicles and equipment) PP = SIC 517 (petroleum and petroleum products) NG = no growth
	GROFAC	6-15	R	Growth factor for two-digit Source Industrial Classification (SIC) code
3	HEADER	1-80	A	Heading for NAPAP Source Category (NSC) and growth factor section
4+	NSC	1-5	I	NAPAP Source Category (NSC) code (-99 = end of section)
	GFNSC	9-18	R	Growth factor for NSC

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```
SIC2      95:85
   0     1.0000      population growth
  01     1.0000
  02     1.0000
  07     1.0000
  10     1.0000
  11     1.0000
  12     1.0000
  13     1.0000
  20     1.0000
  21     1.0000
  22     1.0000
  23     1.0000
  24     1.0000
  25     1.0000
  26     1.0000
  27     1.0000
  28     1.0000
  29     1.0000
  30     1.0000
  31     1.0000
  32     1.0000
  33     1.0000
  34     1.0000
  35     1.0000
  36     1.0000
  37     1.0000
  38     1.0000
  39     1.0000
  40     1.0000
  41     1.0000
  42     1.0000
  44     1.0000
  45     1.0000
  46     1.0000
  47     1.0000
  48     1.0000
  49     1.0000
  72     1.0000
  73     1.0000
  75     1.0000
  MV     1.0000
  PP     1.0000      gasoline marketing growth
  NG     1.0000      no growth
  -9
nsc    sic2
   1     1.0000
   2     1.0000
   3     1.0000
   4     1.0000
   5     1.0000
   6     1.0000
   7     1.0000
   8     1.0000
   9     1.0000
  10     1.0000
  11     1.0000
  12     1.0000
  13     1.0000
  14     1.0000
  15     1.0000
  16     1.0000
  17     1.0000
  18     1.0000
```

EXHIBIT 3-2. Example of growth factors input file to PREPNT and PREGRD.

19	1.0000
20	1.0000
21	1.0000
22	1.0000
23	1.0000
24	1.0000
25	1.0000
26	1.0000
39	1.0000
44	1.0000
45	1.0000
46	1.0000
47	1.0000
48	1.0000
49	1.0000
50	1.0000
51	1.0000
52	1.0000
54	1.0000
55	1.0000
56	1.0000
57	1.0000
58	1.0000
59	1.0000
60	1.0000
61	1.0000
62	1.0000
63	1.0000
64	1.0000
66	1.0000
67	1.0000
68	1.0000
69	1.0000
70	1.0000
71	1.0000
72	1.0000
73	1.0000
74	1.0000
75	1.0000
76	1.0000
77	1.0000
78	1.0000
79	1.0000
80	1.0000
81	1.0000
82	1.0000
83	1.0000
84	1.0000
85	1.0000
86	1.0000
87	1.0000
88	1.0000
89	1.0000
90	1.0000
91	1.0000
92	1.0000
93	1.0000
95	1.0000
96	1.0000
97	1.0000
98	1.0000
99	1.0000
100	1.0000
101	1.0000
102	1.0000
103	1.0000

EXHIBIT 3-2 Continued.

```
104     1.0000
105     1.0000
106     1.0000
107     1.0000
108     1.0000
109     1.0000
-99    -99.
```

EXHIBIT 3-2 Concluded.

PREPNT

TABLE 3-3. Region definition file used by the PREPNT, PREGRD, and GRDEMS programs. (See Exhibit 3-3)

Line	Variable	Columns	Type	Description
1	DESCRP	16-45	A	Region description (not used, skipped)
2	XORG	16-25	R	Region easting coordinate (km)
	YORG	26-35	R	Region northing coordinate (km)
3	IZONE	16-20	I	UTM zone
	NCD	21-25	I	Number of counties in region
4	NX	16-20	I	Number of cells along x-axis
	NY	21-25	I	Number of cells along y-axis
5	DX	16-25	R	Cell size in x direction (km)
	DY	26-35	R	Cell size in y direction (km)
	THETA	36-45	R	Region rotation (degrees counter-clockwise from north)
6	CSTR		-	Skipped
7+	INFC	1-5	I	FIPS state/county code (-9 = end of section)
	INSC	7-12	I	AEROS state/county code (-9 = end of section)
	INIM	13-14	I	I/M control code 0 = none 1 = base year control 2 = base year and future year control
	INS2	15-16	I	Stage II control code 0 = none 1 = base year control 2 = base year and future year control

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```
DESCRIPTION:    GRIDDING ATLANTA FOR 5 CITIES
XORG,YORG:      660.000     3665.000
ZONE,COUNTIES:     16    43
NX,NY:             40    40
DX,DY,THETA:        4.0         4.0         0.0
*****Selected Counties  (FIPS, SAROAD, I/M FLAG)
13011 110320 0 0 Banks
13013 110360 2 2 Barrow
13015 110380 0 0 Bartow
13035 110700 2 2 Butts
13045 110840 0 0 Carroll
13055 111020 0 0 Chattooga
13057 111040 2 2 Cherokee
13063 111120 2 2 Clayton
13067 111160 1 2 Cobb
13077 111420 2 2 Cowetta
13085 111580 0 0 Dawson
13089 111640 1 2 De Kalb
13097 111800 2 2 Douglas
13113 112100 2 2 Fayette
13115 112140 0 0 Floyd
13117 112200 2 2 Forysth
13121 112260 1 2 Fulton
13129 112400 0 0 Gordon
13135 112500 1 2 Gwinnett
13137 112520 0 0 Habersham
13139 112540 0 0 Hall
13143 112600 0 0 Haralson
13149 112720 0 0 Heard
13151 112760 2 2 Henry
13157 112900 0 0 Jackson
13159 112920 0 0 Jasper
13169 113040 0 0 Jones
13171 113120 0 0 Lamar
13187 113320 0 0 Lumpkin
13199 113600 0 0 Meriwetter
13207 113740 0 0 Monroe
13211 113800 0 0 Morgan
13217 113920 2 2 Newton
13219 113980 0 0 Oconee
13223 114020 2 2 Paulding
13227 114100 0 0 Pickens
13231 114140 0 0 Pike
13233 114160 0 0 Polk
13247 114340 2 2 Rockdale
13255 114600 2 2 Spaulding
13285 115120 0 0 Troup
13297 115300 2 2 Walton
13311 115540 0 0 White
-9999 -99999
```

EXHIBIT 3-3. Example of region definition input file to PREPNT, PREGRD, and GRDEMS.

TABLE 3-4. Point source emissions inventory file (unit 14), by county, used by the PREPNT program. (See Exhibit 3-4)

Line	Variable	Columns	Type	Description
1+	STATE	1-2	I	AEROS state code
	COUNTY	3-6	I	AEROS county code
	PLANTID	7-10	A	Plant identification code
	SCC	11-18	I	SCC code
	POINTID	19-20	A	Point identification code
		21-24	-	(Not used, skipped)
	SO2	25-32	R	SO_2 emissions (ton/year)
	TSP	33-40	R	Particulate emissions (ton/year)
	NOX	41-48	R	Oxides of nitrogen (ton/year)
	VOC	49-56	R	Volatile organics (not used, skipped)
	THC	57-64	R	Total hydrocarbon (ton/year)
	CO	65-72	R	Carbon monoxide (ton/year)
	SIC	73-76	I	SIC code
	LAT	77-84	R	Fractional latitude (degrees)
	LON	85-93	R	Fractional longitude (degrees)
	FLOW	94-100	R	Exhaust gas flow rate (ft^3/min)
	PLUMEHT	101-104	R	Plume height (not used, skipped)
	STACKDI	105-108	R	Stack diameter (feet)
	STACKHT	109-112	R	Stack height (feet)
	STACKTP	113-116	R	Stack temperature (deg F)
	WINTHRU	117-119	I	Winter throughput (percent)
	SPRTHRU	120-122	I	Spring throughput (percent)
	SUMTHRU	123-125	I	Summer throughput (percent)
	FALTHRU	126-128	I	Fall throughput (percent)
	HOURS	129-130	I	Hours per day in operation
	DAYS	131-131	I	Days per week in operation
	WEEKS	132-133	I	Weeks per year in operation
	PTSCOMST	134-137	A	Range of points sharing common stack
	NAMEADD	138-177	A	Plant name and address (not used by EPS, skipped)

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```
11038000111010020201  71428.0  3056.0 14770.0  69.0  69.0  473.0491134.12525 84.922472630000  035.21000 290000000000000247520104GA POWER CO-BOWEN      TAYLORSVILLE 30178
11038000111010020202  82488.0  3242.0 17057.0  80.0  80.0  752.0491134.12525 84.922472630000  035.21000 290000000000000247520104GA POWER CO-BOWEN      TAYLORSVILLE 30178
11038000111010020203  87659.0  1991.0 18126.0  85.0  85.0   60.0491134.12525 84.922473300000  035.21000 290000000000000247520104GA POWER CO-BOWEN      TAYLORSVILLE 30178
11038000111010020204  63727.0  1991.0 13178.0  61.0  61.0   60.0491134.12525 84.922473300000  035.21000 300000000000000247520104GA POWER CO-BOWEN      TAYLORSVILLE 30178
11116000031010020201  32734.2   380.0  5094.5  23.9  23.9  244.5491133.82476 84.47488 910000  024.5 835 275000000000000247520102GA POWER CO-MCDONOUGH                 30080
11116000031010020202  33747.7   368.0  5258.5  24.9  24.9  237.7491133.82476 84.47488 910000  024.5 835 275000000000000247520102GA POWER CO-MCDONOUGH                 30080
11142000011010020201  11673.0   546.0  1978.0   9.0   9.0   79.0491133.46313 84.90505 420000  022.1 830 283000000000000247520103GA POWER CO-YATES        BOX 718 30263
11142000011010020202  11199.0   539.0  1898.0   9.0   9.0   76.0491133.46313 84.90505 420000  022.1 830 283000000000000247520103GA POWER CO-YATES        BOX 718 30263
11142000011010020203  11279.0   501.0  1911.0   9.0   9.0   76.0491133.46313 84.90505 420000  022.1 830 283000000000000247520103GA POWER CO-YATES        BOX 718 30263
11142000011010020204  13758.0   983.0  2331.0  11.0  11.0   93.0491133.46313 84.90505 480000  022.1 830 285000000000000247520405GA POWER CO-YATES        BOX 718 30263
11142000011010020205  15754.0   994.0  2669.0  12.0  12.0  107.0491133.46313 84.90505 480000  022.1 830 285000000000000247520405GA POWER CO-YATES        BOX 718 30263
11142000011010020206  42207.0   155.0  7151.0  33.0  33.0  286.0491133.46223 84.905071200000  023.0 805 271000000000000247520607GA POWER CO-YATES        BOX 718 30263
11142000011010020207  23974.0   248.0  4062.0  19.0  19.0  162.0491133.46223 84.905071200000  023.0 805 285000000000000247520607GA POWER CO-YATES        BOX 718 30263
11214000031010020201   9830.0   738.0  3287.0  11.0  11.0  159.0491134.25250 85.34503 490000  030.4 750 300000000000000247520103GA POWER CO-HAMMOND       COOSA 30129
11214000031010020202   9997.0   738.0  3344.0  11.0  11.0  158.0491134.25250 85.34503 420000  030.4 750 300000000000000247520103GA POWER CO-HAMMOND       COOSA 30129
11214000031010020203   9068.0   764.0  3033.0  10.0  10.0  164.0491134.25250 85.34503 420000  030.4 750 300000000000000247520103GA POWER CO-HAMMOND       COOSA 30129
11214000031010020204  35539.0  1596.0 11886.0  40.0  40.0  315.0491134.25250 85.345031770000  030.4 750 315000000000000247520000GA POWER CO-HAMMOND       COOSA 30129
11272000011010020201  128505.0 1011.0 19083.0  89.0  89.0   30.0491133.41127 85.041793200000  035.21000 315000000000000247520000GA POWER CO-WANSLEY     ROOPVILLE 30170
11272000011010020202  120146.0 1011.0 17842.0  83.0  83.0   30.0491133.41217 85.041773120000  035.21000 305000000000000247520000GA POWER CO-WANSLEY     ROOPVILLE 30170
11374000081010021201   15715.4   103.0  8760.2       0.0  350.4491133.05957 83.807226271459  038.21000 306000000000000247520000GA POWER CO PLANT SCHERER JULIETTE 31046
11374000081010021202   16947.4   108.0  9445.6       0.0  377.8491133.06138 83.807286271459  038.21000 306000000000000247520000GA POWER CO PLANT SCHERER JULIETTE 31046
11374000081010040401       0.0       0.0      0.0       0.0    0.0491133.05957 83.807226271459  038.21000 306000000000000247520000GA POWER CO PLANT SCHERER JULIETTE 31046
11374000081010040402       0.0       0.0      0.0       0.0    0.0491133.06138 83.807286271459  038.21000 306000000000000247520000GA POWER CO PLANT SCHERER JULIETTE 31046
11116000031010050101       3.8       0.0      2.8   0.1 0.1    1.0491133.82476 84.47488 910000  024.5 835 275001000000000247520102GA POWER CO-MCDONOUGH                 30080
11116000031010050102       1.2       0.0      0.9   0.0 0.0    0.3491133.82476 84.47488 910000  024.5 835 275001000000000247520102GA POWER CO-MCDONOUGH                 30080
.
.
.
11164001204030020103       0.0       0.0      0.0  23.0 23.0   0.0517133.91469 84.29484      0 40 0.0 0  770250250250250247520000MARATHON OIL 6293 W PEACHTREE RD   30340
11164001214030020101       0.0       0.0      0.0 118.0 118.0 0.0517133.91509 84.27211      0 40 0.0 0  770250250250250247520000SOUTHERN FACILITIES 2797 WOODWIN RD30340
11164001294030020101       0.0       0.0      0.0 117.0 117.0 0.0517133.91136 84.26682      0 41 0.0 0  770250250250250247520000AMOCO OIL CO 6430 WINTERS CHAPEL 30340
11164001314030020101       0.0       0.0      0.0  80.0  80.0 0.0517130.87620 84.36009      0 48 0.0 0  770250250250250247520000TEXACO INC 4127 WINTERS CHAPEL 30340
11164001314030020102       0.0       0.0      0.0  22.0  22.0 0.0517133.92765 84.26955      0 48 0.0 0  770250250250250247520000TEXACO INC 4127 WINTERS CHAPEL 30340
11164001314030020108       0.0       0.0      0.0  13.0  13.0 0.0517133.92765 84.26955      0 50 0.0 0  770250250250250247520000TEXACO INC 4127 WINTERS CHAPEL 30340
11226002214030020101       0.0       0.0      0.0 123.0 123.0 0.0517133.80685 84.48080      0 47 0.0 0  770250250250250247520000SE TERMINAL 3132 PARROTT AVE   30318
11164001204030020202       0.0       0.0      0.0   0.0   0.0 0.0517133.91469 84.29484      0 48 0.0 0  770250250250250247520000MARATHON OIL 6293 W PEACHTREE RD 30340
11164001204030020203       0.0       0.0      0.0   0.0   0.0 0.0517133.91469 84.29484      0 40 0.0 0  770250250250250247520000MARATHON OIL 6293 W PEACHTREE RD 30340
11164001314030020202       0.0       0.0      0.0   0.0   0.0 0.0517133.92765 84.26955      0 48 0.0 0  770250250250250247520000TEXACO INC 4127 WINTERS CHAPEL 30340
11164001314030020208       0.0       0.0      0.0   0.0   0.0 0.0517133.92765 84.26955      0 50 0.0 0  770250250250250247520000TEXACO INC 4127 WINTERS CHAPEL 30340
11226000144050030103       0.0       0.0      0.0  46.0  46.0 0.0275133.72345 84.41525   3200 0 2.0 31 120025025025025247500000ATLANTA PKING INC 840 WOODROW ST SW30310
11226000164050030101       0.0       0.0      0.0 124.0 124.0 0.0275133.69194 84.41728   3440 0 1.0 28 175025025025025247500000INTERNATIONAL PAPER 2323 SYLVAN RD 30344
11226001854050030101       0.0       0.0      0.0 221.0 221.0 0.0275133.76383 84.53821   3000 0 1.5 26 350025025025025247500000PRINTPACK INC 4335 WENDELL DR SW 30336
11164000854060012606       0.0       0.0      0.0 110.1 110.1 0.0517133.92308 84.26645      0 15 0.0 0  770250250250250247520000PHILLIPS PETROLEUM                 30340
11164001004060012624       0.0       0.0      0.0 244.4 244.4 0.0517133.92047 84.27086      0 13 0.0 0  770250250250250247520000CHEVRON USA 4026 WINTERS CHAPEL 30340
11164001204060012607       0.0       0.0      0.0 103.8 103.8 0.0517133.91469 84.29484      0 15 0.0 0  770250250250250247520000MARATHON OIL 6293 W PEACHTREE RD 30340
11164001314060012609       0.0       0.0      0.0 245.8 245.8 0.0517133.92765 84.26955      0 10 0.0 0  770250250250250247520000TEXACO INC 4127 WINTERS CHAPEL 30340
11164001404060012608       0.0       0.0      0.0 105.0 105.0 0.0517130.85315 84.36478      0 15 0.0 0  770250250250250247520000CROWN CENTRAL PETROLEUM2765WOODWIN 30340
11164000854060013006       0.0       0.0      0.0   2.6   2.8 0.0517133.92308 84.26645      0 15 0.0 0  770250250250250247520000PHILLIPS PETROLEUM                 30340
11164001004060013024       0.0       0.0      0.0  26.1  28.6 0.0517133.92047 84.27086      0 13 0.0 0  770250250250250247520000CHEVRON USA 4026 WINTERS CHAPEL 30340
11164001204060013007       0.0       0.0      0.0  11.1  12.2 0.0517133.91469 84.29484      0 15 0.0 0  770250250250250247520000MARATHON OIL 6293 W PEACHTREE RD 30340
11164001314060013009       0.0       0.0      0.0   5.6   6.2 0.0517133.92765 84.26955      0 10 0.0 0  770250250250250247520000TEXACO INC 4127 WINTERS CHAPEL 30340
11164001404060013008       0.0       0.0      0.0   0.9   1.0 0.0517130.85315 84.36478      0 15 0.0 0  770250250250250247520000CROWN CENTRAL PETROLEUM2765WOODWIN 30340
11164000854060013406       0.0       0.0      0.0   0.0   0.0 0.0517133.92308 84.26645      0 15 0.0 0  770250250250250247520000PHILLIPS PETROLEUM                 30340
11038000085030010203       0.0       0.0      0.0   0.0   0.0 0.0281934.15170 84.78515  30000 0 5.0 195 400025025025025247500304CHEMICAL PRODUCTS      BOX 449 30120
```

EXHIBIT 3-4. Example of point source emissions input file to PREPNT.

361230400150	1 33 8 7	0027	6112140	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	13.75	0.00
361210200402	1 33 24 7	0027	1112140	0.0870.0870.0870.0970.0970.0970.0600.0600.0600.0900.0900.090	0.72	9.69	25.13	0.00	3.23
361210200602	1 33 24 7	0027	1112140	0.0870.0870.0870.0970.0970.0970.0600.0600.0600.0900.0900.090	2.87	19.03	0.00	0.00	0.36
361210200402	1 33 24 7	0027	2112140	0.0870.0870.0870.0970.0970.0970.0700.0700.0700.0800.0800.080	0.72	9.69	25.13	0.00	3.23
361210200602	1 33 24 7	0027	2112140	0.2670.2670.2670.0330.0330.0330.0000.0000.0000.0330.0330.033	2.87	19.03	0.00	0.00	0.36
361210200402	1 33 24 7	0027	3112140	0.2670.2670.2670.0330.0330.0330.0000.0000.0000.0330.0330.033	0.72	9.69	25.13	0.00	3.23
361210200602	1 33 24 7	0027	3112140	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	2.87	19.03	0.00	0.00	0.36
361230400150	1 33 24 7	0027	4112140	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	15.03	9.02
361230400150	1 33 24 7	0027	5112140	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	302.48	0.00
329530301401	12 29 24 5	0016	3110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.00	19.88
329530301401	12 29 24 5	0016	4110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.00	19.88
329530301403	12 29 24 5	0016	8110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.00	14.91
329530301403	12 29 24 5	0016	9110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.00	19.88
281910200602	12 29 24 7	0008	1110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	2.58	0.00	0.00	0.52
281910200501	12 29 24 7	0008	1110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	2.58	2.58	0.00	2.07
281910200501	12 29 24 7	0008	2110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	1.29	38.51	41.36	2.58	4.39
281910200601	12 29 24 7	0008	2110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	1.29	137.26	0.00	1.29	0.78
281930199999	12 29 24 7	0008	3110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	26.38	1107.80	0.00	79.13
281930199999	12 29 24 7	0008	3110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	26.38	1107.80	0.00	79.13
281930199999	12 29 24 7	0008	4110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	33.60	3290.52	0.00	38.77
281930199999	12 29 24 7	0008	5110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	5.17	0.00	0.00	25.85
329530301403	12 29 24 7	0016	5110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.00	91.96
329530301403	12 29 24 7	0016	6110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.00	91.96
329530301499	12 29 24 7	0016	10110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.00	49.71
329530301403	12 29 51 7	0016	7110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.00	19.88
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.									
333130300503	5 13 24 7	0008	3110840	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	17895.15	0.00	37.28	0.99	64.62
333130300504	5 13 24 7	0008	4110840	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	586.56	0.00	22.37
333130300505	5 13 24 7	0008	5110840	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.00	74.31
333139000689	5 13 24 7	0008	5110840	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	12.68	0.00	0.00
333139000589	5 13 24 7	0008	5110840	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	22.12	0.00	0.00
333130399999	5 13 24 7	0008	6110840	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	134.21	0.00	0.00
329530301403	5 25 24 7	0002	4114160	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.00	89.48
329530301403	5 25 68 7	0002	1114160	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	537.24	0.00	253.42
329530301403	5 25 68 7	0002	2114160	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	1.52	164.72
329530301403	5 25 68 7	0002	3114160	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	5.28	0.00	131.88
491110100202	6 9 24 7	0001	1112720	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	74.56	47429.61	319391.19	221.20	2512.78
491110100202	6 9 24 7	0001	2112720	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	74.56	44345.18	298615.41	206.29	2512.78
491110100202	8 29 24 7	0011	1110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	149.13	32753.10	158389.50	151.61	4948.51
491110100202	8 29 24 7	0011	1110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	149.13	45051.05	217871.00	211.26	4948.51
491110100202	8 29 24 7	0011	1110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	1175.61	36709.92	177529.86	171.50	7595.50
491110100202	8 29 24 7	0011	1110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	1869.05	42394.11	205018.80	198.84	8057.79
227210200402	8 40 24 5	0039	1112400	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	3.29	35.48	255.70	0.00	19.51
227210200602	8 40 24 5	0039	1112400	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	9.38	38.01	0.25	0.00	0.76
227210200402	8 40 24 5	0039	2112400	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	3.29	35.48	255.70	0.00	19.51
227210200602	8 40 24 5	0039	2112400	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	9.38	38.01	0.25	0.00	0.76
491110100202	9 10 24 7	0001	1111420	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	188.89	4717.36	27834.42	22.37	1339.65
491110100202	9 10 24 7	0001	1111420	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	188.89	4749.67	28033.25	22.37	1245.20
491110100202	9 10 24 7	0001	1111420	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	196.35	4916.20	29012.52	22.37	1357.05
491110100202	9 10 24 7	0001	2111420	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	231.15	5793.56	34194.65	27.34	2443.19
491110100202	9 10 24 7	0001	2111420	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	265.94	6633.63	39155.59	29.83	2470.53
491110100202	9 10 24 7	0001	3111420	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	402.64	10095.85	59585.89	47.22	616.39
491110100202	9 10 24 7	0001	3111420	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	710.84	17773.37	104902.88	82.02	385.24

EXHIBIT 3-5. EXAmple of point source merf file (output from PREPNT, input to CENTEMS).

County Code	Facility ID	Stack ID	UTM Easting	UTM Northing	Stack Height	Stack Diameter	Gas Temp	Flow Rate	Gas Velocity	Effective Plume Rise	Final Plume Rise
110380	0011	1	691.595	3777.799	304.8	10.7	422.	4520.4	50.0	2935.8	3240.6
110380	0008	1	704.198	3780.998	12.2	0.9	422.	8.5	12.9	51.5	63.7
110380	0008	2	704.198	3780.998	12.2	1.1	422.	16.5	18.5	84.8	96.9
110380	0008	3	704.198	3780.998	57.9	1.2	536.	30.2	28.7	179.1	237.0
110380	0008	4	704.198	3780.998	65.5	1.5	533.	42.0	23.0	223.5	289.0
110380	0008	5	704.198	3780.998	12.2	0.5	366.	0.9	5.7	7.2	19.4
110380	0016	1	704.698	3780.998	7.6	0.3	325.	0.8	11.6	3.9	11.5
110380	0016	2	704.698	3780.998	7.6	0.3	325.	0.8	11.6	3.9	11.5
110380	0016	3	704.698	3780.998	15.2	0.1	366.	0.6	50.0	5.0	20.3
110380	0016	4	704.698	3780.998	15.2	0.1	366.	0.6	50.0	5.0	20.3
110380	0016	5	704.698	3780.998	18.3	2.6	378.	15.6	3.0	64.2	82.5
110380	0016	6	704.698	3780.998	18.3	1.4	378.	15.6	10.5	64.2	82.5
110380	0016	7	704.698	3780.998	5.5	0.5	394.	1.4	8.6	11.8	17.3
110380	0016	8	704.698	3780.998	23.8	0.2	378.	1.3	27.8	10.0	33.7
110380	0016	9	704.698	3780.998	23.8	0.5	378.	4.7	28.7	26.2	50.0
110380	0016	10	704.698	3780.998	17.7	0.5	333.	5.2	31.6	17.7	35.4
110380	0016	11	704.698	3780.998	22.9	0.3	311.	0.5	6.5	1.7	24.5
110380	0016	12	704.698	3780.998	22.9	0.3	311.	0.5	6.5	1.7	24.5
110380	0007	1	705.498	3780.998	5.5	0.6	319.	1.4	4.9	5.0	10.5
110840	0018	1	674.493	3719.403	29.6	1.5	450.	17.5	9.6	97.5	127.1
110840	0008	1	679.995	3714.403	20.1	1.1	533.	7.9	8.9	65.4	85.5
110840	0008	2	679.995	3714.403	18.3	1.2	533.	10.4	8.9	80.0	98.3
110840	0008	3	679.995	3714.403	60.0	2.6	383.	23.6	4.5	91.0	151.0
110840	0008	4	679.995	3714.403	54.9	0.9	372.	18.9	28.7	71.3	126.2
110840	0008	5	679.995	3714.403	60.0	2.6	383.	23.6	4.5	91.0	151.0
110840	0008	6	679.995	3714.403	38.1	0.4	310.	0.2	1.3	0.7	38.8
111120	0020	1	742.007	3723.902	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111160	0003	1	733.704	3745.401	254.5	7.5	408.	858.9	19.6	1032.9	1287.4
111160	0022	1	717.900	3744.400	36.6	1.5	339.	44.8	24.6	97.0	133.6
111420	0001	1	694.696	3704.403	253.0	6.7	413.	594.7	16.7	841.9	1094.9
111420	0001	2	694.696	3704.403	253.0	6.7	414.	453.1	12.7	718.0	971.0
111420	0001	3	694.696	3704.303	245.4	7.0	414.	1132.7	29.3	1244.2	1489.5
111640	0086	1	751.309	3754.799	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0085	1	752.709	3756.800	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0085	2	752.709	3756.800	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0085	3	752.709	3756.800	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0085	4	752.709	3756.800	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0085	5	752.709	3756.800	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0100	1	752.309	3756.499	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0100	2	752.309	3756.499	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0100	3	752.309	3756.499	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0100	4	752.309	3756.499	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0100	5	752.309	3756.499	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0100	6	752.309	3756.499	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0100	7	752.309	3756.499	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0100	8	752.210	3755.399	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0100	9	752.309	3756.499	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0120	1	750.109	3755.799	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0120	2	750.109	3755.799	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0120	3	750.109	3755.799	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3

* represents source has been placed into minor point source file negative numbers are defaults used to replace zero inputs.

EXHIBIT 3-6. Example of stack report output from PREPNT.

County Code	Facility ID	Stack ID	UTM Easting	UTM Northing	Stack Height	Stack Diameter	Gas Temp	Flow Rate	Gas Velocity	Effective Plume Rise	Final Plume Rise
111640	0120	4	752.409	3755.299	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0120	5	750.109	3755.799	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0120	6	750.109	3755.799	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0120	7	750.109	3755.799	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0131	1	752.409	3757.298	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0131	2	752.409	3757.298	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0131	3	752.409	3757.298	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0131	4	752.409	3757.298	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0131	5	752.409	3757.298	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0121	1	752.209	3755.899	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
111640	0129	1	752.709	3755.499	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
112100	0013	1	724.802	3697.404	17.7	0.3	298.	1.3	17.5	1.4	19.1
112100	0013	2	724.802	3697.404	12.2	0.4	298.	0.3	2.7	0.5	12.7
112100	0013	3	724.802	3697.404	7.6	0.9	325.	11.8	18.0	28.0	35.7
112100	0013	4	724.802	3697.404	7.6	0.6	298.	7.1	24.3	5.2	12.8
112100	0013	5	724.802	3697.404	15.5	1.1	611.	8.5	9.5	76.7	92.2
112140	0029	1	668.593	3784.098	61.0	2.4	533.	27.4	5.9	165.5	226.5
112140	0027	1	663.793	3794.698	22.6	0.4	530.	6.2	50.0	53.8	76.4
112140	0027	2	663.793	3794.698	22.6	0.4	516.	6.2	50.0	52.5	75.0
112140	0027	3	663.793	3794.698	22.6	0.4	530.	6.2	50.0	53.8	76.4
112140	0027	4	663.793	3794.698	15.8	0.5	386.	1.0	6.2	8.7	24.6
112140	0027	5	663.793	3794.698	16.5	1.2	301.	12.0	9.8	10.6	27.1
112140	0027	6	663.793	3794.698	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
112260	0075	1	742.507	3737.200	93.9	1.7	408.	29.7	13.5	124.0	217.9
112260	0075	2	742.507	3737.200	93.0	1.7	408.	29.7	13.5	124.0	217.0
112260	0075	3	742.507	3737.200	93.9	1.7	408.	29.7	13.5	124.0	217.9
112260	0075	4	742.507	3737.200	93.9	1.7	405.	29.7	13.5	122.4	216.2
112260	0364	1	740.906	3726.401	15.2	1.7	472.	27.4	12.4	145.5	160.7
112260	0364	2	740.906	3726.401	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
112260	0077	1	727.402	3738.600	12.2	0.6	478.	14.6	50.0	92.1	104.3
112260	0077	2	727.402	3738.600	12.2	0.6	464.	3.0	10.3	27.2	39.4
112260	0077	3	727.402	3738.600	7.6	0.6	422.	2.4	8.1	19.7	27.3
112260	0077	4	727.402	3738.600	12.2	0.6	478.	4.7	16.2	39.5	51.7
112260	0007	1	741.006	3742.000	43.0	1.3	533.	47.2	35.0	239.8	282.8
112260	0007	2	741.006	3742.000	18.0	0.9	533.	20.1	30.6	131.3	149.3
112260	0007	3	741.006	3742.000	20.1	1.7	533.	24.4	10.6	151.6	171.7
112260	0007	4	741.006	3742.000	22.9	9.1	344.	4.7	0.1	19.3	42.2
112260	0007	5	741.006	3742.000	15.2	11.0	300.	69.4	0.7	35.4	50.6
112260	0007	6	741.006	3742.000	12.2	1.2	378.	58.4	50.0	173.0	185.2
112260	0020	1	739.406	3728.001	16.2	0.9	505.	0.6	0.9	8.6	24.7
112260	0020	2	739.406	3728.001	11.3	0.4	411.	0.3	2.6	3.7	15.0
112260	0020	3	739.406	3728.001	15.8	0.3	339.	1.2	13.4	6.3	22.2
112260	0020	4	739.406	3728.001	27.1	1.4	589.	26.0	17.6	172.6	199.7
112260	0020	5	739.406	3728.001	27.1	1.4	533.	23.6	16.0	148.1	175.2
112260	0020	6	739.406	3728.001	18.0	0.9	589.	11.8	18.0	95.6	113.5
112260	0020	7	739.406	3728.001	16.2	1.2	533.	18.9	16.2	125.3	141.4
112260	0020	8	739.406	3728.001	15.8	0.5	339.	2.6	15.8	11.5	27.3
112260	0020	9	739.406	3728.001	7.0	0.2	295.	0.2	4.0	0.2	7.2
112260	0020	10	739.406	3728.001	23.5	0.3	298.	0.4	7.2	0.6	24.1
112260	0020	11	739.406	3728.001	11.3	0.4	361.	0.7	6.7	5.5	16.8

* represents source has been placed into minor point source file negative numbers are defaults used to replace zero inputs.

EXHIBIT 3-6 Continued.

County Code	Facility ID	Stack ID	UTM Easting	UTM Northing	Stack Height	Stack Diameter	Gas Temp	Flow Rate	Gas Velocity	Effective Plume Rise	Final Plume Rise
112260	0020	12	739.406	3728.001	19.8	1.0	295.	13.7	16.2	4.8	24.6
112260	0212	1	739.405	3741.001	9.1	0.6	561.	4.0	13.8	41.1	50.3
112260	0212	2	739.405	3741.001	9.1	0.6	533.	4.2	14.3	40.4	49.5
112260	0212	3	739.405	3741.001	9.4	0.6	350.	8.5	29.1	32.0	41.5
112260	0066	1	735.403	3737.000	9.8	0.8	355.	9.4	20.7	36.7	46.5
112260	0066	2	735.403	3737.000	53.3	0.8	357.	10.2	22.3	39.5	92.9
112260	0066	3	735.403	3737.000	35.1	0.8	308.	10.5	23.1	15.3	50.4
112260	0012	1	740.706	3742.200	58.2	0.8	333.	8.0	17.6	24.5	82.7
112260	0004	1	732.503	3743.600	15.5	0.9	344.	5.7	8.6	22.1	37.7
112260	0004	2	732.503	3743.600	14.9	0.9	344.	7.1	10.8	26.2	41.1
112260	0004	3	732.503	3743.600	13.1	0.9	489.	12.8	19.5	85.6	98.8
112260	0004	4	732.503	3743.600	13.1	0.9	478.	13.5	20.6	87.1	100.2
112260	0401	1	734.004	3745.200	30.5	0.3	298.	2.9	39.1	2.6	33.1
112260	0401	2	734.004	3745.200	24.4	1.6	405.	56.6	26.6	198.4	222.8
112260	0401	3	734.004	3745.200	24.4	1.5	405.	56.6	31.0	198.4	222.8
112260	0401	4	734.004	3745.200	30.5	0.4	298.	2.8	19.8	2.6	33.1
112260	0401	5	734.004	3745.200	30.5	0.3	298.	1.2	20.0	1.4	31.8
112260	0401	6	734.004	3745.200	30.5	0.3	298.	1.2	20.0	1.4	31.8
112260	0401	7	734.004	3745.200	18.3	0.6	366.	7.2	24.7	33.2	51.5
112260	0401	8	734.004	3745.200	25.9	0.5	298.	3.5	18.9	3.1	29.0
112260	0401	9	734.004	3745.200	15.2	0.6	298.	5.7	19.7	4.4	19.7
112260	0401	10	734.004	3745.200	18.3	0.7	366.	10.4	24.8	43.8	62.1
112260	0401	11	734.004	3745.200	25.9	0.9	366.	18.9	26.9	68.3	94.2
112260	0401	12	734.004	3745.200	18.3	0.7	366.	8.5	20.2	37.5	55.8
112260	0401	13	734.004	3745.200	13.7	1.3	422.	33.7	26.2	144.8	158.5
112260	0401	14	734.004	3745.200	13.7	1.3	422.	33.7	26.2	144.8	158.5
112260	0401	15	734.004	3745.200	7.6	0.5	298.	4.3	18.2	3.6	11.2
112260	0401	16	734.004	3745.200	7.6	0.5	298.	4.3	18.2	3.6	11.2
112260	0401	17	734.004	3745.200	18.3	0.8	366.	8.5	18.6	37.5	55.8
112260	0401	18	734.004	3745.200	18.3	0.5	298.	4.8	22.8	3.9	22.2
112260	0401	19	734.004	3745.200	18.3	0.9	366.	8.5	12.1	37.5	55.8
112260	0401	20	734.004	3745.200	25.9	0.6	366.	14.2	48.5	55.0	80.9
112260	0401	21	734.004	3745.200	1.8	0.7	298.	7.1	20.0	5.2	7.0
112260	0401	22	734.004	3745.200	17.4	1.1	298.	10.2	11.4	6.8	24.2
112260	0401	23	734.004	3745.200	22.9	0.9	298.	11.5	16.3	7.5	30.3
112260	0401	24	734.004	3745.200	30.5	0.6	298.	5.7	19.7	4.4	34.9
112260	0401	25	734.004	3745.200	30.5	0.3	298.	1.9	21.4	1.9	32.4
112260	0401	26	734.004	3745.200	30.5	0.4	294.	3.1	24.9	1.0	31.5
112260	0401	27	734.004	3745.200	30.5	0.3	298.	1.9	25.9	1.9	32.4
112260	0401	28	734.004	3745.200	30.5	0.4	298.	2.8	23.0	2.6	33.1
112260	0401	29	734.004	3745.200	30.5	0.3	298.	1.9	21.4	1.9	32.4
112260	0401	30	734.004	3745.200	30.5	0.4	298.	2.8	23.0	2.6	33.1
112260	0401	31	734.004	3745.200	30.5	0.4	298.	2.8	23.0	2.6	33.1
112260	0401	32	734.004	3745.200	15.2	1.2	298.	20.4	17.5	11.5	26.7
112260	0401	33	734.004	3745.200	18.3	0.5	298.	2.5	15.3	2.4	20.7
112260	0401	34	734.004	3745.200	16.2	0.5	298.	4.9	29.9	4.0	20.1
112260	0401	35	734.004	3745.200	3.0	0.2	298.	0.4	16.2	0.6	3.7
112260	0401	36	734.004	3745.200	30.5	0.2	298.	0.4	16.2	0.6	31.1
112260	0401	37	734.004	3745.200	13.7	0.4	298.	2.9	19.9	2.6	16.3
112260	0021	1	721.601	3713.802	20.7	1.2	316.	8.5	7.3	17.8	38.5

* represents source has been placed into minor point source file negative numbers are defaults used to replace zero inputs.

EXHIBIT 3-6 Continued.

PREPNT

County Code	Facility ID	Stack ID	UTM Easting	UTM Northing	Stack Height	Stack Diameter	Gas Temp	Flow Rate	Gas Velocity	Effective Plume Rise	Final Plume Rise
112260	0021	2	721.601	3713.802	19.5	3.0	383.	89.7	12.3	238.8	258.3
112260	0021	3	721.601	3713.802	19.5	3.2	413.	89.7	11.1	270.6	290.1
112260	0021	4	721.601	3713.802	15.8	1.2	325.	14.2	12.1	32.1	48.0
112260	0021	5	721.601	3713.802	15.8	1.2	325.	14.2	12.1	32.1	48.0
112260	0021	6	721.601	3713.802	20.7	1.2	326.	8.5	7.3	22.7	43.4
112260	0037	1	727.302	3736.401	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
112260	0124	1	743.106	3733.201	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
112260	0014	1	739.506	3734.301	8.2	0.4	422.	1.8	17.1	16.0	24.3
112260	0014	2	739.506	3734.301	9.4	0.6	322.	1.5	5.2	5.6	15.1
112260	0185	1	728.002	3738.500	10.1	0.6	380.	1.7	6.0	12.7	22.7
112260	0185	2	728.002	3738.500	7.9	0.5	450.	1.4	8.6	14.8	22.7
112260	0221	1	733.204	3743.400	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
112260	0016	1	739.405	3730.801	8.5	0.3	353.	1.6	22.3	9.5	18.1
112400	0039	1	689.796	3823.696	8.5	0.9	533.	-2.6	-4.0	28.5	37.0
112400	0039	2	689.796	3823.696	8.5	0.9	533.	-2.6	-4.0	28.5	37.0
112540	0023	1	790.038	3794.508	30.5	1.5	493.	5.7	3.1	47.0	77.4
112540	0023	2	790.038	3794.508	7.3	0.7	484.	2.4	6.1	23.9	31.2
112540	0023	3	790.038	3794.508	7.3	0.7	484.	2.4	6.1	23.9	31.2
112540	0023	4	790.038	3794.508	30.5	1.5	533.	4.7	2.6	44.3	74.8
112540	0046	1	795.101	3802.121	59.7	1.5	478.	0.8	0.5	10.7	70.4
112720	0001	1	682.094	3698.403	304.8	10.7	430.	1510.2	16.7	1560.5	1865.3
112720	0001	2	682.094	3698.504	304.8	10.7	425.	1472.5	16.3	1511.1	1815.9
113740	0010	1	797.499	3666.205	33.5	1.2	505.	1.9	1.6	21.2	54.8
113740	0010	2	797.499	3666.205	37.2	1.4	505.	1.9	1.3	21.2	58.4
113740	0010	3	797.499	3666.205	12.2	1.2	500.	1.9	1.6	21.0	33.2
113920	0024	1	791.657	3724.074	-3.0	-0.2	305.	-0.1	-4.0	0.5	3.5
113920	0025	1	791.562	3723.969	12.2	0.9	369.	14.6	22.3	57.7	69.8
114100	0003	1	744.307	3812.996	12.2	0.5	366.	0.9	5.7	7.2	19.4
114100	0003	2	744.307	3812.996	-3.0	-0.2	298.	-0.1	-4.0	0.3	3.3
114100	0003	3	744.307	3812.996	18.3	0.3	298.	2.4	32.3	2.3	20.6
114100	0003	4	744.307	3812.996	15.2	0.3	298.	3.6	50.0	3.2	18.4
114100	0003	5	744.307	3812.996	31.7	0.5	422.	3.1	18.7	24.0	55.7
114100	0003	6	744.307	3812.996	3.7	0.3	380.	3.6	50.0	22.0	25.7
114100	0003	7	744.307	3812.996	2.4	0.6	366.	4.7	16.2	24.1	26.6
114160	0002	1	679.094	3762.700	27.4	1.5	350.	23.7	13.0	69.2	96.7
114160	0002	2	679.094	3762.700	15.2	1.5	339.	7.1	3.9	24.3	39.5
114160	0002	3	679.094	3762.700	12.2	1.2	422.	23.6	20.2	110.7	122.9
114160	0002	4	679.094	3762.700	9.1	1.2	355.	5.7	4.9	25.0	34.2

* represents source has been placed into minor point source file negative numbers are defaults used to replace zero inputs.

EXHIBIT 3-6 Concluded.

0011	1110380	691.595	3777.799	305.	10.7	50.0	422.	4520.4
0008	1110380	704.198	3780.998	12.	0.9	12.9	422.	8.5
0008	2110380	704.198	3780.998	12.	1.1	18.5	422.	16.5
0008	3110380	704.198	3780.998	58.	1.2	28.7	536.	30.2
0008	4110380	704.198	3780.998	66.	1.5	23.0	533.	42.0
0016	5110380	704.698	3780.998	18.	2.6	3.0	378.	15.6
0016	6110380	704.698	3780.998	18.	1.4	10.5	378.	15.6
0016	8110380	704.698	3780.998	24.	0.2	27.8	378.	1.3
0016	9110380	704.698	3780.998	24.	0.5	28.7	378.	4.7
0016	10110380	704.698	3780.998	18.	0.5	31.6	333.	5.2
0018	1110840	674.493	3719.403	30.	1.5	9.6	450.	17.5
0008	1110840	679.995	3714.403	20.	1.1	8.9	533.	7.9
0008	2110840	679.995	3714.403	18.	1.2	8.9	533.	10.4
0008	3110840	679.995	3714.403	60.	2.6	4.5	383.	23.6
0008	4110840	679.995	3714.403	55.	0.9	28.7	372.	18.9
0008	5110840	679.995	3714.403	60.	2.6	4.5	383.	23.6
0008	6110840	679.995	3714.403	38.	0.4	1.3	310.	0.2
0003	1111160	733.704	3745.401	255.	7.5	19.6	408.	858.9
0022	1111160	717.900	3744.400	37.	1.5	24.6	339.	44.8
0001	1111420	694.696	3704.403	253.	6.7	16.7	413.	594.7
0001	2111420	694.696	3704.403	253.	6.7	12.7	414.	453.1
0001	3111420	694.696	3704.303	245.	7.0	29.3	414.	1132.7
0013	3112100	724.802	3697.404	8.	0.9	18.0	325.	11.8
0013	5112100	724.802	3697.404	16.	1.1	9.5	611.	8.5
0029	1112140	668.593	3784.098	61.	2.4	5.9	533.	27.4
0027	1112140	663.793	3794.698	23.	0.4	50.0	530.	6.2
0027	2112140	663.793	3794.698	23.	0.4	50.0	516.	6.2
0027	3112140	663.793	3794.698	23.	0.4	50.0	530.	6.2
0027	5112140	663.793	3794.698	16.	1.2	9.8	301.	12.0
0075	1112260	742.507	3737.200	94.	1.7	13.5	408.	29.7
0075	2112260	742.507	3737.200	93.	1.7	13.5	408.	29.7
0075	3112260	742.507	3737.200	94.	1.7	13.5	408.	29.7
0075	4112260	742.507	3737.200	94.	1.7	13.5	405.	29.7
0364	1112260	740.906	3726.401	15.	1.7	12.4	472.	27.4
0077	1112260	727.402	3738.600	12.	0.6	50.0	478.	14.6
0077	2112260	727.402	3738.600	12.	0.6	10.3	464.	3.0
0077	3112260	727.402	3738.600	8.	0.6	8.1	422.	2.4
0077	4112260	727.402	3738.600	12.	0.6	16.2	478.	4.7
0007	1112260	741.006	3742.000	43.	1.3	35.0	533.	47.2
0007	2112260	741.006	3742.000	18.	0.9	30.6	533.	20.1
0007	3112260	741.006	3742.000	20.	1.7	10.6	533.	24.4
0007	4112260	741.006	3742.000	23.	9.1	0.1	344.	4.7
0007	5112260	741.006	3742.000	15.	11.0	0.7	300.	69.4
0007	6112260	741.006	3742.000	12.	1.2	50.0	378.	58.4
0020	4112260	739.406	3728.001	27.	1.4	17.6	589.	26.0
0020	5112260	739.406	3728.001	27.	1.4	16.0	533.	23.6
0020	6112260	739.406	3728.001	18.	0.9	18.0	589.	11.8
0020	7112260	739.406	3728.001	16.	1.2	16.2	533.	18.9
0020	8112260	739.406	3728.001	16.	0.5	15.8	339.	2.6
0212	1112260	739.405	3741.001	9.	0.6	13.8	561.	4.0
0212	2112260	739.405	3741.001	9.	0.6	14.3	533.	4.2
0212	3112260	739.405	3741.001	9.	0.6	29.1	350.	8.5
0066	1112260	735.403	3737.000	10.	0.8	20.7	355.	9.4
0066	2112260	735.403	3737.000	53.	0.8	22.3	357.	10.2
0066	3112260	735.403	3737.000	35.	0.8	23.1	308.	10.5
0012	1112260	740.706	3742.200	58.	0.8	17.6	333.	8.0
0004	1112260	732.503	3743.600	16.	0.9	8.6	344.	5.7
0004	2112260	732.503	3743.600	15.	0.9	10.8	344.	7.1
0004	3112260	732.503	3743.600	13.	0.9	19.5	489.	12.8
0004	4112260	732.503	3743.600	13.	0.9	20.6	478.	13.5
0401	1112260	734.004	3745.200	30.	0.3	39.1	298.	2.9
0401	2112260	734.004	3745.200	24.	1.6	26.6	405.	56.6
0401	3112260	734.004	3745.200	24.	1.5	31.0	405.	56.6
0401	4112260	734.004	3745.200	30.	0.4	19.8	298.	2.8

EXHIBIT 3-7. Example of elevated stack file output from [illegible]T.

PREPNT

0401	5112260	734.004	3745.200	30.	0.3	20.0	298.	1.2
0401	6112260	734.004	3745.200	30.	0.3	20.0	298.	1.2
0401	7112260	734.004	3745.200	18.	0.6	24.7	366.	7.2
0401	8112260	734.004	3745.200	26.	0.5	18.9	298.	3.5
0401	10112260	734.004	3745.200	18.	0.7	24.8	366.	10.4
0401	11112260	734.004	3745.200	26.	0.9	26.9	366.	18.9
0401	12112260	734.004	3745.200	18.	0.7	20.2	366.	8.5
0401	13112260	734.004	3745.200	14.	1.3	26.2	422.	33.7
0401	14112260	734.004	3745.200	14.	1.3	26.2	422.	33.7
0401	17112260	734.004	3745.200	18.	0.8	18.6	366.	8.5
0401	19112260	734.004	3745.200	18.	0.9	12.1	366.	8.5
0401	20112260	734.004	3745.200	26.	0.6	48.5	366.	14.2
0401	23112260	734.004	3745.200	23.	0.9	16.3	298.	11.5
0401	24112260	734.004	3745.200	30.	0.6	19.7	298.	5.7
0401	25112260	734.004	3745.200	30.	0.3	21.4	298.	1.9
0401	26112260	734.004	3745.200	30.	0.4	24.9	294.	3.1
0401	27112260	734.004	3745.200	30.	0.3	25.9	298.	1.9
0401	28112260	734.004	3745.200	30.	0.4	23.0	298.	2.8
0401	29112260	734.004	3745.200	30.	0.3	21.4	298.	1.9
0401	30112260	734.004	3745.200	30.	0.4	23.0	298.	2.8
0401	31112260	734.004	3745.200	30.	0.4	23.0	298.	2.8
0401	32112260	734.004	3745.200	15.	1.2	17.5	298.	20.4
0401	36112260	734.004	3745.200	30.	0.2	16.2	298.	0.4
0021	1112260	721.601	3713.802	21.	1.2	7.3	316.	8.5
0021	2112260	721.601	3713.802	20.	3.0	12.3	383.	89.7
0021	3112260	721.601	3713.802	20.	3.2	11.1	413.	89.7
0021	4112260	721.601	3713.802	16.	1.2	12.1	325.	14.2
0021	5112260	721.601	3713.802	16.	1.2	12.1	325.	14.2
0021	6112260	721.601	3713.802	21.	1.2	7.3	326.	8.5
0039	1112400	689.796	3823.696	9.	0.9	4.0	533.	2.6
0039	2112400	689.796	3823.696	9.	0.9	4.0	533.	2.6
0023	1112540	790.038	3794.508	30.	1.5	3.1	493.	5.7
0023	2112540	790.038	3794.508	7.	0.7	6.1	484.	2.4
0023	3112540	790.038	3794.508	7.	0.7	6.1	484.	2.4
0023	4112540	790.038	3794.508	30.	1.5	2.6	533.	4.7
0046	1112540	795.101	3802.121	60.	1.5	0.5	478.	0.8
0001	1112720	682.094	3698.403	305.	10.7	16.7	430.	1510.2
0001	2112720	682.094	3698.504	305.	10.7	16.3	425.	1472.5
0010	1113740	797.499	3666.205	34.	1.2	1.6	505.	1.9
0010	2113740	797.499	3666.205	37.	1.4	1.3	505.	1.9
0010	3113740	797.499	3666.205	12.	1.2	1.6	500.	1.9
0025	1113920	791.562	3723.969	12.	0.9	22.3	369.	14.6
0003	5114100	744.307	3812.996	32.	0.5	18.7	422.	3.1
0003	6114100	744.307	3812.996	4.	0.3	50.0	380.	3.6
0003	7114100	744.307	3812.996	2.	0.6	16.2	366.	4.7
0002	1114160	679.094	3762.700	27.	1.5	13.0	350.	23.7
0002	2114160	679.094	3762.700	15.	1.5	3.9	339.	7.1
0002	3114160	679.094	3762.700	12.	1.2	20.2	422.	23.6
0002	4114160	679.094	3762.700	9.	1.2	4.9	355.	5.7

EXHIBIT 3-7 Concluded.

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CONTROL
PTSOURCE
ATLANTA - ELEVATED POINT SOURCES
        15          0        113          1         20
        20          0          0
         1          0          0          0          0
        10          1
        11         12                    14         15         16
NO
NO2
OLE
PAR
TOL
XYL
FORM
ALD2
ETH
MEOH
ETOH
ISOP
SO2
CO
AERO
     84155          0      84155       2400
END
REGION
       0.0        0.0         16
  660000.0  3665000.0
    4000.0     4000.0
        40         40          5
         2          3         0.        50.       150.
END
POINT SOURCES
        1STD                691595.  3777799.      0011          1    110380
     305.0      10.70          422.   180000.
        2STD                704198.  3780998.      0008          1    110380
      12.0       0.90          422.    46440.
        3STD                704198.  3780998.      0008          2    110380
      12.0       1.10          422.    66600.
        4STD                704198.  3780998.      0008          3    110380
      58.0       1.20          536.   103320.
        5STD                704198.  3780998.      0008          4    110380
      66.0       1.50          533.    82800.
        .
        .
      109STD                744307.  3812996.      0003          7    114100
        2.0      0.60          366.    58320.
      110STD                679094.  3762700.      0002          1    114160
      27.0       1.50          350.    46800.
      111STD                679094.  3762700.      0002          2    114160
      15.0       1.50          339.    14040.
      112STD                679094.  3762700.      0002          3    114160
      12.0       1.20          422.    72720.
      113STD                679094.  3762700.      0002          4    114160
       9.0       1.20          355.    17640.
END
TIME INTERVAL
     84155          0      84155        100
METHOD
STD        ALL        EMVALUES  0.        50000.
END
VERTICAL METHODS
STD        ALL        PLUME RISE 0.       10000.
```

EXHIBIT 3-8. Example of control file for elevated stacks (output from PREPNT, input to CENTEMS).

```
END
EMISSIONS VALUES
ALL        ALL              0.000
           1FLOWRATE    16273440.
           2FLOWRATE       30600.
           3FLOWRATE       59400.
           4FLOWRATE      108720.
           5FLOWRATE      151200.
                .
                .
          109FLOWRATE       16920.
          110FLOWRATE       85320.
          111FLOWRATE       25560.
          112FLOWRATE       84960.
          113FLOWRATE       20520.
TIME INTERVAL
     84155        100      84155        200
METHOD
STD        ALL        ENVALUES  0.        50000.
END
VERTICAL METHODS
STD        ALL        PLUME RISE 0.       10000.
END
EMISSIONS VALUES
ALL        ALL              0.000
           1FLOWRATE    16273440.
           2FLOWRATE       30600.
           3FLOWRATE       59400.
           4FLOWRATE      108720.
           5FLOWRATE      151200.
                .
                .
          109FLOWRATE       16920.
          110FLOWRATE       85320.
          111FLOWRATE       25560.
          112FLOWRATE       84960.
          113FLOWRATE       20520.
.
.
.
TIME INTERVAL
     84155       2300      84155       2400
METHOD
STD        ALL        ENVALUES  0.        50000.
END
VERTICAL METHODS
STD        ALL        PLUME RISE 0.       10000.
END
EMISSIONS VALUES
ALL        ALL              0.000
           1FLOWRATE    16273440.
           2FLOWRATE       30600.
           3FLOWRATE       59400.
           4FLOWRATE      108720.
           5FLOWRATE      151200.
                .
                .
          109FLOWRATE       16920.
          110FLOWRATE       85320.
          111FLOWRATE       25560.
          112FLOWRATE       84960.
          113FLOWRATE       20520.
```

EXHIBIT 3-8 Concluded.

```
Region definition:
origin (UTMs) and UTM zone:    660.000   3665.00  16
number of grid cells (x,y)lls:   40  40
grid cell size (x,y):    4.00000   4.00000
Number of counties in modeling region:   43

 No controls by SIC..

Number of elevated stacks:   113

Totals from original NAPAP file (kg/day:)
                CO          NOx          SOx          THC          TSP
Total   458394.25    720125.13   2695132.25     91150.30    142990.80

Number of records w/o matching growth factors:   11
SIC codes for records w/o growth factors:
  1429

Totals before application of growth factors:
(kg/day; does not include points outside region)
 SIC          CO          NOx          SOx          THC          TSP
   0        0.00         0.00         0.00         0.00         0.00
  01        0.00         0.00         0.00         0.00         0.00
  02        0.00         0.00         0.00         0.00         0.00
  07        0.00         0.00         0.00         0.00         0.00
  10        0.00         0.00         0.00         0.00         0.00
  11        0.00         0.00         0.00         0.00         0.00
  12        0.00         0.00         0.00         0.00         0.00
  13        0.00         0.00         0.00         0.00         0.00
  20        0.00         0.00         0.00         0.00         0.00
  21        0.00         0.00         0.00         0.00         0.00
  22      204.42       829.45      1713.56        10.04       591.31
  23        0.00         0.00         0.00         0.00         0.00
  24      387.47      1957.65       257.27       377.59      1164.10
  25        0.00         0.00         0.00         0.00         0.00
  26       64.62      1974.83      3386.16      6071.61       284.39
  27        0.00         0.00         0.00      2331.54         0.00
  28       10.04       344.34      6044.41         3.88       782.05
  29      115.52       201.32       658.64       535.02       216.93
  30        0.00         0.00         0.00      1618.12         2.58
  31        0.00         0.00         0.00         0.00         0.00
  32      181.52      5716.64      8136.58      1667.56      4602.36
  33    17994.45       807.08      3915.82       651.41      1170.19
  34        0.00         0.00         0.00       926.03         0.00
  35        0.00         0.00         0.00         0.00         0.00
  36       95.28      1100.22       231.97       353.13        44.64
  37        0.00         0.00         0.00         0.00         0.00
  38        0.00         0.00         0.00         0.00         0.00
  39        0.00         0.00         0.00         0.00         0.00
  40        0.00         0.00         0.00         0.00         0.00
  41        0.00         0.00         0.00         0.00         0.00
  42        0.00         0.00         0.00         0.00         0.00
  44        0.00         0.00         0.00         0.00         0.00
  45        0.00         0.00         0.00         0.00         0.00
  46        0.00         0.00         0.00         0.00         0.00
  47        0.00         0.00         0.00         0.00         0.00
  48        0.00         0.00         0.00         0.00         0.00
  49     6909.52    330202.88   1864794.00      1536.25     42302.14
  72        0.00         0.00         0.00         0.00         0.00
  73        0.00         0.00         0.00         0.00         0.00
  75        0.00         0.00         0.00         0.00         0.00
  MV        2.58        20.68        87.89     23372.26       571.25
  PP        0.00         0.00         0.00      5641.69         0.00
  NG       12.67        93.76        25.34         5.07       356.34
```

EXHIBIT 3-9. Example of message file ouptut from PREPNT.

Total	25978.10	343248.88	1889252.38	45101.23	52088.27

Totals after application of growth factors:
(kg/day; does not include points outside region)

SIC	CO	NOx	SOx	THC	TSP
0	0.00	0.00	0.00	0.00	0.00
01	0.00	0.00	0.00	0.00	0.00
02	0.00	0.00	0.00	0.00	0.00
07	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00
22	204.42	829.45	1713.56	10.04	591.31
23	0.00	0.00	0.00	0.00	0.00
24	387.47	1957.65	257.27	377.59	1164.10
25	0.00	0.00	0.00	0.00	0.00
26	64.62	1974.83	3386.16	6071.61	284.39
27	0.00	0.00	0.00	2331.54	0.00
28	10.04	344.34	6044.41	3.88	782.05
29	115.52	201.32	658.64	535.02	216.93
30	0.00	0.00	0.00	1618.12	2.58
31	0.00	0.00	0.00	0.00	0.00
32	181.52	5716.64	8136.58	1667.56	4602.36
33	17994.45	807.08	3915.82	651.41	1170.19
34	0.00	0.00	0.00	926.03	0.00
35	0.00	0.00	0.00	0.00	0.00
36	95.28	1100.22	231.97	353.13	44.64
37	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00
41	0.00	0.00	0.00	0.00	0.00
42	0.00	0.00	0.00	0.00	0.00
44	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00
46	0.00	0.00	0.00	0.00	0.00
47	0.00	0.00	0.00	0.00	0.00
48	0.00	0.00	0.00	0.00	0.00
49	6909.52	330202.88	1864794.00	1536.25	42302.14
72	0.00	0.00	0.00	0.00	0.00
73	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00
MV	2.58	20.68	87.89	23372.26	571.25
PP	0.00	0.00	0.00	5641.69	0.00
NG	12.67	93.76	25.34	5.07	356.34
Total	25978.10	343248.88	1889252.38	45101.23	52088.27

EXHIBIT 3-9 Concluded.

DESCRIPTION OF PREGRD

The PREGRD program reformats area sources, both stationary and mobile, into a format required by the gridding routine GRDEMS. Figure 3-2 shows the file structure of the PREGRD program. PREGRD requires five input files.

The first input file, the user input file, contains fractions of vehicle miles traveled (VMT) from the EPA's computer program MOBILE4, which are used in calculating refueling emissions, a flag indicating a weekday or weekend episode, a flag indicating the version of the NAPAP emissions, and an optional list of additional controls for pollutants by NAPAP Source Category codes (Table 3-5 and Exhibit 3-10).

The second input file defines the modeling region and is the same region definition file used in PREPNT (Table 3-3 and Exhibit 3-3).

The third input file contains growth factor information to project the base year emissions to a future scenario and is the same growth factor file used in PREPNT (Table 3-2 and Exhibit 3-2). Lines 3 and 4 are used by PREGRD.

The fourth input file is the area and motor vehicle emissions file (Table 3-6 and Exhibit 3-11). This file contains emissions of SO_x, TSP, NO_X, THC, and CO by NAPAP Source Category code for each county in the modeling region. Emissions are converted from tons per year to kilograms per day. Data on emissions from on-road motor vehicles in this file are separated into tailpipe exhaust and evaporative emissions based on vehicle type, road class, and implementation of any inspection/maintenance program or Stage II refueling controls.

The fifth input file contains motor vehicle adjustment factors calculated from the MOBILE4 program (Table 3-7 and Exhibit 3-12). These factors are further discussed in Chapter 4 in the section "Treatment of Mobile Sources".

Three output files are created from the PREGRD program: area and mobile emissions files in model emission record format (merf) and a message file (Figure 3-2). The merf files generated by PREGRD contain incomplete, or skeleton, records

with grid cell indexes and other fields left blank. These fields will be completed after the merf files are processed by GRDEMS. The area emissions merf file contains data for all stationary area sources within the modeling region (Exhibit 3-13). The second output file, the mobile emissions file, breaks down total motor vehicle emissions into tailpipe exhaust, hot soak evaporatives, refueling, and running evaporative emissions (Exhibit 3-14). These files are input to the GRDEMS program. Temporal allocation factors for on-road motor vehicle emissions based on a weekday or weekend episode, are assigned by PREGRD. Temporal allocation factors for area emissions from stationary sources are assigned by GRDEMS.

The third output file contains messages from the PREGRD program (Exhibit 3-15). It indicates the number of counties in the region, emission control factors by NAPAP Source Category, the number of records without matching growth factors, area emission totals before and after application of growth factors, and motor vehicle emission totals before and after adjustments.

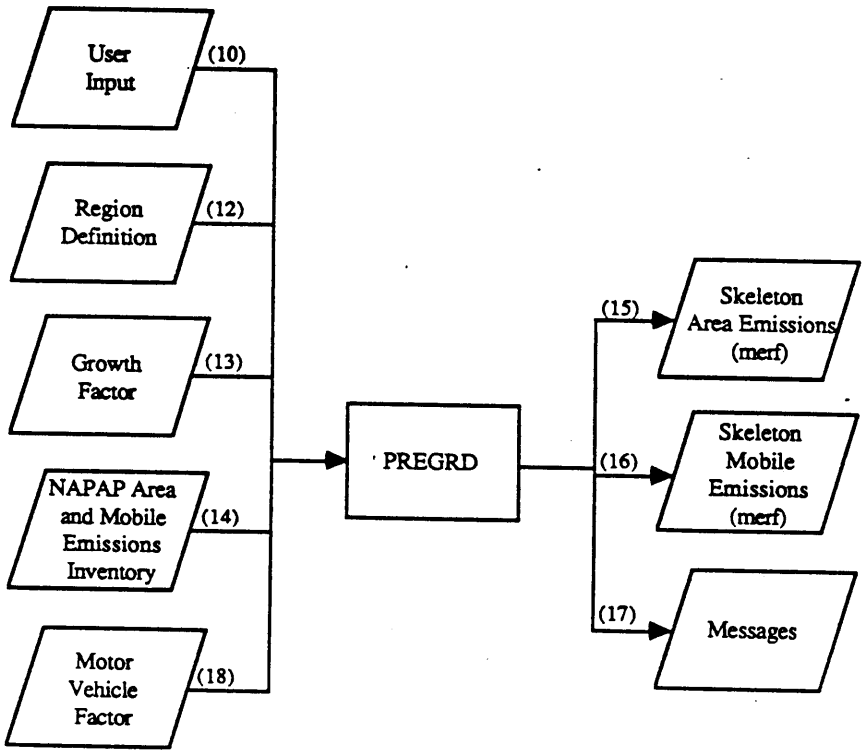

FIGURE 3-2. Input and output files used by PREGRD.

EEE 89077

TABLE 3-5. User input file (unit 10) used by the PREGRD program. (See Exhibit 3-10)

Line	Variable	Columns	Type	Description
1	XVMT(1)	*	R	VMT fraction for LDGV from MOBILE4
	XVMT(2)	*	R	VMT fraction for LDGT from MOBILE4
	XVMT(3)	*	R	VMT fraction for HDGV from MOBILE4
2	IWKFLG	*	I	Day of week flag 1 = weekday 2 = weekend
	NPVERS	*	I	1985 NAPAP version flag 1 = version without running losses 2 = version with running losses
3+	INSC	*	I	NAPAP source category code for additional controls (-999 = end of section)
	CNTRL(1)	*	R	Remaining CO fraction (1.0 - CO control factor) (-999 = end of section)
	CNTRL(2)	*	R	Remaining NO_x fraction (-999 = end of section)
	CNTRL(3)	*	R	Remaining SO_x fraction (-999 = end of section)
	CNTRL(4)	*	R	Remaining THC fraction (-999 = end of section)
	CNTRL(5)	*	R	Remaining TSP fraction (-999 = end of section)

LDGV = light-duty gas vehicle
LDGT = light-duty gas truck
HDGV = heavy-duty gas vehicle

```
0.719   0.237   0.044
1 , 2
 -999     -9.99     -9.99     -9.99     -9.99     -9.99
                - weekday , NAPAP85 vers
```

EXHIBIT 3-10. Example of user input file to PREGRD.

TABLE 3-6. Area and mobile emission data (unit 14), by county, used by the PREGRD program. (See Exhibit 3-11)

Line	Variable	Columns	Type	Description
1+	STATE	1-2	I	AEROS state code
	COUNTY	3-6	I	AEROS county code
	NSC	7-14	I	NSC source category code
	SO2	15-24	R	Sulfur dioxide emissions (ton/year)
	TSP	25-34	R	Particulate emissions (ton/year)
	NOX	35-44	R	Oxides of nitrogen emissions (ton/year)
	VOC	45-54	R	Volatile organics (not used, skipped)
	THC	55-64	R	Total hydrocarbon emissions (ton/year)
	CO	65-74	R	Carbon monoxide emissions (ton/year)

90008 32

1103200001					0.0	
1103200002					0.0	
1103200003	0.3	0.0	0.2	0.0	0.0	0.0
1103200004					0.0	
1103200005	0.1	0.3	10.0	0.0	0.5	2.0
1103200006	1.2	119.9	8.9	161.1	261.4	740.0
1103200007					0.0	
1103200008					0.0	
1103200009	0.4	0.0	0.3	0.0	0.0	0.1
1103200010					0.0	
1103200011	0.0	0.0	1.5	0.0	0.1	0.3
1103200012					0.0	
1103200013					0.0	
1103200014					0.0	
1103200015					0.0	
1103200016					0.0	
1103200017					0.0	
1103200018	0.0	0.0	1.8	0.0	0.0	0.3
1103200019					0.0	
1103200020					0.0	
1103200021					0.0	
1103200022					0.0	
1103200023					0.0	
1103200024	0.8	22.6	5.8	30.4	30.4	96.6
1103200025					0.0	
.						
.						
.						
1155400054				21.8	21.8	
1155400056					0.0	
1155400057					0.0	
1155400058					0.0	
1155400059					0.0	
1155400060	0.0	0.3	0.1	0.3	0.4	2.5
1155400061	0.1	15.3	3.1	10.9	12.1	85.7
1155400062		1.1	0.1	1.0	1.1	7.1
1155400063					0.0	
1155400064		2.3	0.2	1.7	1.9	9.3
1155400066					0.0	
1155400067					0.0	
1155400068					0.0	
1155400071					0.0	
1155400072					0.0	
1155400073					0.0	
1155400074					0.0	
1155400075					0.0	
1155400076					0.0	
1155400078				15.0	15.0	
1155400079				12.0	12.0	
1155400082				22.0	22.0	
1155400084				1.0	1.0	
1155400093				46.0	50.6	
1155400095				95.0	95.0	
1155400100					0.0	
1155400101				2.0	2.0	
1155400103				39.8	41.0	

EXHIBIT 3-11. Example of area and motor vehicle emissions input file to PREGRD.

TABLE 3-7. Motor vehicle adjustment factors file (unit 18), used by the PREGRD program. The variables INIM and INS2 are set in the region definition file (Table 3-3). (See Exhibit 3-12)

Line	Variable	Columns	Type	Description
1	HEADER	1-10	A	Heading for Reid Vapor Pressure and fleet turnover (not used, skipped)
2	HEADER	1-10	A	Column headings (not used, skipped)
3+	NSC	1-6	I	NAPAP Source Category code (-999 = end of section)
	RVP(1)	7-14	R	Exhaust factor when INIM = 0
	RVP(2)	15-22	R	Evaporative factor when INIM = 0
	RVP(3)	23-30	R	Carbon monoxide factor when INIM = 0
	RVP(4)	31-38	R	Oxides of nitrogen factor when INIM = 0
	RVP(5)	39-46	R	Exhaust factor when INIM = 1
	RVP(6)	47-54	R	Evaporative factor when INIM = 1
	RVP(7)	55-62	R	Carbon monoxide factor when INIM = 1
	RVP(8)	63-70	R	Oxides of nitrogen factor when INIM = 1
	RVP(9)	71-78	R	Exhaust factor when INIM = 2
	RVP(10)	79-86	R	Evaporative factor when INIM = 2
	RVP(11)	87-94	R	Carbon monoxide factor when INIM = 2
	RVP(12)	95-103	R	Oxides of nitrogen factor when INIM = 2
	RVP(13)	104-111	R	Running loss factor when INIM = 0
	RVP(14)	112-119	R	Running loss factor when INIM = 1
	RVP(15)	120-127	R	Running loss factor when INIM = 2
	RVP(16)	128-135	R	Refueling loss factor when INIM = 0
	RVP(17)	136-143	R	Refueling loss factor when INIM = 1
	RVP(18)	144-151	R	Refueling loss factor when INIM = 2
4	HEADER	1-10	A	Heading for fuel composition section (not used, skipped)
5	HEADER	1-10	A	Column headings (not used, skipped)
6+	NSC	1-6	I	NAPAP Source Category code (-999 = end of section)
	CMP(1)	7-14	R	Exhaust factor when INIM = 0
	CMP(2)	15-22	R	Evaporative factor when INIM = 0
	CMP(3)	23-30	R	Carbon monoxide factor when INIM = 0
	CMP(4)	31-38	R	Oxides of nitrogen factor when INIM = 0
	CMP(5)	39-46	R	Exhaust factor when INIM = 1
	CMP(6)	47-54	R	Evaporative factor when INIM = 1
	CMP(7)	55-62	R	Carbon monoxide factor when INIM = 1

continued

TABLE 3-7. Continued.

Line	Variable	Columns	Type	Description
	CMP(8)	63-70	R	Oxides of nitrogen factor when INIM = 1
	CMP(9)	71-78	R	Exhaust factor when INIM = 2
	CMP(10)	79-86	R	Evaporative factor when INIM = 2
	CMP(11)	87-94	R	Carbon monoxide factor when INIM = 2
	CMP(12)	95-103	R	Oxides of nitrogen factor when INIM = 2
	CMP(13)	104-111	R	Running loss factor when INIM = 0
	CMP(14)	112-119	R	Running loss factor when INIM = 1
	CMP(15)	120-127	R	Running loss factor when INIM = 2
	CMP(16)	128-135	R	Refueling loss factor when INIM = 0
	CMP(17)	136-143	R	Refueling loss factor when INIM = 1
	CMP(18)	144-151	R	Refueling loss factor when INIM = 2
7	HEADER	1-10	A	Heading for separate exhaust and evaporative emissions section (not used, skipped)
8	HEADER	1-10	A	Column headings (not used, skipped)
9+	NSC	1-6	I	NAPAP Source Category code (-999 = end of section)
	SEP(1)	7-14	R	Exhaust factor when INIM = 0
	SEP(2)	15-22	R	Exhaust factor when INIM = 1
	SEP(3)	23-30	R	Exhaust factor when INIM = 2
10	HEADER	1-10	A	Heading for Stage II controls section (not used, skipped)
11	HEADER	1-10	A	Column headings (not used, skipped)
12+	NSC	1-6	I	NAPAP Source Category code (-999 = end of section)
	CTL(1)	7-14	R	Refueling loss factor when INS2 = 0
	CTL(2)	15-22	R	Refueling loss factor when INS2 = 1
	CTL(3)	23-30	R	Refueling loss factor when INS2 = 2
13	HEADER	1-10	A	Heading for episode day and temperature section (not used, skipped)

continued

TABLE 3-7. Continued.

Line	Variable	Columns	Type	Description
14	HEADER	1-10	A	Column headings (not used, skipped)
15+	NSC	1-6	I	NAPAP Source Category code (-999 = end of section)
	EPS(1)	7-14	R	Exhaust factor when INIM = 0
	EPS(2)	15-22	R	Evaporative factor when INIM = 0
	EPS(3)	23-30	R	Carbon monoxide factor when INIM = 0
	EPS(4)	31-38	R	Oxides of nitrogen factor when INIM = 0
	EPS(5)	39-46	R	Exhaust factor when INIM = 1
	EPS(6)	47-54	R	Evaporative factor when INIM = 1
	EPS(7)	55-62	R	Carbon monoxide factor when INIM = 1
	EPS(8)	63-70	R	Oxides of nitrogen factor when INIM = 1
	EPS(9)	71-78	R	Exhaust factor when INIM = 2
	EPS(10)	79-86	R	Evaporative factor when INIM = 2
	EPS(11)	87-94	R	Carbon monoxide factor when INIM = 2
	EPS(12)	95-103	R	Oxides of nitrogen factor when INIM = 2
16	HEADER	1-10	A	Heading for running loss emissions section (not used, skipped)
17	HEADER	1-10	A	Column headings (not used, skipped)
18+	NSC	1-6	I	NAPAP Source Category code (-999 = end of section)
	RUN(1)	7-14	R	for INIM = 0
	RUN(2)	15-22	R	for INIM = 1
	RUN(3)	23-30	R	for INIM = 2
19	HEADER	1-10	A	Heading for unmeasured aldehydes section (not used, skipped)
20	HEADER	1-10	A	Column headings (not used, skipped)
21+	NSC	1-6	I	NAPAP Source Category code (-999 = end of section)
	ALD	7-14	R	Exhaust adjust factor

continued

TABLE 3-7. Concluded.

Line	Variable	Columns	Type	Description
22	HEADER	1-10	A	Heading for vehicle miles traveled (VMT) growth section (not used, skipped)
23	HEADER	1-10	A	Column headings (not used, skipped)
24+	NSC	1-6	I	NAPAP Source Category code (-999 = end of section)
	VMT	7-14	R	Growth factor

FACTORS FOR RVP AND FLEET TURNOVER (SCENARIO SPECIFIC) 1985 to 1995

NSC	EXH	EVP	CO	NOX	I/M EXH	I/M EVP	I/M CO	I/M NOX	I/M EXH	I/M EVP	I/M CO	I/M NOX	IN0 run hc	IN1 run hc	IN2 run hc	IN0 REFUEL	IN1 REFUEL	IN2 REFUEL
27	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.1200	3.1429	3.0800	1.0000	1.0000	1.0000
28	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.1200	3.1429	3.0800	1.0000	1.0000	1.0000
29	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.1200	3.1429	3.0800	1.0000	1.0000	1.0000
30	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.1200	3.1429	3.0800	1.0000	1.0000	1.0000
31	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.1200	3.1429	3.0800	1.0000	1.0000	1.0000
32	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.1463	3.1750	3.0976	1.0000	1.0000	1.0000
33	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.1463	3.1750	3.0976	1.0000	1.0000	1.0000
34	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.1463	3.1750	3.0976	1.0000	1.0000	1.0000
35	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.1463	3.1750	3.0976	1.0000	1.0000	1.0000
36	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.2308	3.2308	3.2308	1.0000	1.0000	1.0000
37	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.2308	3.2308	3.2308	1.0000	1.0000	1.0000
38	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.2308	3.2308	3.2308	1.0000	1.0000	1.0000
40	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
41	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
43	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
-999																		

FACTORS FOR FUEL COMPOSITION (OXYGEN & DISTILLATION EFFECTS) (SCENARIO SPECIFIC)

NSC	EXH	EVP	CO	NOX	I/M EXH	I/M EVP	I/M CO	I/M NOX	I/M EXH	I/M EVP	IN2 I/M CO	IN2 I/M NOX	IN0 RUN HC	IN1 RUN HC	IN2 RUN HC	IN0 REFUEL	IN1 REFUEL	IN2 REFUEL
27	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
28	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
29	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
30	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
31	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
32	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
33	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
34	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
35	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
36	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
37	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
38	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
40	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
41	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
42	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
43	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
-999																		

FACTORS TO SEPARATE EXHAUST AND EVAPORATIVE EMISSIONS

NSC	EXH	I/M EXH	IN2 EXH
27	0.1755	0.1920	0.1755
28	0.1686	0.1853	0.1686
29	0.0984	0.1114	0.0984
30	0.0984	0.1114	0.0984
31	0.3075	0.3365	0.3075
32	0.2956	0.3241	0.2956
33	0.1720	0.1952	0.1720
34	0.1720	0.1952	0.1720
35	0.5938	0.5938	0.5938
36	0.5769	0.5769	0.5769
37	0.3527	0.3527	0.3527
38	0.3527	0.3527	0.3527
40	0.0000	0.0000	0.0000
41	0.0000	0.0000	0.0000
42	0.0000	0.0000	0.0000
43	0.0000	0.0000	0.0000
-999			

FACTORS FOR APPLYING STAGE II CONTROLS

NSC	IN0 SII	IN1 SII	IN2 SII

EXHIBIT 3-12. Example of motor vehicle adjustment factors input file to PREGRD.

27	1.0000	1.0000	1.0000
28	1.0000	1.0000	1.0000
29	1.0000	1.0000	1.0000
30	1.0000	1.0000	1.0000
31	1.0000	1.0000	1.0000
32	1.0000	1.0000	1.0000
33	1.0000	1.0000	1.0000
34	1.0000	1.0000	1.0000
35	1.0000	1.0000	1.0000
36	1.0000	1.0000	1.0000
37	1.0000	1.0000	1.0000
38	1.0000	1.0000	1.0000
40	1.0000	1.0000	1.0000
41	1.0000	1.0000	1.0000
42	1.0000	1.0000	1.0000
43	1.0000	1.0000	1.0000
-999			

FACTORS FOR CONVERSION TO EPISODE DAY AND TEMPERATURE

NSC	EXH	EVP	CO	NOX	I/M EXH	I/M EVP	I/M CO	I/M NOX	I/M EXH	I/M EVP	IM2 I/M CO	IM2 I/M NOX
27	0.9276	4.0233	1.0098	0.8546	0.9242	3.9767	0.9945	0.8571	0.8026	3.9767	0.8382	0.8511
28	0.9321	4.0233	1.0081	0.8587	0.9286	3.9767	0.9916	0.8545	0.8025	3.9767	0.8357	0.8513
29	0.9331	4.0233	1.0078	0.8560	0.9286	3.9767	0.9922	0.8554	0.7936	3.9767	0.8350	0.8519
30	0.9331	4.0233	1.0078	0.8560	0.9286	3.9767	0.9922	0.8554	0.7936	3.9767	0.8350	0.8519
31	0.9200	1.5701	1.0189	0.8708	0.9162	1.5905	1.0088	0.8711	0.7650	1.5607	0.7755	0.8539
32	0.9252	1.5701	1.0178	0.8706	0.9162	1.5905	1.0077	0.8709	0.7664	1.5607	0.7746	0.8529
33	0.9262	1.5701	1.0169	0.8709	0.9186	1.5905	1.0074	0.8716	0.7616	1.5607	0.7724	0.8543
34	0.9262	1.5701	1.0169	0.8709	0.9186	1.5905	1.0074	0.8716	0.7616	1.5607	0.7724	0.8543
35	1.0047	1.4670	1.1582	0.8683	1.0047	1.4670	1.1582	0.8683	1.0047	1.4670	1.1582	0.8683
36	1.0043	1.4670	1.1582	0.8687	1.0043	1.4670	1.1582	0.8687	1.0043	1.4670	1.1582	0.8687
37	1.0057	1.4670	1.1582	0.8694	1.0057	1.4670	1.1582	0.8694	1.0057	1.4670	1.1582	0.8694
38	1.0057	1.4670	1.1582	0.8694	1.0057	1.4670	1.1582	0.8694	1.0057	1.4670	1.1582	0.8694
40	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
41	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
42	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
43	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
-999												

RUNNING LOSS EMISSIONS FACTORS

NSC	NO I/M	I/M	IM2
27	0.2041	0.2188	0.2041
28	0.1961	0.2112	0.1961
29	0.1144	0.1269	0.1144
30	0.1144	0.1269	0.1144
31	0.1178	0.1282	0.1178
32	0.1133	0.1235	0.1133
33	0.0659	0.0743	0.0659
34	0.0659	0.0743	0.0659
35	0.1092	0.1092	0.1092
36	0.1061	0.1061	0.1061
37	0.0649	0.0649	0.0649
38	0.0649	0.0649	0.0649
40	0.0000	0.0000	0.0000
41	0.0000	0.0000	0.0000
42	0.0000	0.0000	0.0000
43	0.0000	0.0000	0.0000
-999			

FACTORS TO ADJUST EXHAUST FOR UNMEASURED ALDEHYDES

NSC	
27	1.0000
28	1.0000
29	1.0000

EXHIBIT 3-12 Continued.

PREGRD

```
   30  1.0000
   31  1.0000
   32  1.0000
   33  1.0000
   34  1.0000
   35  1.0000
   36  1.0000
   37  1.0000
   38  1.0000
   40  1.0000
   41  1.0000
   42  1.0000
   43  1.0000
 -999
VMT GROWTH FACTORS
 NSC
   27  1.0000
   28  1.0000
   29  1.0000
   30  1.0000
   31  1.0000
   32  1.0000
   33  1.0000
   34  1.0000
   35  1.0000
   36  1.0000
   37  1.0000
   38  1.0000
   40  1.0000
   41  1.0000
   42  1.0000
   43  1.0000
 -999
```

EXHIBIT 3-12 Concluded.

10	10	110360	0.00	1.24	8.20	0.00	0.50
10	10	110380	0.25	2.73	16.65	0.00	0.99
10	10	110840	0.25	3.98	24.85	0.25	1.49
10	10	111020	0.00	1.24	8.20	0.00	0.50
10	10	111040	0.00	1.24	8.20	0.00	0.50
10	10	111120	1.24	14.91	90.97	0.50	5.22
10	10	111160	3.98	44.49	268.92	1.49	15.16
10	10	111420	0.25	2.73	16.65	0.00	0.99
10	10	111640	8.20	88.98	538.10	2.98	30.32
10	10	111800	0.25	2.73	16.65	0.00	0.99
10	10	112100	0.00	1.24	8.20	0.00	0.50
10	10	112140	0.50	6.21	37.28	0.25	1.99
10	10	112200	0.00	1.24	8.20	0.00	0.50
10	10	112260	14.42	157.33	951.92	5.47	53.69
10	10	112400	0.00	1.24	8.20	0.00	0.50
10	10	112500	2.24	25.85	157.33	0.99	8.95
10	10	112520	0.00	1.24	8.20	0.00	0.50
10	10	112540	0.75	7.46	45.48	0.25	2.49
10	10	112600	0.00	1.24	8.20	0.00	0.50
10	10	112760	0.00	1.24	8.20	0.00	0.50
10	10	112900	0.00	1.24	8.20	0.00	0.50
10	10	113800	0.00	1.24	8.20	0.00	0.50
10	10	113920	0.00	1.24	8.20	0.00	0.50
10	10	114160	0.00	1.24	8.20	0.00	0.50
10	10	114340	0.25	2.73	16.65	0.00	0.99
.							
.							
.							
95	95	114140	0.00	0.00	0.00	139.18	0.00
95	95	114160	0.00	0.00	0.00	715.81	0.00
95	95	114340	0.00	0.00	0.00	869.90	0.00
95	95	114600	0.00	0.00	0.00	892.27	0.00
95	95	115120	0.00	0.00	0.00	1399.30	0.00
95	95	115300	0.00	0.00	0.00	688.47	0.00
95	95	115540	0.00	0.00	0.00	236.12	0.00
97	97	110380	0.00	2.49	96.43	0.00	1.99
97	97	112260	2.98	7.70	14.66	3.48	3.23
97	97	112920	0.25	0.50	2.49	0.00	1.24
97	97	114160	5.97	49.21	12.43	2.49	7.21
98	98	110380	0.00	2.49	0.50	0.00	0.50
98	98	112260	9.44	42.00	12.68	8.45	11.68
98	98	112920	2.24	11.93	0.00	0.00	1.24
98	98	114160	6.46	67.60	0.00	0.99	0.25
99	99	110380	0.00	0.00	0.00	0.00	151.61
99	99	111120	0.00	0.00	0.00	193.86	0.00
99	99	111420	0.00	0.00	0.00	0.00	9.94
99	99	111640	0.00	0.00	0.00	84.50	0.00
99	99	112100	0.00	0.00	0.00	0.00	4.97
99	99	112140	0.00	0.00	0.00	39.77	44.74
99	99	112260	14.66	7.46	4.97	12.43	151.61
99	99	112920	0.00	9.94	2.49	0.00	47.22
99	99	113600	0.00	0.00	0.00	0.00	24.85
99	99	113800	0.00	0.00	0.00	0.00	4.97
99	99	114100	0.00	0.00	0.00	0.00	62.14
99	99	114160	0.00	0.00	0.00	0.00	17.40

EXHIBIT 3-13. Example of ungridded skeleton area merf file (Output from PREGRD, input to GRDEMS).

```
227  227  5013   110320  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083
227  227  5013   110360  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083   365.73
227  227  5013   110380  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083   346.58
227  227  5013   110700  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  2780.18
227  227  5013   110840  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083   472.51
227  227  5013   111020  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  1645.61
227  227  5013   111040  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083   318.35
227  227  5013   111120  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  1465.06
227  227  5013   111160  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  3405.57
227  227  5013   111420  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  8260.32
227  227  5013   111580  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  1957.34
227  227  5013   111640  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083   163.38
227  227  5013   111800  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083 14853.70
227  227  5013   112100  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  2757.17
227  227  5013   112140  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083   573.46
227  227  5013   112200  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  1189.15
227  227  5013   112260  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  2922.30
227  227  5013   112400  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083 15836.09
227  227  5013   112500  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  1576.81
227  227  5013   112520  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  6119.71
227  227  5013   112540  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083   621.78
227  227  5013   112600  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  1849.01
227  227  5013   112720  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083   550.17
227  227  5013   112760  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083   135.66
227  227  5013   112900  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083  1835.40
 .                                                                                       1561.55
 .
 .
436  436  5013   114340  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083
436  436  5013   114600  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083
436  436  5013   115120  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    25.73
436  436  5013   115300  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    34.51
436  436  5013   115540  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    30.42
438  438  5013   110360  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    34.16
438  438  5013   110380  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    16.61
438  438  5013   110840  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    11.20
438  438  5013   111020  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083     9.48
438  438  5013   111040  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    18.55
438  438  5013   111120  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083     9.07
438  438  5013   111160  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083     8.39
438  438  5013   111420  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    70.30
438  438  5013   111640  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083   156.45
438  438  5013   111800  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    11.93
438  438  5013   112100  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    88.44
438  438  5013   112140  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    15.95
438  438  5013   112260  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083     3.86
438  438  5013   112500  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    47.37
438  438  5013   112540  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083   307.42
438  438  5013   112760  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    63.27
438  438  5013   113040  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    32.83
438  438  5013   113920  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083     3.60
438  438  5013   113980  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083     1.35
438  438  5013   114160  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083     8.29
438  438  5013   114340  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083     0.47
438  438  5013   114600  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    16.99
438  438  5013   115120  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083     5.37
438  438  5013   115300  0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083    20.85
                                                                                          10.47
                                                                                           6.88
```

EXHIBIT 3-14. Example of ungridded skeleton mobile merf file (output from PREGRD, input to GRDEMS).

Number of counties= 43

Additional control factors (1 - CF):

NSC	CO	NOx	SOx	THC	TSP

Number of records w/o matching growth factors: 0

Area totals before application of growth factors:
(kg/day; does not include motor vehicle emissions)

NSC	CO	NOx	SOx	THC	TSP
1	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00
3	56.92	210.02	335.29	15.91	27.84
4	0.00	0.00	0.00	0.00	0.00
5	1505.93	7529.63	45.48	398.42	225.93
6	118256.12	1421.67	194.86	41777.48	19153.53
7	0.00	0.00	0.00	0.00	0.00
8	8.45	18.14	54.18	0.25	9.44
9	262.21	1055.57	1521.09	29.83	105.38
10	33.06	384.25	2337.80	12.43	132.72
11	816.72	4083.57	23.36	235.37	122.78
12	0.00	0.00	0.00	0.00	0.00
.					
.					
.					
95	0.00	0.00	0.00	57908.22	0.00
96	0.00	0.00	0.00	0.00	0.00
97	9.20	59.90	126.01	5.97	13.67
98	18.14	124.02	13.17	9.44	13.67
99	14.66	17.40	7.46	330.56	519.46
100	0.00	0.00	0.00	509.51	0.00
101	0.00	0.00	0.00	10399.07	0.00
102	0.00	0.00	0.00	2586.60	0.00
103	0.00	0.00	0.00	10893.68	0.00
104	0.00	0.00	0.00	867.42	0.00
105	0.00	0.00	0.00	2770.27	0.00
106	0.00	0.00	0.00	225.43	0.00
107	0.00	0.00	0.00	6504.39	0.00
108	0.00	0.00	0.00	149.13	0.00
109	0.00	0.00	0.00	318.14	0.00
Total	361249.25	80558.84	10820.15	319073.31	38129.87

Area totals after application of growth factors:
(kg/day; does not include motor vehicle emissions)

NSC	CO	NOx	SOx	THC	TSP
1	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00
3	56.92	210.02	335.29	15.91	27.84
4	0.00	0.00	0.00	0.00	0.00
5	1505.93	7529.63	45.48	398.42	225.93
6	118256.12	1421.67	194.86	41777.48	19153.53
7	0.00	0.00	0.00	0.00	0.00
8	8.45	18.14	54.18	0.25	9.44
9	262.21	1055.57	1521.09	29.83	105.38
10	33.06	384.25	2337.80	12.43	132.72
11	816.72	4083.57	23.36	235.37	122.78
12	0.00	0.00	0.00	0.00	0.00
.					
.					
.					
95	0.00	0.00	0.00	57908.22	0.00
96	0.00	0.00	0.00	0.00	0.00
97	9.20	59.90	126.01	5.97	13.67

EXHIBIT 3-15. Example of message file output from PREGRD.

98	18.14	124.02	13.17	9.44	13.67
99	14.66	17.40	7.46	330.56	519.46
100	0.00	0.00	0.00	509.51	0.00
101	0.00	0.00	0.00	10399.07	0.00
102	0.00	0.00	0.00	2586.60	0.00
103	0.00	0.00	0.00	10893.68	0.00
104	0.00	0.00	0.00	867.42	0.00
105	0.00	0.00	0.00	2770.27	0.00
106	0.00	0.00	0.00	225.43	0.00
107	0.00	0.00	0.00	6504.39	0.00
108	0.00	0.00	0.00	149.13	0.00
109	0.00	0.00	0.00	318.14	0.00
Total	361249.25	80558.84	10820.15	319073.31	38129.87

Total unadjusted motor vehicle emissions (kg/day):

NSC	CO	NOx	SOx	THC	TSP
27	211917.11	89309.98	5170.95	115198.72	51710.78
28	153793.92	32707.12	1841.21	44314.62	18142.71
29	0.00	0.00	0.00	0.00	0.00
30	163319.13	22469.35	1297.65	52795.58	48722.78
31	124840.80	31746.75	1687.86	42762.71	12836.79
32	55241.33	12065.80	626.83	17137.34	4610.74
33	0.00	0.00	0.00	0.00	0.00
34	91846.36	6887.40	355.91	16973.80	9736.21
35	89654.98	7863.68	356.41	12495.04	2199.86
36	34404.43	3001.42	140.18	5037.24	865.18
37	0.00	0.00	0.00	0.00	0.00
38	40067.75	1450.75	84.26	4429.55	1361.77
40	4401.96	15954.27	2021.41	1656.05	3125.69
41	10369.74	34409.64	4863.75	4137.01	7520.94
42	0.00	0.00	0.00	0.00	0.00
43	21776.41	36326.91	4863.75	8127.13	13774.54
Total	1001633.75	294193.06	23310.17	325064.69	174607.78

Unadjusted refueling emissions removed from gas mktg:

NSC	CO	NOx	SOx	THC	TSP
54	0.00	0.00	0.00	24218.48	0.00

Totals in output motor vehicle file (kg/day:

NSC	Exh CO	Exh NOx	Exh SOx	Exh THC	Exh TSP	Evp THC	Ref THC	Run THC
27	197402.70	76369.64	5170.95	62331.10	51710.78	84505.66	0.00	76135.72
28	146776.25	27962.06	1841.21	24687.27	18142.71	31135.36	0.00	28057.48
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	154344.39	19210.72	1297.65	36850.12	48722.78	22646.81	17413.09	20392.71
31	116692.14	27488.32	1687.86	20833.86	12836.79	21430.09	0.00	16344.79
32	51552.06	10439.36	626.83	8646.21	4610.74	8208.29	0.00	6266.05
33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	87631.23	5979.19	355.91	11167.71	9736.21	4995.66	5739.78	3802.94
35	103838.38	6828.03	356.41	3728.47	2199.86	10884.49	0.00	4408.29
36	39847.21	2607.33	140.18	1603.67	865.18	4263.08	0.00	1726.70
37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	46406.46	1261.28	84.26	2594.47	1361.77	2291.90	1065.61	928.78
40	4401.96	15954.27	2021.41	1656.05	3125.69	0.00	0.00	0.00
41	10369.74	34409.64	4863.75	4137.01	7520.94	0.00	0.00	0.00
42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	21776.41	36326.91	4863.75	8127.13	13774.54	0.00	0.00	0.00
Total	981038.69	264836.66	23310.17	186363.17	174607.78	190361.36	24218.47	158063.39

EXHIBIT 3-15 Concluded.

DESCRIPTION OF GRDEMS

GRDEMS allocates county emission totals for area and motor vehicle sources to the grid cells of the modeling region. The county emissions are apportioned according to the spatial distribution of surrogate data for the source category specified in the emissions record.

GRDEMS can be run twice, once with the area emissions merf file and once with the mobile emissions merf file, or it can be run once using a merged data file. The preferred method is to run GRDEMS twice, since this allows better quality control. Figure 3-3 shows the structure of file GRDEMS. The inputs include user input, region definition, a cross-reference table, gridded surrogate data, link data, and an ungridded merf file of emissions for all counties in the study region. Outputs include a message file, the merf data file, and a file containing any unprocessed input records.

The first input file contains a description of the run, the year of emissions, a unit conversion factor, and pairings of surrogates and NAPAP source categories by county (Table 3-8 and Exhibit 3-16). The year of emissions, if not zero, must correspond to the year of the meteorological data in the UAM. The unit conversion factor for merf files produced by PREGRD is 1.0, if no conversion is needed; otherwise it will be the factor needed to convert the input emissions to kg/day, annually averaged. The surrogate/NSC (NAPAP source category) pairs included in the user input file allow the user to designate exceptions, by county, to the standard pairing of NSC and surrogate in the cross-reference table. For further discussion see "Geographic Allocation of Emissions" in Chapter 4.

The second input file is the region definition file and is the same file used by PREPNT and PREGRD (Table 3-3 and Exhibit 3-3). This file includes the region definition in UTM coordinates, county codes, both FIPS and AEROS, and I/M and Stage II control codes.

The third input file contains cross-reference tables that allow the user to tailor the distribution of emissions for a particular region (Table 3-9 and Exhibit 3-17). The cross-reference table contains three sections that assign surrogate distribution and temporal profile codes to each NSC. The surrogate distributions are used to distribute the county emission totals into the appropriate model grid cells. The temporal profile codes assigned to each record are used by the program CENTEMS to generate hourly emissions. Source category codes in the cross-reference table must be consistent with those in the input merf data. The codes for diurnal and weekday variation in the input merf file are passed directly to the output record. These codes are optional in the cross-reference tables. If the fields for these codes have not been input in the merf file, GRDEMS will search for the temporal variation codes and monthly factors in the cross-reference tables (by source category) and insert them in merf records. If the cross-reference tables do not contain temporal variation codes, the program will assign the flag "-9". The flag will be output in the appropriate field on the merf record. If the program cannot find a particular source category in the cross-reference tables (because the source category code in the merf record is in error), the input record is not processed and is written to the "erred" record file. Note that if either the diurnal or weekday variation codes, or both, are omitted from the cross-reference tables, the header text and end-of-section flag record must still be included in the file.

The gridded surrogate data file can be created using the most appropriate data available (Table 3-10 and Exhibit 3-18). The assignment of surrogates in the cross-reference tables provides the user flexibility in distributing emissions for a specific area. For example, if only area and population data are available, the surrogate/source pairings would include only these two surrogates. The 15 surrogate fields that indicate the fraction of county area by cell for each surrogate must be filled, padded with zeros where necessary. The surrogates listed in Table 3-10 can be changed by the user. This file must be sorted by FIPS state/county code.

The links data file is an optional input file used to assign motor vehicle, railroad, airport, and seaport emissions to specific cells in the region that may contain each link type (Table 3-11 and Exhibit 3-19). Links must have a length greater than zero. They can be entirely contained within a single cell, such as in the case of small airports, or they may span several cells. If a county emission source category is to

be allocated by a link type and the links data file does not contain data on the link type, the emission record will not be processed. The links data file must be sorted by FIPS code. Links data are optional; if data are unavailable, the file can be empty. However, the file name must be specified when running GRDEMS.

The gridded merf data (Table 3-12 and Exhibit 3-13 and 3-14) are a skeletal (incomplete) version of the gridded merf data created by GRDEMS. I and j cell indexes are not included in the skeleton merf file. Temporal codes and monthly factors may or may not be present. The input records must have a source category code, county AEROS code, and county emissions for CO, NO_x, SO_x, THC, and TSP. If the total of all input emissions is zero, the record is skipped. Diurnal and weekday cycle codes and monthly factors may be present or blank as discussed above.

Three output files are created by GRDEMS: a message file, the gridded merf file, and the erred merf record file. The message file contains information on the files opened, number of records processed, a summary of links data, and emission totals before and after gridding (Exhibit 3-20). The merf file is output in the same format as the input merf file, with all necessary fields completed for input to the program CENTEMS (Exhibit 3-21). The erred merf file contains all records that could not be processed because of an error. This file is provided so that errors can be evaluated and corrected. The skipped skeletal records can be reprocessed separately without having to reprocess the entire merf input data file generated by PREGRD.

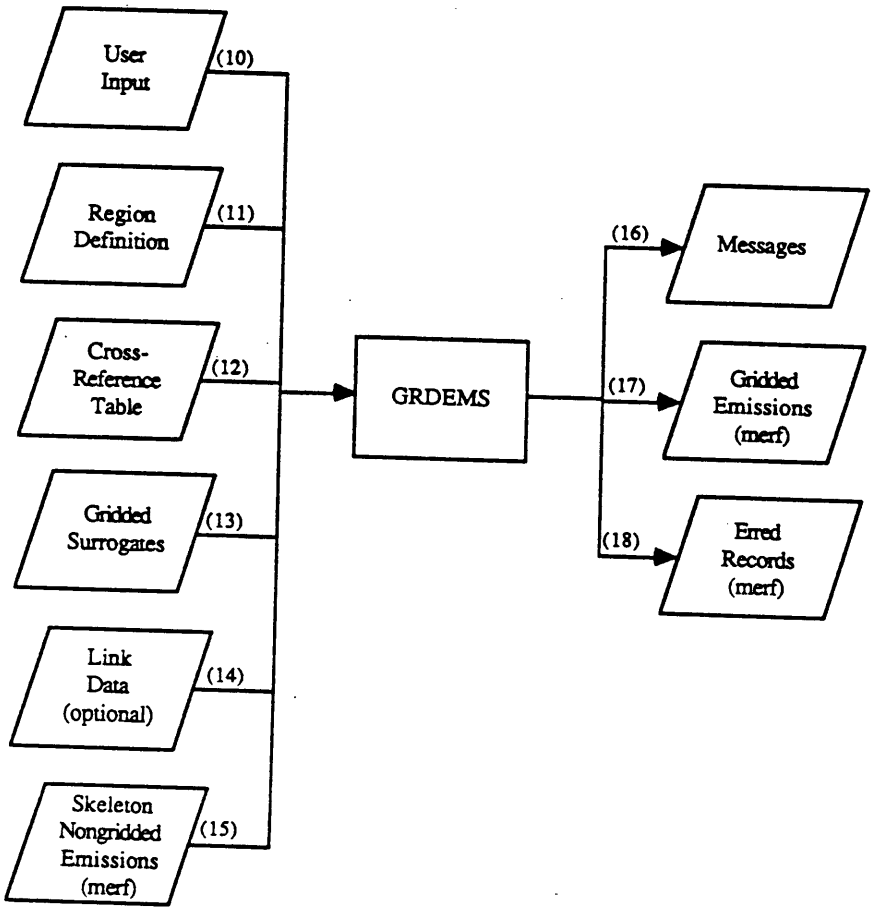

FIGURE 3-3. Input and output files used by GRDEMS.

EEE 89077

TABLE 3-8. User input file (unit 10) used by the GRDEMS program. (See Exhibit 3-16)

Line	Variable	Columns	Type	Description
1	DESC	1-80	A	Descriptive text for GRDEMS run
2	IYEAR	1-2	I	Year of emissions, e.g., 85 for 1985
	CFAC	3-12	R	Factor for converting emissions to kg/day
3	CSTR	1-80	A	Heading for surrogate exception section
4+	IEXC(1)	2-6	I	Surrogate code (-9 = end of section)
	IEXC(2)	8-15	I	NAPAP Source Category code
	IEXC(3)	17-22	I	AEROS county code

```
at14km
0    1.0000
Exception surogate -- county cross reference:
 -9999
```

EXHIBIT 3-16. Example of user input file to GRDEMS.

TABLE 3-9. Cross-reference tables used by the GRDEMS program. (See Exhibit 3-17)

Line	Variable	Columns	Type	Description
1	CSTR	1-80	A	Heading for pairings of surrogates and source categories (header)
2+	ICSRG(1)	2-6	I	Surrogate code (-999 = end of section)
	ICSRG(2)	8-15	I	NAPAP Source Category code
	LABEL	17-96	A	Category label
3	CSTR	1-80	A	Heading for pairings of diurnal variation patterns and source categories
4+	IDIURN(1)	1-5	I	NAPAP Source Category code (-999 = end of section)
	IDIURN(2)	6-10	I	Diurnal variation code
	ZFIN	13-108	R	Monthly factor
5	CSTR	1-80	A	Heading for pairings of weekday variation patterns and source categories
6+	IWEEK(1)	1-5	I	NAPAP Source Category code (-999 = end of section)
	IWEEK(2)	6-10	I	Weekly variation code

15	60	Forest Wild Fires
15	61	Managed Burning - Prescribed
5	62	Agricultural Field Burning
5	63	Frost control - Orchard Heaters
2	64	Structural Fires
2	66	Ammonia Emissions - Light duty Gasoline Vehicles
2	67	Ammonia Emissions - Heavy Duty Gasoline Vehicles
2	68	Ammonia Emissions - Heavy Duty Diesel Vehicles
5	69	Livestock Waste Management - Turkeys
5	70	Livestock Waste Management - Sheep
5	71	Livestock Waste Management - Beef Cattle
5	72	Livestock Waste Management - Dairy Cattle
5	73	Livestock Waste Management - Swine
5	74	Livestock Waste Management - Broilers
5	75	Livestock Waste Management - Other Chickens
5	76	Annydrous Ammonia Fertilizer Application
5	77	Beef Cattle Feed Lots
4	78	Degreasing
2	79	Dry Cleaning
4	80	Graphic Arts/Printing
4	81	Rubber and Plastics Manufacture
2	82	Architectural Coatings
4	83	Auto body Repair
4	84	Motor Vehicle Manufacture
4	85	Paper Coating
4	86	Fabricated Metals
4	87	Machinery Manufacture
4	88	Furniture Manufacture
4	89	Flatwood Products
4	90	Other Transportation Equipment Manufacture
4	91	Electrical Equipment Manufacture
10	92	Shipbuilding and Repairing
4	93	Miscellaneous Industrial Manufacture
4	95	Miscellaneous Solvent Use
4	96	Minor points - coal fired boiler
4	97	Mino points - oil fired boiler
4	98	Minor points - gas fired boiler
4	99	Minor points,others, process sources
2	100	Publicly Owned Treatment Works (POTWs)
2	101	Cutback Asphalt Paving Operation
4	102	Fugitive from Synthetic Organic Chemical Manufacture
4	103	Bulk Terminal and Bulk Plants
4	104	Fugitive from Petroleum Refinery Operations
4	105	Process Emissions from Bakeries
4	106	Process Emissions from Pharamaceutical Manufacture
4	107	Process Emissions from Synthetic Fibers Manufacture
6	108	Crude Oil and Natural Gas Production Fields
4	109	Hazardous Waste Treatment, Storage, and Disposal
101	227	LDGV (SAI nsc) - Limited Access Roads
15	228	LDGV (SAI nsc) - Rural Roads
2	229	LDGV (SAI nsc) - Suburban Roads
4	230	LDGV (SAI nsc) - Urban Roads
101	231	HDGV (SAI nsc) - Limited Access Roads
15	232	HDGV (SAI nsc) - Rural Roads
2	233	HDGV (SAI nsc) - Suburban Roads
4	234	HDGV (SAI nsc) - Urban Roads
101	235	HDGV (SAI nsc) - Limited Access Roads

EXHIBIT 3-17. Example of cross reference tables input to GRDEMS.

```
  15      236 HDGV (SAI nsc) - Rural Roads
   2      237 HDGV (SAI nsc) - Suburban Roads
   4      238 HDGV (SAI nsc) - Urban Roads
  15      239 Off Highway Gasoline Vehicles - (SAI nsc)
 101      240 HDDV (SAI nsc) - Limited Access Roads
  15      241 HDDV (SAI nsc) - Rural Roads
   2      242 HDDV (SAI nsc) - Suburban Roads
   4      243 HDDV (SAI nsc) - Urban Roads
  15      244 Off Highway Diesel Vehicles - (SAI nsc)
   2      266 Ammonia Emissions - LDGV (SAI nsc)
   2      267 Ammonia Emissions - HDGV (SAI nsc)
   2      268 Ammonia Emissions - HDDV (SAI nsc)
 101      327 LDGV (SAI nsc) - Limited Access Roads
  15      328 LDGV (SAI nsc) - Rural Roads
   2      329 LDGV (SAI nsc) - Suburban Roads
   4      330 LDGV (SAI nsc) - Urban Roads
 101      331 MDGV (SAI nsc) - Limited Access Roads
  15      332 MDGV (SAI nsc) - Rural Roads
   2      333 MDGV (SAI nsc) - Suburban Roads
   4      334 MDGV (SAI nsc) - Urban Roads
 101      335 HDGV (SAI nsc) - Limited Access Roads
  15      336 HDGV (SAI nsc) - Rural Roads
   2      337 HDGV (SAI nsc) - Suburban Roads
   4      338 HDGV (SAI nsc) - Urban Roads
  15      339 Off Highway Gasoline Vehicles - (SAI nsc)
 101      340 HDDV (SAI nsc) - Limited Access Roads
  15      341 HDDV (SAI nsc) - Rural Roads
   2      342 HDDV (SAI nsc) - Suburban Roads
   4      343 HDDV (SAI nsc) - Urban Roads
  15      344 Off Highway Diesel Vehicles - (SAI nsc)
   2      366 Ammonia Emissions - LDGV (SAI nsc)
   2      367 Ammonia Emissions - HDGV (SAI nsc)
   2      368 Ammonia Emissions - HDDV (SAI nsc)
 101      427 LDGV (SAI nsc) - Limited Access Roads
  15      428 LDGV (SAI nsc) - Rural Roads
   2      429 LDGV (SAI nsc) - Suburban Roads
   4      430 LDGV (SAI nsc) - Urban Roads
 101      431 MDGV (SAI nsc) - Limited Access Roads
  15      432 MDGV (SAI nsc) - Rural Roads
   2      433 MDGV (SAI nsc) - Suburban Roads
   4      434 MDGV (SAI nsc) - Urban Roads
 101      435 HDGV (SAI nsc) - Limited Access Roads
  15      436 HDGV (SAI nsc) - Rural Roads
   2      437 HDGV (SAI nsc) - Suburban Roads
   4      438 HDGV (SAI nsc) - Urban Roads
  15      439 Off Highway Gasoline Vehicles - (SAI nsc)
 101      440 HDDV (SAI nsc) - Limited Access Roads
  15      441 HDDV (SAI nsc) - Rural Roads
   2      442 HDDV (SAI nsc) - Suburban Roads
   4      443 HDDV (SAI nsc) - Urban Roads
  15      444 Off Highway Diesel Vehicles - (SAI nsc)
   2      466 Ammonia Emissions - LDGV (SAI nsc)
   2      467 Ammonia Emissions - HDGV (SAI nsc)
   2      468 Ammonia Emissions - HDDV (SAI nsc)
-999     -999 End of Surrogate/CES table
diurnal codes  --  none for saroad data, provided by pregrd
  1   33     0.178   0.178   0.143   0.107   0.036   0.036   0.036   0.036   0.036   0.036   0.036   0.143
```

EXHIBIT 3-17. Continued.

2	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
3	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
4	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
5	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.178	0.178
6	33	0.190	0.238	0.238	0.190	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.119
7	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
8	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
9	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
10	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
11	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
12	33	0.190	0.238	0.238	0.190	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.119
13	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
14	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
15	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
16	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
17	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
18	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
19	33	0.190	0.238	0.238	0.190	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.119
20	33	0.178	0.178	0.143	0.107	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.143
21	16	0.039	0.065	0.065	0.039	0.039	0.130	0.130	0.104	0.104	0.130	0.104	0.052
22	16	0.039	0.065	0.065	0.039	0.039	0.130	0.130	0.104	0.104	0.130	0.104	0.052
23	16	0.039	0.065	0.065	0.039	0.039	0.130	0.130	0.104	0.104	0.130	0.104	0.052
24	16	0.039	0.065	0.065	0.039	0.039	0.130	0.130	0.104	0.104	0.130	0.104	0.052
25	16	0.039	0.065	0.065	0.039	0.039	0.130	0.130	0.104	0.104	0.130	0.104	0.052
26	16	0.039	0.065	0.065	0.039	0.039	0.130	0.130	0.104	0.104	0.130	0.104	0.052
27	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
28	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
29	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
30	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
31	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
32	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
33	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
34	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
35	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
36	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
37	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
38	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
39	37	0.013	0.027	0.040	0.067	0.133	0.133	0.133	0.133	0.133	0.107	0.067	0.013
40	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
41	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
42	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
43	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
44	8	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
45	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
46	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
47	37	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
48	35	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
49	33	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
50	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
51	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
52	37	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
53	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
54	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
55	37	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
56	37	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
57	8	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
58	37	0.061	0.073	0.098	0.122	0.098	0.073	0.061	0.061	0.073	0.122	0.098	0.061

EXHIBIT 3-17. Continued.

59	37	0.061	0.073	0.098	0.122	0.098	0.073	0.061	0.061	0.073	0.122	0.098	0.061
60	24	0.000	0.000	0.015	0.074	0.147	0.147	0.147	0.147	0.147	0.147	0.029	0.000
61	16	0.000	0.000	0.167	0.333	0.333	0.000	0.000	0.000	0.000	0.000	0.000	0.167
62	16	0.039	0.065	0.065	0.039	0.039	0.130	0.130	0.104	0.104	0.130	0.104	0.052
63	34	0.333	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.333
64	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
65	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
66	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
67	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
68	48	0.079	0.079	0.082	0.083	0.084	0.084	0.085	0.087	0.085	0.084	0.084	0.084
69	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
70	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
71	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
72	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
73	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
74	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
75	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
76	37	0.061	0.073	0.098	0.122	0.098	0.073	0.061	0.061	0.073	0.122	0.098	0.061
77	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
78	16	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
79	16	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
80	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
81	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
82	37	0.060	0.060	0.090	0.090	0.100	0.100	0.100	0.100	0.090	0.080	0.070	0.060
83	8	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
84	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
85	8	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
86	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
87	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
88	8	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
89	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
90	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
91	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
92	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
93	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
94	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
95	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
96	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
97	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
98	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
99	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
100	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
101	24	0.032	0.043	0.064	0.085	0.106	0.106	0.106	0.106	0.106	0.106	0.085	0.053
102	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
103	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
104	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
105	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
106	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
107	16	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.000	0.000
108	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
109	24	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
-999	-999												

Weekly cycles

1	7
2	7
3	7
4	7

EXHIBIT 3-17. Continued.

5	7
6	7
7	7
8	7
9	7
10	7
11	22
12	7
13	7
14	7
15	7
16	7
17	7
18	22
19	7
20	22
21	7
22	7
23	7
24	7
25	7
26	7
27	5
28	5
29	5
30	5
31	5
32	5
33	5
34	5
35	5
36	5
37	5
38	5
39	21
40	5
41	5
42	5
43	5
44	7
45	7
46	7
47	7
48	7
49	7
50	7
51	7
52	7
53	5
54	7
55	7
56	7
57	5
58	7
59	7
60	7
61	7

EXHIBIT 3-17. Continued.

62	7
63	7
64	7
65	7
66	5
67	5
68	5
69	7
70	7
71	7
72	7
73	7
74	7
75	7
76	7
77	7
78	5
79	6
80	5
81	5
82	7
83	5
84	5
85	5
86	7
87	5
88	5
89	5
90	5
91	5
92	5
93	5
94	7
95	5
96	7
97	7
98	7
99	7
100	7
101	7
102	7
103	7
104	7
105	7
106	5
107	5
108	7
109	7
-999	-999

EXHIBIT 3-17. Concluded.

GRDEMS

TABLE 3-10. Gridded surrogate data file (unit 13) used by the GRDEMS program. (See Exhibit 3-18)

Line	Variable	Columns	Type	Description
1+	INFIP	1-5	I	FIPS county code
	ICELL	6-10	I	X axis cell index
	JCELL	11-15	I	Y axis cell index
	SRGIN (1-15)	16-165	R	Fractions of county totals
				(1) County area
				(2) Population
				(3) Households
				(4) Urban
				(5) Agriculture
				(6) Range
				(7) Deciduous forest
				(8) Coniferous forest
				(9) Mixed forest
				(10) Water
				(11) Barren
				(12) Nonforested wetlands
				(13) Mixed agriculture/range
				(14) Rocky with lichens
				(15) Rural

90008 32

13011	38	35	0.0020	0.0022	0.0000	0.0000	0.0015	0.0000	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021
13011	38	36	0.0137	0.0022	0.0000	0.0000	0.0083	0.0000	0.0167	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0139
13011	38	37	0.0211	0.0000	0.0000	0.0000	0.0129	0.0000	0.0257	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0214
13011	38	38	0.0042	0.0000	0.0000	0.0000	0.0026	0.0000	0.0051	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0043
13011	39	34	0.0014	0.0450	0.0000	0.0000	0.0015	0.0000	0.0015	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014
13011	39	35	0.0249	0.0450	0.0000	0.0000	0.0211	0.0000	0.0273	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0252
13011	39	36	0.0271	0.0450	0.0000	0.0000	0.0165	0.0000	0.0329	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0274
13011	39	37	0.0271	0.0000	0.0000	0.0000	0.0165	0.0000	0.0329	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0274
13011	39	38	0.0241	0.0000	0.0000	0.0000	0.0144	0.0000	0.0293	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0243
13011	39	39	0.0034	0.0195	0.0000	0.0000	0.0021	0.0000	0.0041	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0034
13011	40	34	0.0165	0.0089	0.0000	0.0000	0.0150	0.0000	0.0175	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0168
13011	40	35	0.0271	0.0450	0.0000	0.0000	0.0232	0.0000	0.0296	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0274
13011	40	36	0.0271	0.0626	0.0000	0.0000	0.0165	0.0000	0.0329	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0274
13011	40	37	0.0271	0.0626	0.0000	0.0000	0.0165	0.0000	0.0329	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0274
13011	40	38	0.0271	0.0740	0.0000	0.0000	0.0165	0.0000	0.0329	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0274
13011	40	39	0.0229	0.0740	0.0000	0.0000	0.0139	0.0000	0.0278	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0231
13011	40	40	0.0020	0.0391	0.0000	0.0000	0.0010	0.0000	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021
13013	33	26	0.0021	0.0000	0.0000	0.0000	0.0016	0.0000	0.0031	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022
13013	33	27	0.0060	0.0127	0.0000	0.0000	0.0032	0.0000	0.0098	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0061
13013	33	28	0.0078	0.0000	0.0000	0.0000	0.0044	0.0000	0.0129	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0081
13013	33	29	0.0032	0.0000	0.0000	0.0000	0.0016	0.0000	0.0052	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0034
13013	34	25	0.0092	0.0088	0.0000	0.0000	0.0091	0.0000	0.0098	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0094
13013	34	26	0.0322	0.1407	0.0000	0.0000	0.0230	0.0000	0.0454	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0327
13013	34	27	0.0352	0.0127	0.0000	0.0000	0.0190	0.0000	0.0578	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0359
13013	34	28	0.0352	0.0127	0.0000	0.0000	0.0190	0.0000	0.0578	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0359
.																	
.																	
.																	
13297	38	18	0.0190	0.0081	0.0000	0.0329	0.0204	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186
13297	38	19	0.0190	0.0029	0.0000	0.0329	0.0204	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186
13297	38	20	0.0190	0.0106	0.0000	0.0329	0.0204	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186
13297	38	21	0.0190	0.0106	0.0000	0.0329	0.0204	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186
13297	38	22	0.0190	0.0139	0.0000	0.0329	0.0204	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186
13297	38	23	0.0190	0.0000	0.0000	0.0329	0.0204	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0065
13297	38	24	0.0066	0.0000	0.0000	0.0123	0.0071	0.0000	0.0052	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002
13297	39	16	0.0003	0.0000	0.0000	0.0000	0.0002	0.0000	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0083
13297	39	17	0.0084	0.0026	0.0000	0.0123	0.0088	0.0000	0.0078	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0176
13297	39	18	0.0180	0.0026	0.0000	0.0329	0.0193	0.0000	0.0141	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186
13297	39	19	0.0190	0.0026	0.0000	0.0329	0.0204	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186
13297	39	20	0.0190	0.0162	0.0000	0.0329	0.0204	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186
13297	39	21	0.0190	0.0139	0.0000	0.0329	0.0204	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186
13297	39	22	0.0190	0.0139	0.0000	0.0329	0.0204	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186
13297	39	23	0.0136	0.0000	0.0000	0.0247	0.0146	0.0000	0.0107	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0133
13297	39	24	0.0005	0.0000	0.0000	0.0000	0.0005	0.0000	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005
13297	40	18	0.0021	0.0026	0.0000	0.0041	0.0022	0.0000	0.0015	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021
13297	40	19	0.0129	0.0026	0.0000	0.0206	0.0139	0.0000	0.0100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0126
13297	40	20	0.0190	0.0162	0.0000	0.0329	0.0204	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186
13297	40	21	0.0190	0.0000	0.0000	0.0329	0.0204	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186
13297	40	22	0.0152	0.0000	0.0000	0.0247	0.0164	0.0000	0.0118	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0149
13297	40	23	0.0010	0.0000	0.0000	0.0000	0.0011	0.0000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010
13311	34	40	0.0074	0.0099	0.0000	0.0000	0.0101	0.0000	0.0072	0.0092	0.0000	0.0109	0.0000	0.0000	0.0000	0.0000	0.0075
13311	35	40	0.0030	0.0099	0.0000	0.0000	0.0061	0.0000	0.0028	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0029
13311	36	40	0.0043	0.0099	0.0000	0.0103	0.0101	0.0000	0.0041	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0042
13311	37	40	0.0043	0.0000	0.0000	0.0103	0.0101	0.0000	0.0041	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0042
13311	38	40	0.0010	0.0000	0.0000	0.0000	0.0020	0.0000	0.0009	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010

EXHIBIT 3-18. Example of gridded surrogate file input to GRDEMS.

TABLE 3-11. Link definition data (unit 14) used by the GRDEMS program. (See Exhibit 3-19)

Line	Variable	Columns	Type	Description
1+	ICIN	1-5	I	FIPS state/county code
	LTYPE	6-10	I	Link type
				(101) Limited access roadways
				(102) Railroad
				(103) Airports
				(104) Ports
	UX1	11-22	R	Beginning easting UTM (km)
	UY1	23-34	R	Beginning northing UTM (km)
	UX2	35-46	R	Ending easting UTM (km)
	UY2	47-58	R	Ending northing UTM (km)

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13011	101	822.98	3818.38	825.95	3797.49
13011	101	824.10	3791.92	835.71	3801.85
13013	101	790.20	3767.58	817.60	3760.25
13015	101	693.71	3806.25	710.05	3775.38
13015	101	701.00	3791.00	680.00	3795.00
13035	101	769.54	3683.36	770.35	3676.35
13035	101	793.73	3686.97	770.00	3681.00
13045	101	670.17	3728.62	671.05	3700.71
13045	101	671.23	3726.90	694.51	3736.00
13055	101	656.28	3817.55	652.57	3829.99
13057	101	724.26	3773.43	736.14	3804.75
13063	101	736.06	3723.93	736.98	3721.15
13063	101	736.24	3725.05	736.33	3724.03
13063	101	736.33	3724.03	731.13	3722.54
13063	101	736.98	3721.15	748.78	3713.90
13063	101	740.71	3717.71	737.92	3710.28
13063	101	745.45	3715.33	748.30	3701.00
13063	101	748.69	3720.59	745.81	3726.07
13063	101	749.61	3713.44	748.69	3720.59
13063	103	736.00	3721.00	740.00	3725.00
13067	101	710.33	3775.66	732.34	3751.42
13067	101	720.00	3765.00	724.26	3773.43
13067	101	728.54	3742.88	710.99	3750.59
13067	101	728.81	3751.70	727.42	3744.92
13067	101	733.55	3756.25	728.81	3751.70
.					
.					
.					
13199	101	726.00	3677.00	712.00	3658.00
13207	101	774.14	3672.61	800.00	3645.00
13211	101	807.66	3722.45	845.09	3712.33
13217	101	780.54	3725.14	804.97	3723.01
13217	101	800.23	3721.80	799.39	3706.38
13219	101	817.78	3760.53	821.87	3759.60
13223	101	710.06	3751.05	683.59	3760.34
13227	101	735.49	3805.65	728.44	3830.92
13231	101	753.81	3673.13	750.37	3651.22
13231	101	753.99	3673.13	757.34	3668.40
13233	101	668.86	3773.15	668.86	3753.05
13233	101	683.31	3760.71	651.18	3762.10
13247	101	769.30	3732.01	780.63	3725.14
13255	101	750.16	3693.10	752.55	3674.06
13255	101	768.00	3687.00	769.54	3683.36
13285	101	674.20	3650.38	664.36	3638.31
13285	101	681.25	3671.36	682.15	3652.15
13285	101	683.21	3648.43	684.42	3642.30
13285	101	684.05	3659.58	674.20	3650.38
13285	101	684.33	3659.20	683.21	3648.43
13285	101	684.42	3642.30	681.73	3637.57
13285	101	687.76	3664.03	684.05	3659.58
13285	101	690.18	3668.21	687.76	3664.03
13285	101	698.59	3672.58	690.18	3668.21
13297	101	784.07	3749.10	803.85	3743.72
13297	101	799.76	3722.82	803.85	3743.90
13297	101	803.85	3743.62	815.00	3752.17
13297	101	805.15	3723.10	808.22	3722.36
13311	101	800.14	3821.82	800.51	3837.14

EXHIBIT 3-19. Example of links definition file input to GRDEMS.

TABLE 3-12. Ungridded model emission record format (merf) (unit 15) used by the GRDEMS program. (See Exhibits 3-13 and 3-14)

Line	Variable	Columns	Type	Description
1+	IGS	1-3	I	Gridding surrogate (blank)
	INFIP	4-8	I	FIPS state/county code (blank)
	INSIC	9-12	I	Either Source Industrial Category code or NAPAP Source Category
	INNSC	13-20	I	Either Standard Classification Code or NAPAP Source Category code, right justified
	ICELL	21-23	I	X-cell index (blank)
	JCELL	24-26	I	Y-cell index (blank)
	IYIN	27-28	I	Year (e.g., 85 for year 1985)
	CINDC	29-30	A	Diurnal variation code
	CINWC	31-32	A	Weekday variation code
	IDFAC	33-41	A	Facility ID (zero or blank for area sources)
	IDSTK	42-46	A	Stack ID (zero or blank for area sources)
	INCTY	47-52	I	AEROS state/county code
		53-56	-	(Not used, skipped)
	FACM	57-116	R	12 monthly factors of annual activity levels
	CO	117-126	R	Carbon monoxide, annually averaged (kg/day)
	ZNOX	127-136	R	Oxides of nitrogen, annually averaged (kg/day)
	SOX	137-146	R	Oxides of sulfur, annually averaged (kg/day)
	THC	147-156	R	Total organic, annually averaged (kg/day)
	TSP	157-166	R	Particulates, annually averaged (kg/day)
		167-168	-	(Not used, skipped)
	DESC	169-176	A	Scenario label

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```
Opened message:  msg.grdarea.at185                                          on unit   16
Opened input file:  in.grdat1                                                 on unit   10
Opened regndef file:  /u2/epsl-4/atlanta/regndef.at1                            on unit   11
Opened xref file:  xreftbl.at1                                                on unit   12
Opened surg file:  grdsrg.at1                                                 on unit   13
Opened link file:  link.at1                                                   on unit   14
Opened input emiss:  /u2/epsl-4/atlanta/edb/sklmerf.area.at18                  on unit   15
Opened gridded emiss:  /u2/epsl-4/atlanta/edb/merf.area.at185                     on unit   17
Opened errd file:  errd.grdarea.at185                                         on unit   18
167   nsc/surrogate pairs
109   diurnal cycle codes read in
109   weekly cycle codes read in
adding county:  13011 to list now at        1
adding county:  13013 to list now at        2
adding county:  13015 to list now at        3
adding county:  13035 to list now at        4
adding county:  13045 to list now at        5
adding county:  13055 to list now at        6
  .
  .
  .
adding county:  13233 to list now at       38
adding county:  13247 to list now at       39
adding county:  13255 to list now at       40
adding county:  13285 to list now at       41
adding county:  13297 to list now at       42
adding county:  13311 to list now at       43

     ***** Gridded links by SETLNK *****

Link #.   1 type: 101 crossed    0 cells in county 13011
Link #    2 type: 101 crossed    0 cells in county 13011
Link #    3 type: 101 crossed   10 cells in county 13013
       ( 33, 26)( 34, 26)( 35, 26)( 35, 25)( 36, 25)( 37, 25)
       ( 38, 25)( 39, 25)( 39, 24)( 40, 24)(
Link #    4 type: 101 crossed   13 cells in county 13015
       (  9, 36)(  9, 35)( 10, 35)( 10, 34)( 10, 33)( 11, 33)
       ( 11, 32)( 11, 31)( 12, 31)( 12, 30)( 12, 29)( 13, 29)
       ( 13, 28)(
Link #    5 type: 101 crossed    7 cells in county 13015
       (  6, 33)(  7, 33)(  8, 33)(  8, 32)(  9, 32)( 10, 32)
       ( 11, 32)(
Link #    6 type: 101 crossed    3 cells in county 13035
       ( 28,  5)( 28,  4)( 28,  3)(
  .
  .
  .
Link # 147 type: 101 crossed    0 cells in county 13285
Link # 148 type: 101 crossed    1 cells in county 13285
       (  8,  1)(
Link # 149 type: 101 crossed    4 cells in county 13285
       (  8,  1)(  8,  2)(  9,  2)( 10,  2)(
Link # 150 type: 101 crossed    7 cells in county 13297
       ( 32, 22)( 32, 21)( 33, 21)( 34, 21)( 35, 21)( 35, 20)
       ( 36, 20)(
Link # 151 type: 101 crossed    7 cells in county 13297
       ( 35, 15)( 36, 15)( 36, 16)( 36, 17)( 36, 18)( 36, 19)
       ( 36, 20)(
Link # 152 type: 101 crossed    6 cells in county 13297
       ( 36, 20)( 37, 20)( 37, 21)( 38, 21)( 38, 22)( 39, 22)
Link # 153 type: 101 crossed    2 cells in county 13297
       ( 37, 15)( 38, 15)(
Link # 154 type: 101 crossed    1 cells in county 13311
       ( 36, 40)(
```

EXHIBIT 3-20. Example of message file output from GRDEMS.

```
154   links processed
      County   13011   has   2   links
      County   13013   has   1   links
      County   13015   has   2   links
      County   13035   has   2   links
      County   13045   has   2   links
      County   13055   has   1   links
        .
        .
      County   13233   has   2   links
      County   13247   has   1   links
      County   13255   has   2   links
      County   13285   has   9   links
      County   13297   has   4   links
      County   18311   has   1   links

2167   surrogate records processed

1379   county emissions records processed
51315   area records written to merf file
8   link records written to merf file
```

	CO	NOx	SOx	THC	PM
Total in:	361249.13	80559.08	10820.53	319072.75	38130.04
grid'd:	303518.47	73320.51	10068.64	284575.81	30281.99
skip'd:	0.00	0.00	0.00	0.00	0.00
% grid'd:	84.02%	91.01%	93.05%	89.19%	79.42%

EXHIBIT 3-20 Concluded.

10113013 227	227 33 26 05013	110360	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	22.77	0.00
10113013 227	227 34 26 05013	110360	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	50.60	0.00
10113013 227	227 35 26 05013	110360	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	48.63	0.00
10113013 227	227 35 25 05013	110360	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	1.97	0.00
10113013 227	227 36 25 05013	110360	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	50.60	0.00
10113013 227	227 37 25 05013	110360	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	50.60	0.00
10113013 227	227 38 25 05013	110360	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	50.60	0.00
10113013 227	227 39 25 05013	110360	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	35.37	0.00
10113013 227	227 39 24 05013	110360	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	15.22	0.00
10113013 227	227 40 24 05013	110360	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	20.24	0.00
10113015 227	227 9 36 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	69.83	0.00
10113015 227	227 9 35 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	171.87	0.00
10113015 227	227 10 35 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	51.60	0.00
10113015 227	227 10 34 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	223.47	0.00
10113015 227	227 10 33 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	147.11	0.00
10113015 227	227 11 33 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	76.36	0.00
10113015 227	227 11 32 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	223.47	0.00
10113015 227	227 11 31 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	122.36	0.00
10113015 227	227 12 31 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	101.11	0.00
10113015 227	227 12 30 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	223.47	0.00
10113015 227	227 12 29 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	97.61	0.00
10113015 227	227 13 29 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	125.86	0.00
10113015 227	227 13 28 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	90.51	0.00
10113015 227	227 6 33 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	201.06	0.00
10113015 227	227 7 33 05013	110380	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	201.06	0.00
.								
.								
413297 438	438 37 18 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 37 19 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 37 20 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 37 21 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 37 22 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 37 23 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 37 24 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.06	0.00
413297 438	438 38 17 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.17	0.00
413297 438	438 38 18 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 38 19 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 38 20 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 38 21 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 38 22 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 38 23 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 38 24 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.08	0.00
413297 438	438 39 17 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.08	0.00
413297 438	438 39 18 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 39 19 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 39 20 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 39 21 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 39 22 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 39 23 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.17	0.00
413297 438	438 40 18 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.03	0.00
413297 438	438 40 19 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.14	0.00
413297 438	438 40 20 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 40 21 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.23	0.00
413297 438	438 40 22 05013	115300	0.0830.0830.0830.0830.0830.0830.0830.0830.0830.0830.083	0.00	0.00	0.00	0.17	0.00

EXHIBIT 3-21. Example of gridded merf file (output from GRDEMS, input to CENTEMS).

DESCRIPTION OF CENTEMS

CENTEMS, the central program of the EPS, creates three files:

A gridded binary emissions file for input to the UAM

A file of total emissions by activity, process, control, old inventory category (OIC) code, and hydrocarbon speciation profile used for tabulating categorized emission totals (see Exhibit 3-38)

An elevated point source input file for the UAM preprocessor PTSRCE

Figure 3-4 shows the file structure of CENTEMS. The input files include the user input file, the control file for elevated stacks (produced by PREPNT), five files that provide information to categorize, speciate, and apply temporal variation factors to the emissions inputs, and the gridded merf file produced by GRDEMS.

CENTEMS is generally run three times, each time with a different merf file. The merf file is either the area or motor vehicle emissions file produced by PREGRD or the point source emissions file produced by PREPNT. These files can also be merged and the program executed once.

The first input file, the user input file , contains information on type of sources, time and day flags, modeling region information, and control factors (Table 3-13 and Exhibit 3-22). The date on the future-year inventory files must correspond to the date specified in the UAM meteorological files. At a minimum, the region covered by the emission inventory must be the same as the modeling region; however, it may be larger. The modeling region origin (lower left) can also be different from the origin of the emissions inventory grid. IDEL and JDEL define this difference. It is also possible to have the UAM modeling grid coarser than the emissions inventory grid. IGSCL and JGSCL define this difference; these factors must be an integer because the UAM grid cannot be finer than the emissions inventory grid.

The second input file, created by PREPNT, contains parameters for elevated stacks (Table 3-14 and Exhibit 3-8). It requires no modification for use as CENTEMS input. The heading in this file generates the header record for the low-level emission file and provides the template for the elevated point source preprocessor file. Note that CENTEMS arrays have a maximum of 1000 elevated point sources.

The glossary file is a direct access file and matches either a paired Standard Industrial Classification (SIC) and Source Classification Code (SCC) or the NAPAP Source Category (NSC) with a set of activity, process, control, and source category codes (OIC). The direct access file is generated by the utility program MKGLOS (Figure 3-5). MKGLOS need only be run for the initial set up of the glossary file or when additions or changes to the glossary file are necessary. The glossary file modifications are made to the sequential access file (Table 3-15 and Exhibit 3-23) and MKGLOS is again run. The SIC/SCC pair or NSC code is taken from the merf input file. The current glossary was developed from work by the California Air Resources Board. The codes are explained in Appendix A. The glossary is used by CENTEMS to assign activity, process, control, and source category codes (OIC) and to prepare emission totals by code category for POSTEMS. It has no bearing on the calculation of emissions.

The speciation factors file matches a hydrocarbon speciation profile code with a set of factors that split the NO_x and THC emission rates read from the merf input file into emissions for the CB-4 species NO, NO2, OLE, PAR, TOL, XYL, FORM, ALD2, ETH, MEOH, ETOH, and ISOP (Table 3-16 and Exhibit 3-24). The current factors were derived from the EPA's Air Emission Species Manual (1988). The units of the factors are moles per gram. CENTEMS converts emissions from kg/day to g/day. By multiplying by the appropriate speciation factors, the emissions will be in moles, the unit required by the UAM.

The speciation profile file matches an SCC or NSC code with a hydrocarbon speciation profile code (Table 3-17 and Exhibit 3-25). The SCC or NSC code is taken from the merf input file. The hydrocarbon speciation profile code is then used to determine the speciation factors to apply. The current speciation profiles were obtained from the Air Emission Species Manual.

The diurnal variation factors file contains diurnal profiles (hourly variation) for the emissions data (Table 3-18 and Exhibit 3-26). A code on each merf record determines which set of diurnal variation factors will be used. The 24 hourly factors are used to split the daily emission rates into the hourly emission rates needed for the UAM. The 24 activity factors are normalized by dividing by the daily total (TDYFAC). The daily emission rates are multiplied by the normalized activity factors to obtain hourly emission rates.

The weekday file includes the appropriate weekday variation factors for the weekday code specified on the merf file (Table 3-19 and Exhibit 3-27). This code specifies the seven daily activity factors used to allocate emissions. These factors are normalized by dividing by the total weekly activity (TWKFAC), and the emission rates are multiplied by the normalized daily activity factors to obtain emission rates for a particular day of the week.

The final input file is the gridded emissions file in merf format (Table 3-20 and Exhibit 3-5 and 3-21). This file contains emission rates information, codes that define the speciation, temporal variation profile codes, source identity, and location of the emission source.

CENTEMS produces four output files. The message file contains tables of emission totals by activity, process, control, and source category (OIC), as well as maps of daily emission totals by species (Exhibit 3-28). The file of gridded hourly low-level emissions is a binary file in UAM format and is input to POSTEMS. The ASCII elevated point source file is input to the UAM preprocessor PTSRCE (Exhibit 3-29). This file is empty if only area or motor vehicle emissions are being processed. The file of categorized totals is a binary file of daily total emissions by category and is input to POSTEMS.

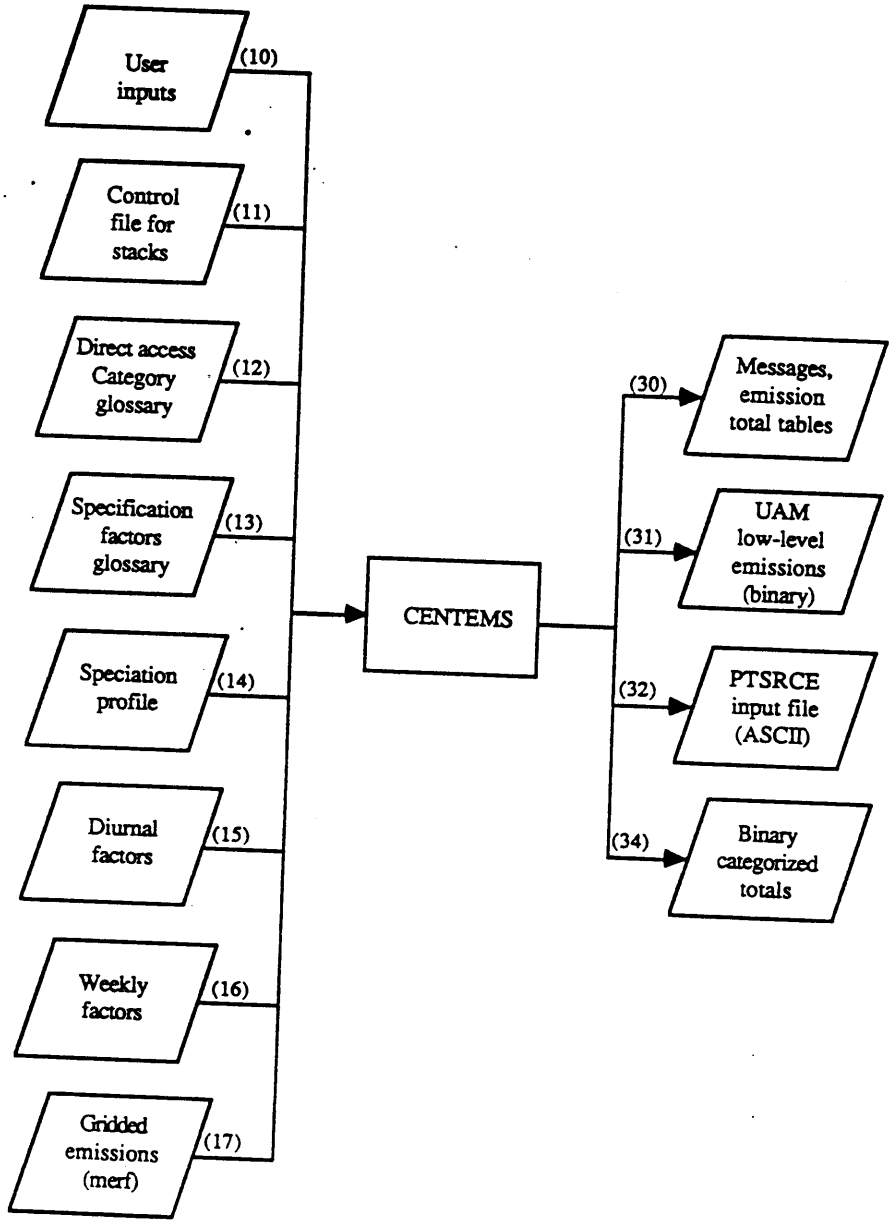

FIGURE 3-4. Input and output files used by CENTEMS.

EEE 99077

TABLE 3-13. User input file (unit 10) used by the CENTEMS program. (See Exhibit 3-22)

Line	Variable	Columns	Type	Description
1	MFILID	1-60	A	UAM EMISSIONS file identification text
2	IEMIS	*	I	Source type 0 = no elevated points included 1 = elevated points included but omitted from categorized totals 2 = elevated points included in categorized totals
	IPDT	*	I	Daylight time flag, 0 = emission in LST 1 = emission in LDT
	IDBG	*	I	Debug option, prints volumes of messages (default = 0)
	KSEAS	*	I	Season flag (not used, skipped)
	KWKND	*	I	Weekend flag 1 = weekday 2 = weekend
	KDAY	*	I	Day of week (1 = Monday, ..., 7 = Sunday
	ITODAY	*	I	Episode date (YYMMDD format)
3	IDEL	*	I	Modeling region origin offset from emission inventory grid in x direction (number of cells)
	JDEL	*	I	Modeling region origin offset from emission inventory grid in y direction (number of cells)
	IGSCL	*	I	Number of input x-cells per UAM grid cell
	JGSCL	*	I	Number of input y-cells per UAM grid cell
4+	KNTRL	*	I	Control code (-999 = end of section)
	CFCO	*	R	CO control factor (-999 = end of section)
	CFNOX	*	R	NO_x control factor (-999 = end of section)
	CFSOX	*	R	SO_x control factor (-999 = end of section)
	CFTHC	*	R	Total hydrocarbon compounds (THC) factor (-999 = end of section)
	CFPM	*	R	Particulate matter (PM) factor (-999 = end of section)

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```
Atlanta area source emissions -- 1985 base case
0,1,0,2,1,3,840603
          0          0          1          1
-999      0          0          0          0          0
```

```
Atlanta motor vehicle emissions --1985 base case
0,1,0,2,1,3,840603
          0          0          1          1
-999      0          0          0          0          0
```

```
Atlanta point source emissions -- 1985 base case
2,1,0,2,1,3,840603
          0          0          1          1
-999      0          0          0          0          0
```

EXHIBIT 3-22. Example of three separate user input files to CENTEMS.

TABLE 3-14. Control file for elevated stacks (unit 11) created by PREPNT and used by the CENTEMS program. (See Exhibit 3-8)

Line	Variable	Columns	Type	Description
1	IDUM			Not used, skipped
2	IDUM			Not used, skipped
3	IDUM			Not used, skipped
4	NSPECS	1-10	I	Number of species
	NPTS	21-30	I	Number of point sources
5	IDUM			Not used, skipped
6	IDUM			Not used, skipped
7	IDUM			Not used, skipped
8	IDUM			Not used, skipped
9+	IDUM			Not used, NSPECS records skipped
10	JTDAY1	1-10	I	Beginning Julian date
	IFSTRT	11-20	I	Beginning time
	JTDAY2	21-30	I	Ending Julian date
	IFEND	31-40	I	Ending time
11	IDUM			Not used, skipped
12	MTEMP	1-60	A	Begin region defintion section
13	UTMX	1-10	R	Region origin, easting coordinate
	UTMY	11-20	R	Region origin, northing coordinate
	IUTMZN	21-30	I	UTM zone
14	ORGX	1-10	R	Modeling region easting offset from UTMX
	ORGY	11-20	R	Modeling region northing offset from UTMY
15	DELTAX	1-10	R	X direction cell size
	DELTAY	11-20	R	Y direction cell size
16	NXCELL	1-10	I	Number of cells in x direction
	NYCELL	11-20	I	Number of cells in y direction
	NZCELL	21-30	I	Number of vertical cells

continued

TABLE 3-14. Concluded.

Line	Variable	Columns	Type	Description
17	NZLOWR	1-10	I	Number of vertical cell layers in lower layer
	NZUPPR	11-20	I	Number of vertical cell layers in upper layer
	HTSUR	21-30	R	Height of the surface layer
	HTLOW	31-40	R	Height of the lower layer
	HTUPP	41-50	R	Height of the upper layer
18	MTEMP	1-60	A	End region defintion section
19	TEXT	1-80	A	Begin point sources section
20/	BFACIL	42-50	A	Point source facility identification
21+	BSTK	56-60	A	Stack identification
	BCNTY	61-70	I	AEROS state/county code
				Second record not used, skipped
22	MTEMP	1-80	A	End point sources section
For each hourly interval:				
23	TEXT	1-80	A	Time interval header
24	TEXT	1-80	A	Date and time interval
25	TEXT	1-80	A	Method header
26	TEXT	1-80	A	Method infomation
27	TEXT	1-80	A	End method section
28	TEXT	1-80	A	Vertical methods header
29	TEXT	1-80	A	Veritcal method informtion
30	TEXT	1-80	A	End vertical methods section
31	TEXT	1-80	A	Emissions header 1
32	TEXT	1-80	A	Emissions header 2
33+	TEXT	1-80	A	Flowrate for NPTS point sources

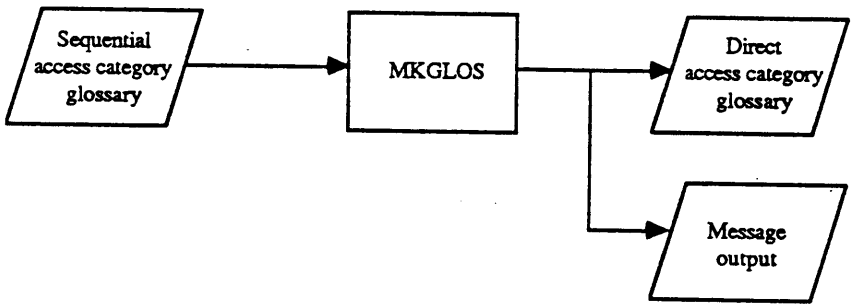

FIGURE 3-5. Input and output files used by utility program MKGLOS.

TABLE 3-15. Glossary file used by the MKGLOS utility program. (See Exhibit 3-23)

Line	Variable	Columns	Type	Description
1+	ACT(1)	5-9	A	Either Source Industrial Classification code or NAPAP Source Category code for area and mobile sources
	ACT(2-3)	13-20	A	Either Standard Classification Code or NAPAP Source Category code
	ACT(4)	21-30	A	Activity code
	ACT(5)	31-40	A	Process code
	ACT(6)	41-50	A	Control code
	ACT(7)	51-60	A	Old industrial category code

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1	1	510	100	114	170
2	2	510	100	114	170
3	3	510	100	114	170
4	4	510	100	114	170
5	5	510	100	99	170
6	6	510	100	99	170
7	7	300	100	114	160
8	8	300	100	114	160
9	9	300	100	114	160
10	10	300	100	114	160
11	11	300	100	99	160
12	12	300	100	99	160
13	13	200	100	99	140
14	14	200	100	99	140
15	15	200	100	99	140
16	16	200	100	114	140
.					
.					
.					
3542	40200901	294	300	309	380
3542	40201001	294	120	99	140
3542	40202501	294	330	308	340
3542	40202505	294	330	308	340
3542	40288801	294	330	308	340
3544	10200502	294	111	109	140
3544	10200602	294	111	109	140
3544	30903099	294	553	99	570
3545	40100202	294	320	331	320
3545	40100203	294	320	331	320
3545	40100204	294	320	331	320
3545	40100299	294	320	314	320
3545	40200101	294	330	308	340
3545	40200410	294	330	308	340
3545	40200501	294	330	308	340
3545	40200599	294	330	308	340
3545	40200901	294	300	309	380
.					
.					
.					
9999	40299999	900	330	99	340
9999	40300198	900	410	99	499
9999	40300199	900	410	99	499
9999	40300302	900	420	99	499
9999	40301010	900	410	99	499
9999	40399999	900	410	99	499
9999	40500401	900	350	334	360
9999	40500599	900	350	319	360
9999	40600198	900	420	99	499
9999	40600399	900	410	99	499
9999	40600499	900	440	99	499
9999	49099999	900	900	999	699
9999	50200505	900	210	99	240
9999	50300101	900	210	99	240
9999	50300102	900	210	99	240
9999	99999999	900	900	999	699

EXHIBIT 3-23. Example of category glossary file input to MKGLOS.

TABLE 3-16. Speciation factors file (unit 13) used by the CENTEMS program. (See Exhibit 3-24)

Line	Variable	Columns	Type	Description
1+	IPRF	1-5	I	Hydrocarbon speciation profile code
	SPLTAB (3-12)	9-138	R	Factors to calculate emissions from total hydrocarbon compounds, in order: OLE, PAR, TOL, XYL, FORM, ALD2, ETH, MEOH, ETOH, ISOP
	SPLTAB (1-2)	152-177	R	Factors to calculate emissions from NO_x, in order: NO, NO2
	SPLTAB (19)	178-190	R	Factor to convert THC from actual mass to emissions as methane

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0	0.1910E-02	0.2552E-01	0.5871E-03	0.3259E-03	0.6620E-03	0.1191E-02	0.1120E-02	0.4370E-03	0.2952E-03	0.5872E-04	0.1328E-01	0.5900E+00	0.1000E+0
1	0.0000E+00	0.2765E-01	0.0000E+00	0.0000E+00	0.1399E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6789E-02	0.5900E+00	0.1000E+0
2	0.0000E+00	0.3515E-01	0.0000E+00	0.0000E+00	0.1622E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4082E-03	0.5900E+00	0.1000E+0
3	0.0000E+00	0.2022E-01	0.2171E-03	0.0000E+00	0.2664E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3848E-01	0.5900E+00	0.1000E+0
4	0.4159E-02	0.3234E-01	0.0000E+00	0.0000E+00	0.2531E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2224E-01	0.5900E+00	0.1000E+0
5	0.7129E-04	0.1471E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4171E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.5396E-01	0.5900E+00	0.1000E+0
7	0.0000E+00	0.4364E-03	0.0000E+00	0.0000E+00	0.9990E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4320E-01	0.5900E+00	0.1000E+0
8	0.9088E-02	0.1468E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1023E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1805E-01	0.5900E+00	0.1000E+0
9	0.9088E-02	0.1468E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1023E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1805E-01	0.5900E+00	0.1000E+0
11	0.6542E-03	0.4270E-02	0.7597E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.9875E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.4187E-01	0.5900E+00	0.1000E+0
12	0.0000E+00	0.1837E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1889E-01	0.5900E+00	0.1000E+0
13	0.7129E-03	0.7253E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2103E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.5252E-01	0.5900E+00	0.1000E+0
14	0.0000E+00	0.4030E-01	0.3907E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1304E-01	0.5900E+00	0.1000E+0
16	0.0000E+00	0.2427E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2574E-01	0.5900E+00	0.1000E+0
23	0.0000E+00	0.6284E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.7130E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.4954E-02	0.5900E+00	0.1000E+0
24	0.2250E-02	0.4202E-01	0.2062E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.1070E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.2000E-01	0.5900E+00	0.1000E+0
25	0.0000E+00	0.2022E-01	0.2171E-03	0.0000E+00	0.2664E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3848E-01	0.5900E+00	0.1000E+0
26	0.1978E-02	0.4351E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.7130E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.2009E-01	0.5900E+00	0.1000E+0
29	0.0000E+00	0.9275E-02	0.0000E+00	0.0000E+00	0.1698E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2222E-01	0.5900E+00	0.1000E+0
31	0.0000E+00	0.6335E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6238E-02	0.5900E+00	0.1000E+0
35	0.0000E+00	0.6930E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
39	0.2305E-02	0.4683E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1663E-01	0.5900E+00	0.1000E+0
47	0.1212E-02	0.3278E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3293E-01	0.5900E+00	0.1000E+0
51	0.0000E+00	0.1432E-01	0.0000E+00	0.0000E+00	0.6660E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3851E-01	0.5900E+00	0.1000E+0
66	0.0000E+00	0.5330E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.9045E-03	0.5900E+00	0.1000E+0
68	0.2376E-01	0.2376E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
72	0.0000E+00	0.3623E-01	0.2826E-03	0.2608E-03	0.0000E+00	0.2237E-02	0.0000E+00	0.1561E-02	0.5427E-03	0.0000E+00	0.9829E-02	0.5900E+00	0.1000E+0
76	0.0000E+00	0.3877E-01	0.5427E-03	0.1413E-02	0.0000E+00	0.1316E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.9061E-02	0.5900E+00	0.1000E+0
78	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2021E-01	0.5900E+00	0.1000E+0
79	0.5264E-02	0.1330E-01	0.7714E-03	0.1790E-03	0.5661E-03	0.2699E-03	0.7797E-02	0.1685E-02	0.3039E-03	0.0000E+00	0.1225E-01	0.5900E+00	0.1000E+0
85	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1206E-01	0.5900E+00	0.1000E+0
87	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1499E-01	0.5900E+00	0.1000E+0
88	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.7280E-02	0.5900E+00	0.1000E+0
89	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1499E-01	0.5900E+00	0.1000E+0
90	0.0000E+00	0.0000E+00	0.1085E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
100	0.0000E+00	0.7042E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
121	0.4417E-02	0.4656E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6916E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.1376E-02	0.5900E+00	0.1000E+0
122	0.1188E-03	0.1965E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3102E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.5599E-01	0.5900E+00	0.1000E+0
127	0.0000E+00	0.5330E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.9045E-03	0.5900E+00	0.1000E+0
166	0.0000E+00	0.8355E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5574E-01	0.5900E+00	0.1000E+0
182	0.0000E+00	0.4376E-01	0.5651E-03	0.5215E-03	0.0000E+00	0.4474E-02	0.0000E+00	0.1873E-02	0.0000E+00	0.0000E+00	0.2186E-02	0.5900E+00	0.1000E+0
183	0.0000E+00	0.4368E-01	0.1411E-02	0.3768E-03	0.0000E+00	0.7281E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
195	0.0000E+00	0.6234E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6172E-01	0.5900E+00	0.1000E+0
197	0.0000E+00	0.1895E-01	0.0000E+00	0.0000E+00	0.1998E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.8010E-02	0.0000E+00	0.1285E-01	0.5900E+00	0.1000E+0
202	0.7340E-05	0.1068E-02	0.1085E-04	0.9419E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6104E-01	0.5900E+00	0.1000E+0
203	0.0000E+00	0.6009E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4341E-03	0.0000E+00	0.5490E-01	0.5900E+00	0.1000E+0
217	0.2448E-02	0.9535E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.9982E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.5351E-01	0.5900E+00	0.1000E+0
219	0.0000E+00	0.5165E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
220	0.0000E+00	0.3405E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1135E-01	0.5900E+00	0.1000E+0
221	0.0000E+00	0.5547E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
222	0.0000E+00	0.2270E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.7567E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.7567E-02	0.5900E+00	0.1000E+0
223	0.0000E+00	0.0000E+00	0.0000E+00	0.9419E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
225	0.0000E+00	0.7025E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
226	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
227	0.0000E+00	0.2496E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2171E-01	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
228	0.0000E+00	0.3917E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2496E-01	0.5900E+00	0.1000E+0
229	0.0000E+00	0.7003E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.9791E-02	0.5900E+00	0.1000E+0
230	0.0000E+00	0.6962E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
271	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.7611E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0

EXHIBIT 3-24. Example of speciation factors file input to CENTEMS.

272	0.0000E+00	0.6916E-01	0.4341E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1792E-02	0.5900E+00	0.1000E+0
273	0.0000E+00	0.6582E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4929E-02	0.5900E+00	0.1000E+0
274	0.0000E+00	0.7129E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
275	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1177E-01	0.5900E+00	0.1000E+0
277	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1067E-01	0.5900E+00	0.1000E+0
282	0.0000E+00	0.7018E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
288	0.0000E+00	0.4304E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.8609E-02	0.5900E+00	0.1000E+0
289	0.0000E+00	0.5397E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
290	0.0000E+00	0.2219E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1109E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
291	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3121E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
292	0.0000E+00	0.2736E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1368E-01	0.5900E+00	0.1000E+0
296	0.0000E+00	0.5567E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1286E-01	0.5900E+00	0.1000E+0
297	0.0000E+00	0.5367E-01	0.1519E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1388E-01	0.5900E+00	0.1000E+0
299	0.0000E+00	0.7129E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
301	0.0000E+00	0.6986E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
304	0.0000E+00	0.2496E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2496E-01	0.5900E+00	0.1000E+0
305	0.0000E+00	0.5988E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6813E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.8948E-02	0.5900E+00	0.1000E+0
307	0.1459E-02	0.3802E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1508E-01	0.5900E+00	0.1000E+0
316	0.2376E-04	0.4172E-01	0.5427E-04	0.1884E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2471E-01	0.5900E+00	0.1000E+0
321	0.0000E+00	0.6216E-01	0.3256E-03	0.1224E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4254E-02	0.5900E+00	0.1000E+0
332	0.1211E-01	0.1803E-01	0.0000E+00	0.0000E+00	0.7259E-02	0.0000E+00	0.7130E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.1055E-01	0.5900E+00	0.1000E+0
333	0.0000E+00	0.1206E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3401E-01	0.5900E+00	0.1000E+0
1001	0.4617E-03	0.5473E-02	0.6773E-05	0.8760E-05	0.2721E-03	0.6590E-04	0.2246E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.5597E-01	0.5900E+00	0.1000E+0
1002	0.0000E+00	0.1932E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4991E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.3077E-01	0.5900E+00	0.1000E+0
1003	0.1337E-04	0.3069E-01	0.4161E-02	0.7953E-03	0.0000E+00	0.5482E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1146E-02	0.5900E+00	0.1000E+0
1004	0.4321E-02	0.9419E-03	0.9583E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1005	0.4801E-02	0.0000E+00	0.9602E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3327E-01	0.5900E+00	0.1000E+0
1006	0.4079E-02	0.4870E-02	0.0000E+00	0.9419E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.9516E-03	0.5900E+00	0.1000E+0
1007	0.3082E-03	0.4750E-01	0.0000E+00	0.2733E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1008	0.2411E-01	0.0000E+00	0.3841E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3559E-01	0.5900E+00	0.1000E+0
1009	0.1323E-01	0.1131E-01	0.3841E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3011E-01	0.5900E+00	0.1000E+0
1010	0.0000E+00	0.3032E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4448E-01	0.5900E+00	0.1000E+0
1011	0.0000E+00	0.3644E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2667E-02	0.5900E+00	0.1000E+0
1012	0.0000E+00	0.2034E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.9235E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.9606E-03	0.5900E+00	0.1000E+0
1013	0.1394E-04	0.4453E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1769E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1419E-02	0.5900E+00	0.1000E+0
1014	0.6126E-03	0.6279E-01	0.7614E-04	0.3467E-04	0.2770E-03	0.1444E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3331E-02	0.5900E+00	0.1000E+0
1015	0.5774E-03	0.6144E-01	0.2545E-03	0.1257E-03	0.1273E-03	0.2464E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1283E-02	0.5900E+00	0.1000E+0
1016	0.1289E-02	0.4602E-01	0.1739E-02	0.2562E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2250E-02	0.5900E+00	0.1000E+0
1017	0.1016E-03	0.3190E-01	0.4839E-02	0.3937E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.7249E-03	0.5900E+00	0.1000E+0
1018	0.0000E+00	0.3011E-01	0.1948E-02	0.2290E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1019	0.0000E+00	0.3064E-01	0.4809E-02	0.3466E-03	0.0000E+00	0.8570E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.6512E-02	0.8242E-02	0.5900E+00	0.1000E+0
1020	0.0000E+00	0.6025E-01	0.3712E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1021	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1081E-04	0.5900E+00	0.1000E+0
1022	0.0000E+00	0.5990E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3120E-01	0.0000E+00	0.0000E+00	0.2204E-02	0.5900E+00	0.1000E+0
1023	0.0000E+00	0.4635E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2425E-02	0.0000E+00	0.0000E+00	0.2155E-01	0.5900E+00	0.1000E+0
1024	0.0000E+00	0.3334E-01	0.0000E+00	0.7818E-04	0.0000E+00	0.1914E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1025	0.0000E+00	0.2066E-01	0.0000E+00	0.3184E-03	0.0000E+00	0.3837E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4422E-02	0.5900E+00	0.1000E+0
1026	0.0000E+00	0.5077E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1320E-01	0.5900E+00	0.1000E+0
1027	0.0000E+00	0.5397E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2270E-01	0.5900E+00	0.1000E+0
1028	0.9268E-02	0.4513E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.8633E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.8401E-02	0.5900E+00	0.1000E+0
1029	0.0000E+00	0.3201E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2319E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1030	0.0000E+00	0.2039E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4994E-01	0.5900E+00	0.1000E+0
1031	0.0000E+00	0.2270E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1737E-01	0.5900E+00	0.1000E+0
1032	0.1435E-01	0.0000E+00	0.0000E+00	0.1435E-01	0.4445E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2342E-01	0.5900E+00	0.1000E+0
1033	0.1566E-01	0.1735E-01	0.0000E+00	0.6716E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00			
1034	0.3698E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00			
1035	0.2259E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00			
1036	0.0000E+00	0.9589E-02	0.5159E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00			
1037	0.0000E+00	0.5520E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2161E-01	0.0000E+00	0.0000E+00	0.0000E+00			
1038	0.0000E+00	0.2929E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3894E-02	0.0000E+00	0.0000E+00	0.0000E+00			

EXHIBIT 3-24 Continued.

1039	0.0000E+00	0.3949E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1153E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.2104E-01	0.5900E+00	0.1000E+0
1040	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1330E-01	0.5900E+00	0.1000E+0
1041	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1366E-01	0.5900E+00	0.1000E+0
1042	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.7924E-02	0.5900E+00	0.1000E+0
1043	0.6354E-02	0.2592E-01	0.0000E+00	0.0000E+00	0.6725E-03	0.1816E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2386E-01	0.5900E+00	0.1000E+0
1044	0.0000E+00	0.3883E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.7000E-02	0.5900E+00	0.1000E+0
1045	0.0000E+00	0.2865E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1211E-01	0.5900E+00	0.1000E+0
1046	0.2017E-02	0.2339E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.5111E-02	0.0000E+00	0.0000E+00	0.1710E-02	0.0000E+00	0.5029E-02	0.5900E+00	0.1000E+0
1047	0.2635E-02	0.4556E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2635E-02	0.5900E+00	0.1000E+0
1048	0.6500E-03	0.2650E-01	0.5995E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4340E-01	0.5900E+00	0.1000E+0
1049	0.0000E+00	0.3059E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3631E-01	0.5900E+00	0.1000E+0
1050	0.0000E+00	0.5117E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.4297E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1820E-01	0.5900E+00	0.1000E+0
1051	0.1938E-02	0.5537E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2673E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.2634E-02	0.5900E+00	0.1000E+0
1052	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3565E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1053	0.1162E-01	0.1162E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1162E-01	0.5900E+00	0.1000E+0
1054	0.5343E-02	0.5343E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.1226E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5343E-02	0.5900E+00	0.1000E+0
1055	0.0000E+00	0.6130E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1056	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3565E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1057	0.0000E+00	0.3633E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1691E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.3243E-01	0.5900E+00	0.1000E+0
1058	0.0000E+00	0.1520E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2696E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1505E-01	0.5900E+00	0.1000E+0
1059	0.7191E-04	0.4025E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1420E-02	0.0000E+00	0.0000E+00	0.1455E-02	0.5900E+00	0.1000E+0
1060	0.2760E-02	0.1123E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1848E-01	0.0000E+00	0.0000E+00	0.2760E-02	0.5900E+00	0.1000E+0
1061	0.0000E+00	0.1279E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6394E-01	0.5900E+00	0.1000E+0
1062	0.0000E+00	0.1280E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6401E-01	0.5900E+00	0.1000E+0
1064	0.0000E+00	0.2940E-01	0.5535E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.8427E-04	0.0000E+00	0.0000E+00	0.3722E-01	0.5900E+00	0.1000E+0
1065	0.1307E-02	0.3306E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3024E-01	0.5900E+00	0.1000E+0
1066	0.2357E-03	0.4921E-02	0.2407E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.8695E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.3179E-01	0.5900E+00	0.1000E+0
1067	0.1697E-03	0.2193E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4694E-01	0.5900E+00	0.1000E+0
1068	0.9366E-03	0.7146E-02	0.5828E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2654E-01	0.5900E+00	0.1000E+0
1069	0.0000E+00	0.3917E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.9791E-02	0.5900E+00	0.1000E+0
1070	0.0000E+00	0.5642E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4806E-03	0.0000E+00	0.0000E+00	0.5352E-01	0.5900E+00	0.1000E+0
1071	0.0000E+00	0.4266E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5400E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1072	0.0000E+00	0.1099E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5497E-01	0.5900E+00	0.1000E+0
1073	0.0000E+00	0.1261E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6304E-01	0.5900E+00	0.1000E+0
1074	0.0000E+00	0.8884E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4442E-01	0.5900E+00	0.1000E+0
1075	0.0000E+00	0.9163E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4581E-01	0.5900E+00	0.1000E+0
1076	0.0000E+00	0.6803E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3401E-01	0.5900E+00	0.1000E+0
1077	0.0000E+00	0.6812E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3406E-01	0.5900E+00	0.1000E+0
1078	0.0000E+00	0.6444E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2578E-01	0.5900E+00	0.1000E+0
1079	0.0000E+00	0.6803E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3401E-01	0.5900E+00	0.1000E+0
1080	0.0000E+00	0.7681E-02	0.0000E+00	0.7681E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1536E-01	0.5900E+00	0.1000E+0
1081	0.9988E-02	0.1998E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.9988E-02	0.5900E+00	0.1000E+0
1082	0.0000E+00	0.1063E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5313E-01	0.5900E+00	0.1000E+0
1083	0.0000E+00	0.1971E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1971E-01	0.5900E+00	0.1000E+0
1084	0.5626E-03	0.5005E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5840E-02	0.0000E+00	0.3575E-02	0.0000E+00	0.3904E-01	0.5900E+00	0.1000E+0
1085	0.0000E+00	0.3433E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3291E-01	0.5900E+00	0.1000E+0
1086	0.0000E+00	0.5160E-01	0.7033E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1087	0.0000E+00	0.4854E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6934E-02	0.5900E+00	0.1000E+0
1088	0.0000E+00	0.4440E-01	0.2203E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3032E-02	0.5900E+00	0.1000E+0
1089	0.7314E-04	0.1097E-01	0.1530E-02	0.1137E-02	0.2920E-03	0.3356E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2960E-01	0.5900E+00	0.1000E+0
1090	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.7515E-02	0.5900E+00	0.1000E+0
1091	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1600E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1092	0.0000E+00	0.5163E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1093	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1322E-01	0.5900E+00	0.1000E+0
1094	0.0000E+00	0.1073E-01	0.8753E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1095	0.4569E-04	0.4662E-01	0.2952E-03	0.7511E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1327E-01	0.5900E+00	0.1000E+0
1096	0.4566E-03	0.3873E-01	0.1033E-02	0.3224E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1372E-01	0.5900E+00	0.1000E+0
1097	0.3285E-02	0.1517E-01	0.1495E-03	0.1305E-03	0.6244E-02	0.1977E-02	0.6553E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.9732E-02	0.5900E+00	0.1000E+0
1098	0.3125E-02	0.1553E-01	0.1406E-03	0.1241E-03	0.6114E-02	0.1903E-02	0.6214E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.9666E-02	0.5900E+00	0.1000E+0
1099	0.2793E-02	0.1626E-01	0.1307E-03	0.1122E-03	0.5763E-02	0.1782E-02	0.5519E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.1025E-01	0.5900E+00	0.1000E+0

EXHIBIT 3-24 Continued.

1100	0.9670E-03	0.5996E-01	0.1480E-03	0.9458E-04	0.0000E+00	0.2672E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.2936E-05	0.6401E-03	0.5900E+00	0.1000E+0
1101	0.1507E-02	0.3926E-01	0.8700E-03	0.1068E-02	0.2571E-03	0.9695E-03	0.1398E-02	0.0000E+00	0.0000E+00	0.1028E-04	0.8202E-02	0.5900E+00	0.1000E+0
1103	0.1426E-01	0.4278E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1104	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2270E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1105	0.0000E+00	0.1665E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1665E-01	0.5900E+00	0.1000E+0
1106	0.0000E+00	0.1959E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1959E-01	0.5900E+00	0.1000E+0
1107	0.1784E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1784E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1108	0.1388E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1388E-01	0.5900E+00	0.1000E+0
1109	0.1885E-01	0.1885E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1110	0.0000E+00	0.2737E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1369E-01	0.5900E+00	0.1000E+0
1111	0.0000E+00	0.1074E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5369E-01	0.5900E+00	0.1000E+0
1112	0.0000E+00	0.0000E+00	0.7900E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1114	0.7802E-02	0.3121E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.7802E-02	0.5900E+00	0.1000E+0
1115	0.0000E+00	0.2466E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1233E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1116	0.0000E+00	0.3384E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.8460E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1118	0.0000E+00	0.1491E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1491E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1119	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6501E-02	0.5900E+00	0.1000E+0
1120	0.0000E+00	0.3840E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3840E-01	0.5900E+00	0.1000E+0
1121	0.0000E+00	0.0000E+00	0.9247E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.8377E-02	0.5900E+00	0.1000E+0
1122	0.0000E+00	0.0000E+00	0.1664E-01	0.8320E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1123	0.0000E+00	0.5990E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1124	0.0000E+00	0.6114E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1125	0.0000E+00	0.1468E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.2936E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1126	0.0000E+00	0.1885E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.9423E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1127	0.0000E+00	0.2665E-01	0.0000E+00	0.6163E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1128	0.0000E+00	0.2981E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.7453E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1129	0.5941E-02	0.5941E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1130	0.0000E+00	0.3243E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1131	0.0000E+00	0.6549E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1132	0.9988E-02	0.1998E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2620E-01	0.5900E+00	0.1000E+0
1134	0.0000E+00	0.9419E-02	0.9419E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.9988E-02	0.5900E+00	0.1000E+0
1135	0.0000E+00	0.2698E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1349E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1136	0.0000E+00	0.3219E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1137	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1138	0.0000E+00	0.8873E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1065E-01	0.5900E+00	0.1000E+0
1139	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3549E-01	0.5900E+00	0.1000E+0
1140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3330E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1141	0.1041E-01	0.1041E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2173E-01	0.5900E+00	0.1000E+0
1142	0.1018E-01	0.5092E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1041E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1144	0.0000E+00	0.2774E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1145	0.7802E-02	0.3121E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1387E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1146	0.0000E+00	0.5397E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.7802E-02	0.5900E+00	0.1000E+0
1147	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1148	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1468E-01	0.0000E+00	0.5900E+00	0.1000E+0
1149	0.0000E+00	0.2700E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3121E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1150	0.1162E-01	0.1162E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1350E-01	0.5900E+00	0.1000E+0
1151	0.0000E+00	0.2497E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.8323E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1162E-01	0.5900E+00	0.1000E+0
1152	0.0000E+00	0.1314E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1314E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1153	0.8462E-02	0.0000E+00	0.8462E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1154	0.2773E-01	0.1849E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1155	0.0000E+00	0.3403E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1134E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1158	0.0000E+00	0.0000E+00	0.0000E+00	0.9419E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1159	0.0000E+00	0.8123E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1160	0.0000E+00	0.2774E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1387E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4061E-01	0.5900E+00	0.1000E+0
1162	0.0000E+00	0.7028E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1163	0.0000E+00	0.7045E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1164	0.0000E+00	0.0000E+00	0.0000E+00	0.9419E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1165	0.0000E+00	0.7061E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1166	0.5497E-03	0.1001E-01	0.6921E-03	0.5813E-02	0.2198E-03	0.6097E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1211E-01	0.5900E+00	0.1000E+0
1167													

EXHIBIT 3-24 Continued.

1168	0.2936E-01	0.1468E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1171	0.0000E+00	0.1722E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1722E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1172	0.0000E+00	0.2700E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1173	0.0000E+00	0.3444E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1350E-01	0.5900E+00	0.1000E+0
1174	0.0000E+00	0.0000E+00	0.0000E+00	0.9419E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1722E-01	0.5900E+00	0.1000E+0
1175	0.0000E+00	0.5397E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1176	0.0000E+00	0.0000E+00	0.5742E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1178	0.1138E-02	0.2111E-01	0.1670E-02	0.4511E-02	0.0000E+00	0.2994E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1148E-01	0.5900E+00	0.1000E+0
1185	0.1268E-02	0.2906E-01	0.1445E-02	0.1353E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1718E-02	0.5900E+00	0.1000E+0
1186	0.8297E-03	0.5025E-01	0.4688E-03	0.5948E-03	0.1542E-03	0.1589E-02	0.1551E-02	0.0000E+00	0.0000E+00	0.1468E-04	0.4111E-02	0.5900E+00	0.1000E+0
1187	0.0000E+00	0.2065E-01	0.3113E-02	0.3884E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6657E-03	0.5900E+00	0.1000E+0
1188	0.0000E+00	0.1762E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2161E-01	0.0000E+00	0.3632E-04	0.5900E+00	0.1000E+0
1189	0.5802E-02	0.4783E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.6976E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1020E-04	0.5900E+00	0.1000E+0
1190	0.8610E-03	0.2636E-01	0.2574E-02	0.3106E-02	0.0000E+00	0.2392E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2100E-02	0.5900E+00	0.1000E+0
1191	0.3198E-04	0.4318E-01	0.1916E-04	0.0000E+00	0.0000E+00	0.5689E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1158E-01	0.5900E+00	0.1000E+0
1192	0.3189E-03	0.5192E-01	0.2481E-02	0.2207E-03	0.0000E+00	0.1127E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1513E-05	0.5900E+00	0.1000E+0
1193	0.4322E-03	0.6119E-01	0.5412E-03	0.6153E-03	0.0000E+00	0.3181E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1681E-03	0.5900E+00	0.1000E+0
1194	0.7864E-03	0.3472E-01	0.2138E-02	0.2084E-02	0.0000E+00	0.5941E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1641E-02	0.5900E+00	0.1000E+0
1195	0.9725E-04	0.1803E-01	0.9661E-03	0.3875E-03	0.0000E+00	0.1112E-03	0.1605E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.5796E-02	0.5900E+00	0.1000E+0
1196	0.6455E-04	0.9053E-02	0.8688E-04	0.9422E-04	0.0000E+00	0.5274E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1025E-01	0.5900E+00	0.1000E+0
1197	0.0000E+00	0.7003E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1198	0.0000E+00	0.6930E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1199	0.0000E+00	0.6930E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1200	0.0000E+00	0.7130E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
1201	0.1528E-02	0.2685E-01	0.1697E-02	0.1366E-03	0.2867E-02	0.1338E-02	0.7970E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.5232E-02	0.5900E+00	0.1000E+0
1202	0.1177E-02	0.3553E-01	0.4216E-03	0.2589E-02	0.0000E+00	0.1278E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.1468E-05	0.9133E-02	0.5900E+00	0.1000E+0
1203	0.1492E-02	0.3250E-01	0.9969E-03	0.1259E-02	0.4996E-03	0.6162E-03	0.2998E-02	0.0000E+00	0.0000E+00	0.2496E-04	0.9780E-02	0.5900E+00	0.1000E+0
1204	0.6928E-03	0.5398E-01	0.1063E-02	0.5785E-03	0.0000E+00	0.1036E-02	0.1070E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.9972E-03	0.5900E+00	0.1000E+0
9001	0.7848E-03	0.2574E-01	0.2369E-03	0.1931E-03	0.5058E-02	0.0000E+00	0.5954E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.2492E-01	0.5900E+00	0.1000E+0
9002	0.4659E-02	0.8841E-02	0.1085E-05	0.1774E-05	0.2565E-02	0.1791E-04	0.5173E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.3380E-01	0.5900E+00	0.1000E+0
9003	0.1916E-02	0.2266E-01	0.5098E-03	0.7699E-04	0.8201E-03	0.4782E-03	0.2289E-02	0.6086E-03	0.2431E-03	0.0000E+00	0.1896E-01	0.5900E+00	0.1000E+0
9004	0.2226E-02	0.1758E-01	0.6320E-03	0.4792E-04	0.3293E-03	0.5606E-03	0.3213E-02	0.9114E-03	0.3907E-04	0.0000E+00	0.1821E-01	0.5900E+00	0.1000E+0
9005	0.9223E-02	0.7203E-02	0.4605E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.3200E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
9006	0.0000E+00	0.5163E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
9007	0.0000E+00	0.2415E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5119E-03	0.0000E+00	0.0000E+00	0.2676E-01	0.5900E+00	0.1000E+0
9008	0.0000E+00	0.1762E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2161E-01	0.0000E+00	0.3632E-04	0.5900E+00	0.1000E+0
9009	0.2734E-03	0.1889E-01	0.9334E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.2396E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.3041E-01	0.5900E+00	0.1000E+0
9010	0.3848E-04	0.1028E-01	0.1022E-02	0.5683E-03	0.1469E-03	0.1678E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3976E-01	0.5900E+00	0.1000E+0
9011	0.9072E-03	0.4321E-01	0.8465E-04	0.5470E-03	0.5328E-03	0.0000E+00	0.3066E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.1690E-01	0.5900E+00	0.1000E+0
9012	0.4426E-03	0.4248E-01	0.4775E-04	0.1790E-04	0.2957E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1819E-01	0.5900E+00	0.1000E+0
9013	0.5802E-02	0.4783E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.6976E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1020E-04	0.5900E+00	0.1000E+0
9014	0.8035E-02	0.4499E-01	0.1294E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2240E-02	0.5900E+00	0.1000E+0
9015	0.0000E+00	0.2533E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4004E-01	0.5900E+00	0.1000E+0
9016	0.2503E-03	0.4267E-01	0.6640E-03	0.1987E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1349E-01	0.5900E+00	0.1000E+0
9017	0.6672E-04	0.9972E-02	0.1070E-02	0.9443E-04	0.0000E+00	0.1176E-04	0.6583E-03	0.2228E-02	0.4645E-03	0.0000E+00	0.6871E-02	0.5900E+00	0.1000E+0
9021	0.4757E-04	0.3644E-01	0.7722E-03	0.5794E-03	0.0000E+00	0.1206E-02	0.0000E+00	0.1039E-02	0.7228E-03	0.0000E+00	0.4277E-02	0.5900E+00	0.1000E+0
9022	0.1514E-02	0.1653E-01	0.3256E-05	0.2826E-05	0.0000E+00	0.0000E+00	0.3340E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.3948E-01	0.5900E+00	0.1000E+0
9023	0.6062E-04	0.3554E-01	0.8191E-04	0.4606E-03	0.0000E+00	0.1610E-02	0.0000E+00	0.1486E-02	0.1033E-02	0.0000E+00	0.5502E-02	0.5900E+00	0.1000E+0
9024	0.0000E+00	0.4697E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2489E-01	0.5900E+00	0.1000E+0
9025	0.4079E-03	0.5899E-01	0.1653E-03	0.5476E-04	0.1396E-03	0.1101E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5582E-02	0.5900E+00	0.1000E+0
9026	0.1516E-02	0.3543E-01	0.3379E-03	0.1127E-03	0.9091E-03	0.3341E-02	0.8913E-04	0.2341E-03	0.0000E+00	0.0000E+00	0.1001E-01	0.5900E+00	0.1000E+0
9027	0.4186E-03	0.4311E-01	0.1286E-02	0.1554E-02	0.0000E+00	0.1166E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5530E-02	0.5900E+00	0.1000E+0
9028	0.2701E-02	0.2550E-01	0.7216E-03	0.5060E-03	0.7517E-03	0.2879E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.2158E-03	0.5904E-02	0.5900E+00	0.1000E+0
9029	0.0000E+00	0.4820E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.6240E-02	0.5900E+00	0.1000E+0
9030	0.0000E+00	0.7030E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
9031	0.8063E-02	0.5517E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
9032	0.0000E+00	0.8719E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.3845E-01	0.5900E+00	0.1000E+0
9033	0.1058E-02	0.6339E-02	0.4431E-02	0.4302E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
9034	0.2775E-02	0.1420E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1589E-01	0.5900E+00	0.1000E+0
9035	0.5317E-02	0.2983E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.9636E-02	0.5900E+00	0.1000E+0

EXHIBIT 3-24 Continued.

9036	0.0000E+00	0.2173E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.1110E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
9037	0.0000E+00	0.2981E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.7453E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
9038	0.0000E+00	0.8106E-02	0.1975E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.4287E-02	0.5900E+00	0.1000E+0
9039	0.0000E+00	0.0000E+00	0.5742E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1148E-01	0.5900E+00	0.1000E+0
9040	0.0000E+00	0.6122E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
9041	0.0000E+00	0.1817E-01	0.0000E+00	0.0000E+00	0.8325E-02	0.1124E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
9042	0.0000E+00	0.7046E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.5900E+00	0.1000E+0
9043	0.0000E+00	0.3071E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.6746E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.8609E-02	0.5900E+00	0.1000E+0
9044	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.7439E-02	0.5900E+00	0.1000E+0
9046	0.1427E-01	0.1813E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.5872E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.2936E-02	0.0000E+00	0.5900E+00	0.1000E+0
9047	0.2550E-02	0.1132E-01	0.0000E+00	0.9601E-03	0.0000E+00	0.1301E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.2530E-01	0.5900E+00	0.1000E+0

EXHIBIT 3-24 Concluded.

TABLE 3-17. Hydrocarbon speciation profiles file (unit 14) used by the CENTEMS program. (See Exhibit 3-25)

Line	Variable	Columns	Type	Description
1+	KA(1-2)	1-8	I	Either Source Classification Code (SCC) or NAPAP Source Category code
	KA(3)	9-12	I	Hydrocarbon speciation profile code

```
11185
21185
30002
40001
50195
61084
71178
81178
90002
100001
110003
121084
131185
141185
150005
160002
170001
180003
191084
200004
210122
220122
230122
240121
250121
.
.
.
503001020122
503001030000
503001040122
503001050121
503001060000
503001070122
503001089022
503001090122
503002010121
503002020122
503002039022
503002049022
503005019022
503005060122
503006010079
503006029022
503006039022
503007019022
503008019022
503008109022
503008209022
503009010000
503900050000
503900060000
503900100000
102001041185
406002341190
```

EXHIBIT 3-25. Example of hydrocarbon speciation profiles input to CENTEMS.

TABLE 3-18. Diurnal variation factors file (unit 15) used by the CENTEMS program. (See Exhibit 3-26)

Line	Variable	Columns	Type	Description
1+	INDY	1-5	I	Diurnal code
	DAYFAC	7-54	R	Array of 24 hourly activity factors
	TDYFAC	55-58	R	Total daily activity, used to normalize DAYFAC

```
 1  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  8
 2  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  8
 3  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  8
 4  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  8
 5  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  8
 6  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  8
 7  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  8
 8  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  8
 9  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  8
10  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  8
11  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  8
12  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  8
13  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 16
14  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 16
15  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 16
16  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 16
17  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 16
18  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 16
19  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 16
20  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 24
21  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 24
22  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 24
23  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 24
24  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 24
26  0 0 0 0 0 0 0 0 0212121212121212121212121212121215454402  uts,MVelc,16hr
27 2323232323231515151515151515151515151515151515151515232342 4  uts,MVelc,24hr
31  3 1 1 1 1 1 1 5 5 5 5 5 5 5 5 5 5101010101 7 7 3116
33  2 2 2 2 2 2 21010 6 6 5 5 5 5 5 5 5 5101010101 2128
34  0 8 8 8 8101010101 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 72
35 10 1 1 1 1 1 1 8 8101010101010101010101010101010101010182
37  0 0 0 0 0 1 3 6 9101010101010101010 9 6 3 1 0 0 0118
38  0 0 0 0 0 2 6 6 2 2 1 2 4 4 2 1 1 310 8 7 6 1 0 68
40  0 0 0 0 2 3 4 4 4 4 4 4 3 3 2 2 1 1 0 0 0 0 0 0 41  JEG DIURNAL
41  0 0 0 0 0 0185923 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0100  JEG AM PEAK
42  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0283735 0 0 0 0 0 0100  JEG PM PEAK
43 1411 3 2 41927 050788894999399 3 3 3987050443314999  JEG WDY OFFPK
44  8 8 2 1 1 4123648547072716875768478655642352 5 8999  JEG WEN OFFPK
48  9 1 1 1 1 7 93243519784898078778972444241202 0 8996  MV WKEND
50  1 1 1 1 1 1 610 6 5 5 5 5 5 5 610 8 6 4 1 1 1 1 96  MV WKDAY
51  0 0 0 0 0 0 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0  6
52  0 0 0 0 0 1 61010101010 6 3 3 3 3 4 4 0 0 0 0 0 83
53  0 0 0 0 0 0 0 2 2 2 2 2 0 1 0 0 0 0 0 0 0 0 0 0 11
55  0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 22
56  0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 23
57  0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 21
58  0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 19
59  0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 20
60  0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 12
61  0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 18
62  0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 10
63  0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 11
64  0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 17
65  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0  9
66  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 13
67  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 14
68  0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 15
69  0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0  7
```

EXHIBIT 3-26. Example of diurnal variation factors file input to CENTEMS.

TABLE 3-19. Weekday variation factors file (unit 16) used by the CENTEMS program. (See Exhibit 3-27)

Line	Variable	Columns	Type	Description
1+	INWEK	1-5	I	Weekday code
	WEKFAC	7-20	R	Array of 7 weekday activity factors (ordered Monday through Sunday)
	TWKFAC	21-22	R	Total weekday activity, used to normalize WEKFAC

```
 1   1 1 1 1 1 0 0 5
 2   0 0 0 0 0 1 1 2
 3   1 1 1 1 1 0 0 5
 4   1 1 1 1 1 0 0 5
 5   1 1 1 1 1 0 0 5
 6   1 1 1 1 1 1 0 6
 7   1 1 1 1 1 1 1 7
13   4 4 4 4 4 3 326
21   1 1 1 1 1 2 2 9
22 1010101010 7 461
23   5 5 5 5 5 4 433
```

EXHIBIT 3-27. Example of weekday variation factors file input to CENTEMS.

TABLE 3-20. Emissions input file (merf) (unit 17) created by PREPNT or GRDEMS and used by the CENTEMS program. (See Exhibits 3-5 and 3-21)

Line	Variable	Columns	Type	Description
1+	ISRG	1-3	I	Gridded surrogate code (not used, skipped)
	IFIP	4-8	I	FIPS state/county code (not used, skipped)
	SIC	9-12	R	Either Source Industrial Classification or NAPAP Source Category code
	PS	13-20	A	Either Standard Classification Code or NAPAP Source Category code
	ICL	21-23	I	I coordinate of grid cell
	JCL	24-26	I	J coordinate of grid cell
	IYR	27-28	I	Year, two digits (e.g., 89 for 1989)
	IDYCOD	29-30	I	Diurnal variation code
	IWKCOD	31-32	I	Weekday variation code
	FID	33-41	A	Facility ID
	FST	42-46	A	Stack ID
	FCNTY	47-52	I	AEROS state/county code
		53-56	-	(Not used, skipped)
	VMNTH	57-116	R	Array of 12 monthly factors
	CO	117-126	R	CO annually averaged emissions
	CNO	127-136	R	NO_x annually averaged emissions
	SOX	137-146	R	SO_x annually averaged emissions
	THC	147-156	R	TOC annually averaged emissions
	PM	157-166	R	PM annually averaged emissions
		167-168	-	(Not used, skipped)
	SLBL	169-175	A	Scenario label (not used, skipped)

```
input file:
in.centarea.at185
output (l.) file:
msg.centarea.at185
```

EXHIBIT 3-28. Example of message file output from CENTEMS.

```
 grid offset is (     0,     0)
  grid cell scaling is (  1,  1)
 0   control code factors on input
          142 code gloss blks read with   118 records each

REGION
        0.        0.        16
   660000.  3665000.
     4000.     4000.
        40        40         5
         2         3        0.       50.      150.
END
****** number of ces codes read are       3515

 11   day of week factors read
 57   diurnal factors read

***** number of lines read is      51323


***** Total of input emissions *****
     CO: 3.035E+05
    NOx: 7.332E+04
    SOx: 1.007E+04
    THC: 2.846E+05
    TSP: 3.028E+04



    368 records skipped, zero emissions...


  Temporal and control code factors applied ---PRE-speciated input totals (kg/day)

   Control
    code       NOx          THC          SOx          CO          TSP
      99    7.802E+03    3.314E+04    4.190E+02    6.061E+04    1.278E+04
     101    4.715E+01    5.330E+00    1.222E+02    7.740E+00    1.143E+01
     102    1.046E+02    9.150E+00    1.344E+01    1.636E+01    1.345E+01
     107    4.462E+03    1.122E+02    6.958E+00    7.860E+02    3.669E+01
     114    6.963E+02    2.409E+01    1.783E+03    1.504E+02    1.154E+02
     122    2.082E+02    4.683E+03    3.693E+01    1.628E+04    0.000E+00
     303    0.000E+00    1.665E+04    0.000E+00    0.000E+00    0.000E+00
     304    0.000E+00    1.499E+03    0.000E+00    0.000E+00    0.000E+00
     308    0.000E+00    1.028E+03    0.000E+00    0.000E+00    0.000E+00
```

EXHIBIT 3-28. Continued.

CENTEMS

310	0.000E+00	1.560E+04	0.000E+00	0.000E+00	0.000E+00
312	0.000E+00	3.674E+04	0.000E+00	0.000E+00	0.000E+00
314	0.000E+00	1.084E+04	0.000E+00	0.000E+00	0.000E+00
318	0.000E+00	1.310E+04	0.000E+00	0.000E+00	0.000E+00
319	0.000E+00	1.330E+04	0.000E+00	0.000E+00	0.000E+00
320	0.000E+00	4.519E+03	0.000E+00	0.000E+00	0.000E+00
323	0.000E+00	1.143E+04	0.000E+00	0.000E+00	0.000E+00
333	0.000E+00	6.775E+02	0.000E+00	0.000E+00	0.000E+00
398	0.000E+00	3.573E+04	0.000E+00	0.000E+00	0.000E+00
399	0.000E+00	8.902E+04	0.000E+00	0.000E+00	0.000E+00
401	0.000E+00	2.588E+03	0.000E+00	0.000E+00	0.000E+00
403	0.000E+00	1.844E+04	0.000E+00	0.000E+00	0.000E+00
410	0.000E+00	1.094E+04	0.000E+00	0.000E+00	0.000E+00
501	0.000E+00	9.879E+03	0.000E+00	0.000E+00	0.000E+00
514	0.000E+00	2.689E+03	0.000E+00	0.000E+00	0.000E+00
515	0.000E+00	1.852E+04	0.000E+00	0.000E+00	0.000E+00
602	0.000E+00	2.957E+02	0.000E+00	0.000E+00	0.000E+00
719	5.228E+03	1.894E+04	2.162E+02	1.185E+05	7.260E+02
759	1.776E+04	3.020E+03	1.476E+03	5.405E+03	1.959E+03
806	1.734E+04	4.405E+03	2.671E+03	6.091E+03	1.173E+03
807	3.174E+02	1.031E+03	3.820E+01	1.646E+04	6.191E+01
808	8.626E+03	8.189E+03	9.348E+02	2.439E+04	1.224E+03
901	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
902	2.361E+01	1.348E+02	0.000E+00	8.865E+02	1.089E+02
999	1.595E+01	3.242E+02	7.020E+00	1.465E+01	4.220E+02
TOTAL	6.263E+04	3.511E+05	7.725E+03	2.496E+05	1.863E+04

*** Cksum : 6801 on 576000 data points

EXHIBIT 3-28. Continued.

C.E.S. emissions inventory by activity category for 0 hour

Cat	NOx	THC	SOx	CO	PART	OLE	PAR	TOL	XYL	FORM	ALD2	ETH	MEOH	ETOH	ISOP	RHC
200	6.97E+01	1.76E+00	1.09E-01	1.23E+01	5.73E-01	0.0E+00	5.7E-01	4.3E-02	0.0E+00	7.5E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.84E-01
213	0.00E+00	3.30E+01	0.00E+00	0.00E+00	0.00E+00	2.2E+00	1.3E+01	2.1E+00	3.6E-01	4.7E-01	5.5E-01	2.6E+00	3.5E-01	2.8E-01	0.0E+00	2.21E+01
242	0.00E+00	9.67E+01	0.00E+00	0.00E+00	0.00E+00	8.0E+00	3.2E+01	7.9E+00	6.9E-01	5.9E-01	2.0E+00	1.2E+01	1.6E+00	1.4E-01	0.0E+00	6.40E+01
245	0.00E+00	4.55E+02	0.00E+00	0.00E+00	0.00E+00	3.8E+01	1.5E+02	3.7E+01	3.2E+00	2.8E+00	9.5E+00	5.4E+01	7.7E+00	6.6E-01	0.0E+00	3.01E+02
261	0.00E+00	4.28E+02	0.00E+00	0.00E+00	0.00E+00	5.8E+00	2.8E+02	2.2E+00	9.4E-01	1.9E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.08E+02
293	0.00E+00	6.56E+01	0.00E+00	0.00E+00	0.00E+00	2.6E-02	2.9E+01	2.8E+01	6.1E+00	0.0E+00	1.1E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.45E+01
300	4.03E+01	2.01E+00	2.60E+01	8.15E+00	2.56E+00	5.7E-05	7.2E-01	4.3E-02	9.0E-04	1.5E-01	1.5E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.11E-01
310	6.32E+00	5.56E-01	5.65E+00	1.00E+00	1.04E+00	0.0E+00	2.2E-01	9.3E-03	0.0E+00	6.6E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.97E-01
320	0.00E+00	9.04E+02	0.00E+00	0.00E+00	0.00E+00	2.1E+01	3.2E+02	2.2E+02	3.1E+02	0.0E+00	5.9E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.78E+02
321	0.00E+00	1.20E+02	0.00E+00	0.00E+00	0.00E+00	1.4E+00	1.0E+02	2.0E+00	7.6E-01	2.4E-01	3.8E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.10E+02
330	0.00E+00	1.30E+01	0.00E+00	0.00E+00	0.00E+00	6.0E-01	3.3E+00	4.5E-03	4.5E-03	0.0E+00	0.0E+00	1.3E+00	0.0E+00	0.0E+00	0.0E+00	5.18E+00
334	0.00E+00	1.65E+01	0.00E+00	0.00E+00	0.00E+00	7.6E-01	4.1E+00	5.7E-03	5.7E-03	0.0E+00	0.0E+00	1.7E+00	0.0E+00	0.0E+00	0.0E+00	6.59E+00
420	7.22E+02	1.62E+02	1.11E+02	2.54E+02	4.89E+01	9.0E+00	7.9E+01	3.5E+01	3.2E+00	8.4E+00	7.9E+00	4.7E+00	0.0E+00	0.0E+00	0.0E+00	1.47E+02
440	4.51E+01	3.44E+01	4.84E+00	1.23E+02	2.07E+00	3.9E+00	9.6E+00	6.1E-01	6.1E-01	3.8E+00	2.4E+00	7.7E+00	0.0E+00	0.0E+00	0.0E+00	2.85E+01
510	4.88E+01	2.59E+00	2.34E+00	9.86E+00	1.60E+00	0.0E+00	7.9E-02	0.0E+00	0.0E+00	2.5E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.03E-01
631	1.76E+01	4.41E+01	2.24E+00	8.28E+01	3.53E+01	5.1E+00	1.2E+01	8.1E-01	8.1E-01	4.8E+00	3.1E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	3.66E+01
900	7.55E+00	7.61E+01	2.92E-01	2.92E+02	8.46E+01	3.5E+00	4.0E+01	8.9E-01	5.6E-01	1.4E-01	5.1E-01	1.3E+01	9.4E-02	1.3E-01	6.3E-02	5.94E+01
TOTL	9.58E+02	2.45E+03	1.53E+02	7.83E+02	1.77E+02	9.9E+01	1.1E+03	3.4E+02	3.2E+02	4.1E+01	3.7E+01	1.1E+02	9.8E+00	1.2E+00	6.3E-02	2.03E+03

EXHIBIT 3-28. Continued.

CENTEMS

C.E.S. emissions inventory by activity category for 2300 hour

Cat	NOx	THC	SOx	CO	PART	OLE	PAR	TOL	XYL	FORM	ALD2	ETH	MEOH	ETOH	ISOP	RHC
200	6.97E+01	1.76E+00	1.09E-01	1.23E+01	5.73E-01	0.0E+00	5.7E-01	4.3E-02	0.0E+00	7.5E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.84E-01
213	0.00E+00	3.30E+01	0.00E+00	0.00E+00	0.00E+00	2.2E+00	1.3E+01	2.1E+00	3.6E-01	4.7E-01	5.5E-01	2.6E+00	3.5E-01	2.8E-01	0.0E+00	2.21E+01
242	0.00E+00	9.67E+01	0.00E+00	0.00E+00	0.00E+00	8.0E+00	3.2E+01	7.9E+00	6.9E-01	5.9E-01	2.0E+00	1.2E+01	1.6E+00	1.4E-01	0.0E+00	6.40E+01
245	0.00E+00	4.55E+02	0.00E+00	0.00E+00	0.00E+00	3.8E+01	1.5E+02	3.7E+01	3.2E+00	2.8E+00	9.5E+00	5.4E+01	7.7E+00	6.6E-01	0.0E+00	3.01E+02
261	0.00E+00	4.28E+02	0.00E+00	0.00E+00	0.00E+00	5.8E+00	2.8E+02	2.2E+00	9.4E-01	1.9E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.08E+02
293	0.00E+00	6.56E+01	0.00E+00	0.00E+00	0.00E+00	2.6E-02	2.9E+01	2.8E+01	6.1E+00	0.0E+00	1.1E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.45E+01
300	4.03E+01	2.01E+00	2.60E+01	8.15E+00	2.56E+00	5.7E-05	7.2E-01	4.3E-02	9.0E-04	1.5E-01	1.5E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.11E-01
310	6.32E+00	5.56E-01	5.65E+00	1.00E+00	1.04E+00	0.0E+00	2.2E-01	9.3E-03	0.0E+00	6.6E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.97E-01
320	0.00E+00	9.04E+02	0.00E+00	0.00E+00	0.00E+00	2.1E+01	3.2E+02	2.2E+02	3.1E+02	0.0E+00	5.9E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.78E+02
321	0.00E+00	1.20E+02	0.00E+00	0.00E+00	0.00E+00	1.4E+00	1.0E+02	2.0E+00	7.6E-01	2.4E-01	3.8E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.10E+02
330	0.00E+00	1.30E+01	0.00E+00	0.00E+00	0.00E+00	6.0E-01	3.3E+00	4.5E-03	4.5E-03	0.0E+00	0.0E+00	1.3E+00	0.0E+00	0.0E+00	0.0E+00	5.18E+00
334	0.00E+00	1.65E+01	0.00E+00	0.00E+00	0.00E+00	7.6E-01	4.1E+00	5.7E-03	5.7E-03	0.0E+00	0.0E+00	1.7E+00	0.0E+00	0.0E+00	0.0E+00	6.59E+00
420	7.22E+02	1.62E+02	1.11E+02	2.54E+02	4.89E+01	9.0E+00	7.9E+01	3.5E+01	3.2E+00	8.4E+00	7.9E+00	4.7E+00	0.0E+00	0.0E+00	0.0E+00	1.47E+02
440	4.51E+02	3.44E+02	4.84E+01	1.23E+03	2.07E+01	3.9E+01	9.6E+01	6.1E+00	6.1E+00	3.8E+01	2.4E+01	7.7E+01	0.0E+00	0.0E+00	0.0E+00	2.85E+02
510	4.88E+01	2.59E+00	2.34E+00	9.86E+00	1.60E+00	0.0E+00	7.9E-02	0.0E+00	0.0E+00	2.5E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.03E-01
631	1.76E+01	4.41E+01	2.24E+00	8.28E+01	3.53E+01	5.1E+00	1.2E+01	8.1E-01	8.1E-01	4.8E+00	3.1E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	3.66E+01
900	7.55E+00	7.61E+01	2.92E-01	2.92E+02	8.46E+01	3.5E+00	4.0E+01	8.9E-01	5.6E-01	1.4E-01	5.1E-01	1.3E+01	9.4E-02	1.3E-01	6.3E-02	5.94E+01
TOTL	1.36E+03	2.76E+03	1.96E+02	1.89E+03	1.95E+02	1.3E+02	1.2E+03	3.4E+02	3.3E+02	7.5E+01	5.8E+01	1.8E+02	9.8E+00	1.2E+00	6.3E-02	2.29E+03

EXHIBIT 3-28. Continued.

Total C.E.S. emissions in kg/day by activity category

Cat	NOx	THC	SOx	CO	PART	OLE	PAR	TOL	XYL	FORM	ALD2	ETH	MEOH	ETOH	ISOP	RHC
111	7.94E+01	6.39E+02	0.00E+00	3.73E+03	5.60E+02	2.7E+01	3.5E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	5.00E+02
140	0.00E+00	1.14E+04	0.00E+00	0.00E+00	0.00E+00	0.0E+00	4.4E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.43E+03
200	4.66E+03	7.75E+03	3.24E+01	4.40E+03	6.29E+02	1.8E+02	3.9E+03	1.2E+03	5.4E+02	4.8E+00	3.9E+01	7.8E+02	0.0E+00	0.0E+00	0.0E+00	6.65E+03
213	0.00E+00	7.92E+02	0.00E+00	0.00E+00	0.00E+00	5.3E+01	3.1E+02	5.0E+01	8.5E+00	1.1E+01	1.3E+01	6.4E+01	8.4E+00	6.7E+00	0.0E+00	5.29E+02
220	0.00E+00	1.78E+04	0.00E+00	0.00E+00	0.00E+00	7.0E+00	8.0E+03	7.6E+03	1.7E+03	0.0E+00	2.9E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.75E+04
241	0.00E+00	2.14E+04	0.00E+00	0.00E+00	0.00E+00	4.8E+03	1.3E+04	2.7E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.08E+04
242	0.00E+00	2.32E+03	0.00E+00	0.00E+00	0.00E+00	1.9E+02	7.6E+02	1.9E+02	1.6E+01	1.4E+01	4.8E+01	2.8E+02	3.9E+01	3.4E+00	0.0E+00	1.54E+03
245	0.00E+00	1.09E+04	0.00E+00	0.00E+00	0.00E+00	9.0E+02	3.6E+03	9.0E+02	7.8E+01	6.7E+01	2.3E+02	1.3E+03	1.8E+02	1.6E+01	0.0E+00	7.23E+03
261	0.00E+00	1.03E+04	0.00E+00	0.00E+00	0.00E+00	1.4E+02	6.7E+03	5.3E+01	2.3E+01	4.7E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.40E+03
290	0.00E+00	3.24E+04	0.00E+00	0.00E+00	0.00E+00	2.2E+03	1.3E+04	2.0E+03	3.5E+02	4.6E+02	5.4E+02	2.6E+03	3.4E+02	2.8E+02	0.0E+00	2.16E+04
291	0.00E+00	3.03E+02	0.00E+00	0.00E+00	0.00E+00	0.0E+00	3.0E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.03E+02
292	0.00E+00	4.95E+03	0.00E+00	0.00E+00	0.00E+00	1.9E+00	2.2E+03	2.1E+03	4.6E+02	0.0E+00	7.9E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.87E+03
293	0.00E+00	1.57E+03	0.00E+00	0.00E+00	0.00E+00	6.1E-01	7.1E+02	6.7E+02	1.5E+02	0.0E+00	2.5E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.55E+03
294	0.00E+00	1.44E+03	0.00E+00	0.00E+00	0.00E+00	5.6E-01	6.5E+02	6.1E+02	1.3E+02	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.42E+03
295	0.00E+00	1.66E+03	0.00E+00	0.00E+00	0.00E+00	6.5E-01	7.5E+02	7.1E+02	1.5E+02	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.64E+03
300	2.62E+03	1.32E+04	1.68E+03	8.37E+02	2.51E+02	3.0E+02	6.5E+03	2.7E+03	3.0E+03	9.3E+00	2.2E+02	2.3E+01	0.0E+00	0.0E+00	0.0E+00	1.28E+04
310	1.52E+02	1.33E+01	1.36E+02	2.41E+01	2.49E+01	0.0E+00	5.3E+00	2.2E-01	0.0E+00	1.6E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.12E+00
320	0.00E+00	2.17E+04	0.00E+00	0.00E+00	0.00E+00	5.1E+02	7.8E+03	5.3E+03	7.3E+03	0.0E+00	1.4E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.11E+04
321	0.00E+00	2.87E+03	0.00E+00	0.00E+00	0.00E+00	3.4E+01	2.4E+03	4.8E+01	1.8E+01	5.8E+00	9.1E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.64E+03
330	0.00E+00	3.11E+02	0.00E+00	0.00E+00	0.00E+00	1.4E+01	7.8E+01	1.1E-01	1.1E-01	0.0E+00	0.0E+00	3.2E+01	0.0E+00	0.0E+00	0.0E+00	1.24E+02
332	0.00E+00	1.17E+04	0.00E+00	0.00E+00	0.00E+00	1.4E+01	9.2E+03	2.9E+01	0.0E+00	0.0E+00	2.4E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.25E+03
333	0.00E+00	4.36E+03	0.00E+00	0.00E+00	0.00E+00	2.7E+01	1.9E+03	1.3E+02	1.6E+02	0.0E+00	2.2E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.21E+03
334	0.00E+00	3.96E+02	0.00E+00	0.00E+00	0.00E+00	1.8E+01	9.9E+01	1.4E-01	1.4E-01	0.0E+00	0.0E+00	4.0E+01	0.0E+00	0.0E+00	0.0E+00	1.58E+02
410	2.30E+04	2.39E+04	1.69E+03	1.24E+05	2.69E+03	1.1E+03	1.1E+04	2.7E+03	3.1E+03	2.9E+02	5.0E+02	1.9E+03	0.0E+00	0.0E+00	3.8E+01	2.07E+04
420	1.73E+04	3.89E+03	2.67E+03	6.09E+03	1.17E+03	2.2E+02	1.9E+03	8.4E+02	7.7E+01	2.0E+02	1.9E+02	1.1E+02	0.0E+00	0.0E+00	0.0E+00	3.52E+03
430	2.08E+02	5.28E+03	3.69E+01	1.63E+04	0.00E+00	1.2E+02	3.8E+03	2.5E+02	3.6E+02	1.2E+01	2.4E+02	2.3E+02	0.0E+00	0.0E+00	5.5E+00	4.98E+03
440	8.52E+03	7.16E+03	9.19E+02	3.89E+04	4.38E+02	7.9E+02	2.0E+03	1.3E+02	1.3E+02	7.8E+02	4.9E+02	1.6E+03	0.0E+00	0.0E+00	0.0E+00	5.91E+03
510	5.46E+03	1.64E+04	5.00E+02	4.65E+04	9.99E+03	1.7E+03	9.2E+03	0.0E+00	0.0E+00	1.6E+00	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	1.38E+04
631	4.22E+02	1.06E+03	5.37E+01	1.99E+03	8.48E+02	1.2E+02	2.8E+02	1.9E+01	1.9E+01	1.2E+02	7.4E+01	2.4E+02	0.0E+00	0.0E+00	0.0E+00	8.78E+02
900	1.81E+02	8.80E+04	7.02E+00	7.00E+03	2.03E+03	7.7E+02	4.0E+04	3.3E+03	5.6E+02	2.9E+02	1.4E+02	3.1E+02	2.3E+00	2.3E+04	1.5E+00	6.84E+04
TOTL	6.26E+04	3.26E+05	7.73E+03	2.50E+05	1.86E+04	1.4E+04	1.6E+05	3.4E+04	1.8E+04	2.7E+03	3.4E+03	1.3E+04	5.8E+02	2.3E+04	4.5E+01	2.64E+05

EXHIBIT 3-28. Continued.

CENTEMS

C.E.S. emissions inventory by process category for 0 hour

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C.E.S. emissions inventory by process category for 2300 hour

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Total C.E.S. emissions in kg/day by process category

cat	NOx	THC	SOx	CO	PART	OLE	PAR	TOL	XYL	FORM	ALD2	ETH	MEOH	ETOH	ISOP	RHC
100	1.02E+04	4.07E+02	1.82E+03	1.94E+03	3.03E+02	3.6E-03	8.7E+01	5.5E+00	5.8E-02	1.6E+01	9.6E-04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.09E+02
141	1.52E+02	1.33E+01	1.36E+02	2.41E+01	2.49E+01	0.0E+00	5.3E+00	2.2E-01	0.0E+00	1.6E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.12E+00
210	4.48E+01	2.48E+03	2.55E+01	7.20E+03	8.87E+02	9.1E+00	7.6E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E+02	0.0E+00	0.0E+00	0.0E+00	3.23E+02
220	2.53E+03	1.50E+04	3.64E+02	4.26E+04	9.68E+03	1.9E+03	9.9E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	1.48E+04
221	7.94E+01	6.39E+02	0.00E+00	3.73E+03	5.60E+02	2.7E+01	3.5E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	5.00E+02
300	0.00E+00	6.84E+04	0.00E+00	0.00E+00	0.00E+00	0.0E+00	2.7E+04	0.0E+00	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	2.3E+04	0.0E+00	5.01E+04
310	0.00E+00	4.36E+03	0.00E+00	0.00E+00	0.00E+00	2.7E+01	1.9E+03	1.3E+02	1.6E+02	0.0E+00	2.2E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.21E+03
320	0.00E+00	6.47E+03	0.00E+00	0.00E+00	0.00E+00	3.4E+01	3.1E+03	1.2E+03	5.4E+02	0.0E+00	3.9E+01	5.6E+02	0.0E+00	0.0E+00	0.0E+00	5.47E+03
330	0.00E+00	3.75E+04	0.00E+00	0.00E+00	0.00E+00	9.8E+02	2.2E+04	8.7E+03	4.2E+03	0.0E+00	4.5E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.62E+04
350	0.00E+00	1.17E+04	0.00E+00	0.00E+00	0.00E+00	1.4E+01	9.2E+03	2.9E+01	0.0E+00	0.0E+00	2.4E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.25E+03
410	0.00E+00	2.87E+03	0.00E+00	0.00E+00	0.00E+00	3.4E+01	2.4E+03	4.8E+01	1.8E+01	5.8E+00	9.1E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.64E+03
500	0.00E+00	3.24E+04	0.00E+00	0.00E+00	0.00E+00	2.2E+03	1.3E+04	2.0E+03	3.5E+02	4.6E+02	5.4E+02	2.6E+03	3.4E+02	2.8E+02	0.0E+00	2.16E+04
510	0.00E+00	1.32E+04	0.00E+00	0.00E+00	0.00E+00	1.1E+03	4.3E+03	1.1E+03	9.4E+01	8.1E+01	2.8E+02	1.6E+03	2.2E+02	1.9E+01	0.0E+00	8.76E+03
520	0.00E+00	7.92E+02	0.00E+00	0.00E+00	0.00E+00	5.3E+01	3.1E+02	5.0E+01	8.5E+00	1.1E+01	1.3E+01	6.4E+01	8.4E+00	6.7E+00	0.0E+00	5.29E+02
530	0.00E+00	4.34E+04	0.00E+00	0.00E+00	0.00E+00	6.5E+02	1.9E+04	5.4E+03	7.4E+03	4.7E+02	1.4E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.29E+04
553	0.00E+00	3.88E+03	0.00E+00	0.00E+00	0.00E+00	1.5E+00	1.7E+03	1.7E+03	3.6E+02	0.0E+00	6.2E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.82E+03
560	0.00E+00	1.71E+04	0.00E+00	0.00E+00	0.00E+00	6.7E+00	7.7E+03	7.3E+03	1.6E+03	0.0E+00	2.7E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.68E+04
570	0.00E+00	2.14E+04	0.00E+00	0.00E+00	0.00E+00	4.8E+03	1.3E+04	2.7E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.08E+04
621	0.00E+00	7.07E+02	0.00E+00	0.00E+00	0.00E+00	3.3E+01	1.8E+02	2.4E-01	2.4E-01	0.0E+00	0.0E+00	7.2E+01	0.0E+00	0.0E+00	0.0E+00	2.82E+02
652	2.30E+04	2.39E+04	1.69E+03	1.24E+05	2.69E+03	1.1E+03	1.1E+04	2.7E+03	3.1E+03	2.9E+02	5.0E+02	1.9E+03	0.0E+00	0.0E+00	3.8E+01	2.07E+04
661	2.36E+01	1.50E+02	0.00E+00	8.86E+02	1.09E+02	6.3E+00	8.2E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E+01	0.0E+00	0.0E+00	0.0E+00	1.18E+02
662	1.42E+02	1.39E+03	0.00E+00	6.10E+03	1.50E+03	5.8E+01	7.6E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E+02	0.0E+00	0.0E+00	0.0E+00	1.09E+03
720	2.08E+02	5.28E+03	3.69E+01	1.63E+04	0.00E+00	1.2E+02	3.8E+03	2.5E+02	3.6E+02	1.2E+01	2.4E+02	2.3E+02	0.0E+00	0.0E+00	5.5E+00	4.98E+03
730	1.73E+04	3.89E+03	2.67E+03	6.09E+03	1.17E+03	2.2E+02	1.9E+03	8.4E+02	7.7E+01	2.0E+02	1.9E+02	1.1E+02	0.0E+00	0.0E+00	0.0E+00	3.52E+03
750	8.94E+03	8.22E+03	9.73E+02	4.08E+04	1.29E+03	9.2E+02	2.3E+03	1.5E+02	1.5E+02	9.0E+02	5.6E+02	1.8E+03	0.0E+00	0.0E+00	0.0E+00	6.79E+03
900	1.59E+01	2.89E+02	7.02E+00	1.47E+01	4.22E+02	2.0E+01	1.3E+02	2.1E+01	1.4E+01	3.4E+00	1.2E+01	1.2E+01	2.3E+00	3.1E+00	1.5E+00	2.21E+02
TOTL	6.26E+04	3.26E+05	7.73E+03	2.50E+05	1.86E+04	1.4E+04	1.6E+05	3.4E+04	1.8E+04	2.7E+03	3.4E+03	1.3E+04	5.8E+02	2.3E+04	4.5E+01	2.64E+05

EXHIBIT 3-28. Continued.

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C.E.S. emissions inventory by old category for      0 hour
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C.E.S. emissions inventory by old category for   2300 hour
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Total C.E.S. emissions in kg/day by old category
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C.E.S. emissions inventory by control category for      0 hour
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C.E.S. emissions inventory by control category for   2300 hour
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Total C.E.S. emissions in kg/day by control category
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C.E.S. emissions inventory by hc speciation code for      0 hour
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C.E.S. emissions inventory by hc speciation code for   2300 hour
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Total C.E.S. emissions in kg/day by hc speciation code
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EXHIBIT 3-28. Continued.

CENTEMS

Emissions of NOX at 100 hour

	1	2	3	4	5	6	7	8	9	10	11
40	7.60E+00	7.14E+00	6.68E+00	1.19E+01	1.10E+01	1.08E+01	1.01E+01	1.56E+01	1.21E+01	1.03E+01	1.03E+01
39	7.60E+00	7.14E+00	8.07E+00	1.09E+01	1.08E+01	1.37E+01	2.58E+01	3.82E+01	2.40E+01	2.40E+01	2.24E+01
38	7.03E+00	6.56E+00	9.61E+00	1.09E+01	1.05E+01	1.29E+01	2.89E+01	3.17E+01	3.30E+01	2.92E+01	2.98E+01
37	7.65E+00	8.76E+00	1.11E+01	1.16E+01	1.05E+01	1.05E+01	2.98E+01	3.08E+01	2.92E+01	2.92E+01	2.92E+01
36	1.18E+01	1.13E+01	1.13E+01	1.17E+01	1.21E+01	1.09E+01	2.00E+01	2.04E+01	1.88E+01	1.67E+01	1.50E+01
35	1.46E+01	1.19E+01	1.09E+01	1.09E+01	1.24E+01	1.01E+01	2.04E+01	1.47E+01	1.58E+01	1.58E+01	1.51E+01
34	3.12E+01	3.32E+01	3.17E+01	2.91E+01	3.00E+01	2.76E+01	1.46E+01	1.47E+01	1.58E+01	1.58E+01	1.59E+01
33	3.38E+01	3.59E+01	3.78E+01	3.57E+01	3.26E+01	2.84E+01	1.46E+01	1.46E+01	1.57E+01	1.59E+01	1.59E+01
32	2.82E+01	4.48E+01	4.93E+01	3.58E+01	3.29E+01	2.93E+01	1.46E+01	1.51E+01	1.57E+01	1.42E+01	3.30E+01
31	2.84E+01	3.37E+01	4.11E+01	3.31E+01	3.19E+01	2.39E+01	1.58E+01	1.51E+01	1.57E+01	1.69E+01	3.03E+01
30	2.40E+01	2.93E+01	3.78E+01	2.93E+01	2.93E+01	2.19E+01	1.53E+01	1.45E+01	1.53E+01	1.53E+01	3.90E+01
29	2.16E+01	2.16E+01	2.22E+01	2.24E+01	2.24E+01	1.74E+01	1.54E+01	1.45E+01	1.99E+01	1.49E+01	1.82E+01
28	2.35E+01	2.33E+01	2.23E+01	2.22E+01	2.04E+01	1.91E+01	1.78E+01	1.70E+01	1.36E+01	1.54E+01	1.39E+01
27	2.36E+01	2.34E+01	2.34E+01	2.53E+01	2.30E+01	2.18E+01	2.15E+01	1.90E+01	1.15E+01	1.24E+01	1.24E+01
26	3.52E+01	2.34E+01	2.14E+01	2.53E+01	2.74E+01	2.18E+01	2.19E+01	1.54E+01	1.24E+01	1.24E+01	1.24E+01
25	3.01E+01	1.55E+01	1.29E+01	1.60E+01	1.68E+01	2.62E+01	1.17E+01	6.82E+00	7.38E+00	7.38E+00	7.38E+00
24	9.22E+00	9.22E+00	7.82E+00	1.09E+01	8.88E+00	7.77E+00	6.07E+00	5.43E+00	5.43E+00	5.71E+00	7.06E+00
23	9.42E+00	8.59E+00	8.56E+00	1.03E+01	8.26E+00	6.79E+00	5.43E+00	5.43E+00	5.43E+00	1.37E+01	1.16E+01
22	6.14E+00	6.14E+00	6.99E+00	6.99E+00	6.97E+00	6.53E+00	5.65E+00	5.43E+00	6.95E+00	6.95E+00	9.58E+00
21	7.52E+00	6.99E+00	6.99E+00	6.99E+00	6.97E+00	6.51E+00	5.65E+00	5.55E+00	5.55E+00	7.44E+00	9.58E+00
20	7.52E+00	9.48E+00	6.99E+00	6.97E+00	6.97E+00	8.32E+00	9.36E+00	7.30E+00	5.64E+00	7.44E+00	5.09E+00
19	7.52E+00	6.21E+00	6.21E+00	6.21E+00	6.97E+00	9.83E+00	1.27E+01	1.07E+01	1.03E+01	1.01E+01	9.35E+00
18	7.40E+00	7.41E+00	6.21E+00	8.45E+00	8.45E+00	1.33E+01	1.18E+01	1.18E+01	1.86E+01	1.54E+01	1.95E+01
17	7.40E+00	7.45E+00	1.68E+01	1.62E+01	1.19E+01	1.14E+01	1.16E+01	1.30E+01	1.84E+01	1.54E+01	1.27E+01
16	1.56E+02	1.60E+02	1.93E+01	1.93E+01	1.90E+01	1.90E+01	1.41E+01	1.30E+01	1.22E+01	1.35E+01	1.68E+01
15	1.84E+01	3.10E+01	3.77E+01	3.19E+01	3.77E+01	3.16E+01	2.07E+01	1.30E+01	1.21E+01	1.34E+01	1.34E+01
14	1.84E+01	3.20E+01	3.20E+01	3.54E+01	4.59E+01	3.73E+01	2.07E+01	1.31E+01	1.22E+01	1.33E+01	1.53E+01
13	2.05E+01	3.20E+01	3.22E+01	3.22E+01	5.48E+01	3.20E+01	2.45E+01	1.69E+01	1.12E+01	1.12E+01	4.11E+01
12	2.12E+01	4.03E+01	3.34E+01	3.34E+01	3.50E+01	3.46E+01	2.19E+01	1.17E+01	1.16E+01	1.07E+01	2.26E+01
11	1.61E+01	1.84E+01	1.66E+01	1.66E+01	1.66E+01	1.65E+01	1.41E+01	1.17E+01	1.16E+01	9.37E+00	7.61E+00
10	7.99E+00	1.10E+01	8.98E+00	9.37E+00	1.04E+01	1.08E+01	1.10E+01	9.38E+00	9.37E+00	7.61E+00	1.18E+01
9	2.32E+00	2.56E+00	3.27E+00	2.41E+00	3.18E+00	2.41E+00	5.26E+00	7.36E+00	7.36E+00	1.18E+01	1.18E+01
8	1.91E+00	3.27E+00	3.27E+00	3.27E+00	3.18E+00	3.18E+00	3.74E+00	7.36E+00	7.70E+00	9.18E+00	1.27E+01
7	1.48E+00	3.27E+00	3.27E+00	3.27E+00	3.18E+00	3.18E+00	2.41E+00	7.05E+00	7.70E+00	9.18E+00	8.11E+00
6	1.26E+00	2.77E+00	2.43E+00	2.43E+00	3.36E+00	3.54E+00	3.54E+00	5.55E+00	7.70E+00	9.18E+00	8.51E+00
5	8.02E-01	2.77E+00	2.77E+00	2.43E+00	3.36E+00	3.54E+00	3.54E+00	3.28E+00	6.92E+00	7.22E+00	8.51E+00
4	4.12E-01	2.72E+00	2.77E+00	2.77E+00	3.36E+00	3.54E+00	2.41E+00	2.87E+00	7.45E+00	8.03E+00	1.02E+01
3	0.00E+00	2.35E+00	2.77E+00	2.77E+00	3.57E+00	3.34E+00	5.67E+00	1.24E+01	1.31E+01	9.45E+00	5.03E+00
2	0.00E+00	1.92E+00	3.35E+00	5.45E+00	8.94E+00	9.80E+00	9.36E+00	9.79E+00	1.75E+01	9.45E+00	5.34E+00
1	0.00E+00	4.29E+00	9.80E+00	9.79E+00	9.79E+00	9.79E+00	9.79E+00	9.79E+00	9.79E+00	9.27E+00	5.11E+00

EXHIBIT 3-28. Continued.

Emissions of 106 at 100 hour

	1	2	3	4	5	6	7	8	9	10	11
40	2.18E+01	1.16E+01	7.37E+00	2.74E+01	2.49E+01	2.45E+01	1.74E+01	7.65E+01	3.93E+01	1.94E+01	1.94E+01
39	2.18E+01	1.17E+01	9.11E+00	1.26E+01	2.46E+01	5.64E+01	1.60E+02	2.93E+02	1.40E+02	1.40E+02	1.23E+02
38	1.72E+01	7.05E+00	1.11E+01	1.27E+01	2.16E+01	4.22E+01	1.77E+02	2.07E+02	2.20E+02	1.80E+02	1.86E+02
37	2.74E+01	1.29E+01	1.58E+01	2.04E+01	2.16E+01	2.16E+01	1.87E+02	1.97E+02	1.80E+02	1.80E+02	1.80E+02
36	2.75E+01	1.60E+01	1.60E+01	2.06E+01	2.41E+01	1.41E+01	1.27E+02	1.42E+02	1.33E+02	1.12E+02	1.02E+02
35	4.84E+01	2.27E+01	1.28E+01	1.28E+01	2.76E+01	1.01E+01	1.59E+02	1.00E+02	1.12E+02	1.12E+02	1.04E+02
34	2.15E+02	2.33E+02	2.19E+02	1.92E+02	2.01E+02	2.03E+02	9.87E+01	1.00E+02	1.12E+02	1.12E+02	1.12E+02
33	2.40E+02	2.59E+02	2.79E+02	2.57E+02	2.26E+02	2.10E+02	9.87E+01	9.87E+01	1.10E+02	1.12E+02	1.12E+02
32	1.86E+02	3.49E+02	3.94E+02	2.58E+02	2.29E+02	2.18E+02	9.87E+01	1.04E+02	1.10E+02	9.47E+01	2.92E+02
31	1.87E+02	2.37E+02	3.11E+02	2.31E+02	2.20E+02	1.96E+02	1.15E+02	1.04E+02	1.10E+02	1.23E+02	2.64E+02
30	1.43E+02	1.95E+02	2.79E+02	1.94E+02	1.94E+02	1.72E+02	1.06E+02	9.72E+01	1.05E+02	1.05E+02	3.55E+02
29	1.18E+02	1.18E+02	1.23E+02	1.26E+02	1.26E+02	1.15E+02	1.06E+02	9.72E+01	1.54E+02	1.02E+02	1.36E+02
28	1.29E+02	1.27E+02	1.21E+02	1.22E+02	1.17E+02	1.17E+02	1.09E+02	1.03E+02	7.40E+01	9.60E+01	7.06E+01
27	1.26E+02	1.25E+02	1.25E+02	1.39E+02	1.22E+02	1.14E+02	1.11E+02	9.18E+01	3.37E+01	3.99E+01	3.99E+01
26	2.08E+02	1.25E+02	1.10E+02	1.39E+02	1.53E+02	1.14E+02	1.14E+02	6.36E+01	4.01E+01	4.01E+01	3.99E+01
25	1.68E+02	6.46E+01	4.64E+01	6.83E+01	7.42E+01	1.41E+02	3.75E+01	1.33E+01	1.85E+01	1.85E+01	1.85E+01
24	1.78E+01	1.78E+01	7.80E+00	2.97E+01	1.53E+01	1.43E+01	7.33E+00	9.19E+00	9.19E+00	1.13E+01	2.09E+01
23	2.33E+01	1.70E+01	1.70E+01	2.90E+01	1.46E+01	1.32E+01	9.19E+00	9.19E+00	9.19E+00	6.82E+01	5.33E+01
22	5.73E+00	5.82E+00	1.15E+01	1.15E+01	1.14E+01	1.14E+01	1.08E+01	9.19E+00	2.01E+01	2.01E+01	3.89E+01
21	1.51E+01	1.15E+01	1.15E+01	1.15E+01	1.14E+01	1.14E+01	1.08E+01	1.01E+01	1.01E+01	2.36E+01	3.89E+01
20	1.51E+01	2.83E+01	1.15E+01	1.14E+01	1.14E+01	1.26E+01	1.32E+01	1.15E+01	1.01E+01	2.36E+01	6.81E+00
19	1.51E+01	6.34E+00	6.34E+00	6.34E+00	1.14E+01	2.30E+01	2.55E+01	9.69E+00	9.39E+00	2.20E+01	2.10E+01
18	1.43E+01	1.44E+01	6.34E+00	2.13E+01	2.13E+01	4.76E+01	1.86E+01	1.86E+01	7.10E+01	7.71E+01	1.55E+02
17	1.43E+01	1.44E+01	6.89E+01	5.39E+01	2.43E+01	1.56E+01	1.66E+01	2.76E+01	7.03E+01	7.71E+01	2.56E+01
16	2.51E+03	2.54E+03	9.13E+01	9.13E+01	8.95E+01	8.95E+01	4.17E+01	2.76E+01	3.59E+01	4.10E+01	1.04E+02
15	8.45E+01	2.08E+02	2.60E+02	2.14E+02	2.60E+02	2.13E+02	1.03E+02	2.76E+01	3.42E+01	3.93E+01	3.93E+01
14	8.45E+01	2.15E+02	2.15E+02	2.42E+02	3.24E+02	2.57E+02	1.03E+02	2.89E+01	3.81E+01	4.21E+01	4.44E+01
13	1.01E+02	2.15E+02	2.17E+02	2.17E+02	3.94E+02	2.15E+02	1.32E+02	5.86E+01	1.37E+01	1.37E+01	5.03E+01
12	1.07E+02	2.80E+02	2.26E+02	2.26E+02	2.39E+02	2.35E+02	1.12E+02	1.71E+01	1.65E+01	9.69E+00	3.04E+01
11	5.72E+01	7.97E+01	6.57E+01	6.57E+01	6.57E+01	6.54E+01	4.17E+01	1.71E+01	1.65E+01	1.44E+01	1.31E+01
10	7.74E+00	2.83E+01	9.90E+00	1.03E+01	1.51E+01	1.55E+01	1.58E+01	1.24E+01	1.50E+01	1.31E+01	4.72E+01
9	2.49E+00	2.82E+00	7.25E+00	1.92E+00	6.65E+00	1.92E+00	8.65E+00	1.10E+01	1.10E+01	4.72E+01	4.72E+01
8	2.17E+00	7.25E+00	7.25E+00	7.25E+00	6.65E+00	6.65E+00	6.90E+00	1.10E+01	1.39E+01	2.60E+01	5.51E+01
7	1.86E+00	7.25E+00	7.25E+00	7.25E+00	6.65E+00	6.65E+00	1.92E+00	1.31E+01	1.39E+01	2.60E+01	1.72E+01
6	2.93E+00	4.21E+00	2.05E+00	2.05E+00	7.75E+00	8.91E+00	8.91E+00	1.14E+01	1.39E+01	2.60E+01	2.05E+01
5	2.62E+00	4.21E+00	4.21E+00	2.05E+00	7.75E+00	8.91E+00	8.91E+00	3.46E+00	7.43E+00	9.87E+00	2.05E+01
4	2.34E+00	4.15E+00	4.21E+00	4.21E+00	7.75E+00	8.91E+00	1.92E+00	3.01E+00	8.23E+00	1.10E+01	3.95E+01
3	0.00E+00	3.87E+00	4.21E+00	4.21E+00	5.73E+00	5.42E+00	8.23E+00	1.18E+02	1.19E+02	1.52E+01	9.16E+00
2	0.00E+00	1.51E+00	4.93E+00	1.94E+01	2.36E+01	2.47E+01	1.27E+01	2.47E+01	2.42E+02	1.52E+01	7.21E+00
1	0.00E+00	6.59E+00	2.47E+01	2.47E+01	2.47E+01	2.47E+01	2.47E+01	2.47E+01	2.47E+01	1.02E+01	4.89E+00

EXHIBIT 3-28. Continued.

CENTEMS

Emissions of CO at 100 hour

	1	2	3	4	5	6	7	8	9	10	11
40	4.57E+01	4.57E+01	5.84E+01	9.02E+01	7.34E+01	7.04E+01	6.28E+01	1.31E+02	8.79E+01	6.51E+01	6.51E+01
39	4.59E+01	4.59E+01	5.08E+01	7.59E+01	7.11E+01	1.07E+02	1.11E+02	2.65E+02	8.80E+01	8.80E+01	6.83E+01
38	3.89E+01	3.89E+01	6.47E+01	7.61E+01	6.79E+01	6.81E+01	6.18E+01	9.64E+01	1.12E+02	6.53E+01	7.26E+01
37	4.00E+01	5.63E+01	7.70E+01	7.95E+01	6.79E+01	6.74E+01	7.30E+01	8.52E+01	6.53E+01	6.53E+01	6.53E+01
36	7.21E+01	7.82E+01	7.82E+01	8.13E+01	8.29E+01	7.63E+01	5.63E+01	8.11E+01	8.04E+01	5.81E+01	5.75E+01
35	8.34E+01	8.27E+01	7.62E+01	7.62E+01	8.59E+01	6.78E+01	1.19E+02	5.46E+01	6.74E+01	6.74E+01	5.87E+01
34	1.26E+02	1.06E+02	9.62E+01	7.90E+01	8.45E+01	7.54E+01	5.34E+01	5.48E+01	6.76E+01	6.76E+01	6.81E+01
33	1.26E+02	1.07E+02	1.20E+02	1.06E+02	8.53E+01	7.40E+01	5.34E+01	5.34E+01	6.55E+01	6.81E+01	6.81E+01
32	9.82E+01	1.66E+02	1.96E+02	1.06E+02	8.70E+01	7.82E+01	5.34E+01	5.92E+01	6.55E+01	4.90E+01	2.62E+02
31	9.91E+01	9.22E+01	1.41E+02	8.84E+01	8.07E+01	5.96E+01	5.92E+01	5.92E+01	6.55E+01	7.95E+01	2.32E+02
30	7.88E+01	8.04E+01	1.36E+02	8.00E+01	8.00E+01	5.94E+01	6.18E+01	5.18E+01	6.08E+01	6.08E+01	3.31E+02
29	7.96E+01	7.97E+01	8.35E+01	8.49E+01	8.49E+01	7.26E+01	6.19E+01	5.20E+01	1.14E+02	5.73E+01	9.40E+01
28	9.99E+01	9.06E+01	7.02E+01	8.71E+01	8.09E+01	6.96E+01	6.10E+01	5.34E+01	4.68E+01	6.92E+01	5.23E+01
27	8.34E+01	8.16E+01	8.16E+01	1.06E+02	7.65E+01	6.13E+01	5.65E+01	5.13E+01	3.43E+01	4.39E+01	4.39E+01
26	2.30E+02	8.16E+01	5.51E+01	1.06E+02	1.32E+02	6.13E+01	6.16E+01	4.44E+01	4.43E+01	4.43E+01	4.39E+01
25	2.70E+02	8.53E+01	5.28E+01	9.19E+01	1.02E+02	2.21E+02	5.90E+01	3.52E+01	4.23E+01	4.23E+01	4.23E+01
24	6.89E+01	6.91E+01	5.13E+01	9.04E+01	6.47E+01	5.75E+01	4.12E+01	3.84E+01	3.84E+01	4.16E+01	5.65E+01
23	7.44E+01	6.37E+01	6.36E+01	8.52E+01	5.96E+01	5.04E+01	3.84E+01	3.84E+01	3.84E+01	1.30E+02	1.07E+02
22	3.68E+01	3.74E+01	4.74E+01	4.74E+01	4.73E+01	4.46E+01	4.08E+01	3.84E+01	5.52E+01	5.52E+01	8.42E+01
21	5.33E+01	4.74E+01	4.74E+01	4.74E+01	4.73E+01	4.47E+01	4.08E+01	3.97E+01	3.97E+01	6.06E+01	8.42E+01
20	5.33E+01	7.71E+01	4.74E+01	4.73E+01	4.73E+01	5.51E+01	6.03E+01	4.91E+01	4.02E+01	6.06E+01	3.47E+01
19	5.33E+01	3.83E+01	3.83E+01	3.83E+01	4.73E+01	7.21E+01	8.86E+01	6.37E+01	6.15E+01	1.02E+02	9.47E+01
18	5.19E+01	5.26E+01	3.83E+01	6.47E+01	6.47E+01	1.12E+02	7.77E+01	7.77E+01	1.68E+02	2.39E+02	4.07E+02
17	5.18E+01	5.29E+01	1.55E+02	1.36E+02	8.48E+01	7.30E+01	7.47E+01	9.19E+01	1.62E+02	2.39E+02	1.29E+02
16	1.36E+02	1.47E+02	7.84E+01	7.84E+01	7.56E+01	7.56E+01	7.60E+01	9.19E+01	1.22E+02	1.62E+02	2.96E+02
15	6.72E+01	7.18E+01	1.54E+02	8.23E+01	1.54E+02	7.95E+01	9.66E+01	9.19E+01	1.18E+02	1.58E+02	1.58E+02
14	6.71E+01	8.34E+01	8.34E+01	1.26E+02	2.56E+02	1.50E+02	9.66E+01	9.40E+01	1.26E+02	1.58E+02	1.58E+02
13	9.26E+01	8.34E+01	8.58E+01	8.58E+01	3.66E+02	8.34E+01	1.43E+02	1.41E+02	7.00E+01	7.00E+01	7.73E+01
12	1.02E+02	1.86E+02	1.01E+02	1.01E+02	1.21E+02	1.15E+02	1.11E+02	7.53E+01	7.44E+01	6.37E+01	6.95E+01
11	9.98E+01	9.80E+01	7.58E+01	7.58E+01	7.58E+01	7.53E+01	7.60E+01	7.53E+01	7.44E+01	6.47E+01	5.79E+01
10	4.66E+01	8.16E+01	5.45E+01	5.70E+01	6.69E+01	6.94E+01	7.16E+01	6.25E+01	6.62E+01	5.79E+01	1.07E+02
9	1.13E+01	1.33E+01	2.25E+01	1.14E+01	2.13E+01	1.14E+01	3.74E+01	5.49E+01	5.49E+01	1.07E+02	1.07E+02
8	9.41E+00	2.25E+01	2.25E+01	2.25E+01	2.13E+01	2.13E+01	2.45E+01	5.49E+01	5.89E+01	7.64E+01	1.18E+02
7	7.63E+00	2.25E+01	2.25E+01	2.25E+01	2.13E+01	2.13E+01	1.14E+01	5.34E+01	5.89E+01	7.64E+01	6.38E+01
6	8.63E+00	1.62E+01	1.17E+01	1.17E+01	2.36E+01	2.60E+01	2.60E+01	4.09E+01	5.89E+01	7.64E+01	6.85E+01
5	6.69E+00	1.62E+01	1.62E+01	1.17E+01	2.36E+01	2.60E+01	2.60E+01	1.94E+01	4.97E+01	5.32E+01	8.95E+01
4	5.08E+00	1.60E+01	1.62E+01	1.62E+01	2.36E+01	2.60E+01	1.14E+01	1.58E+01	5.39E+01	5.97E+01	2.93E+01
3	[illegible]	[illegible]	[illegible]	1.62E+01	2.15E+01	1.93E+01	3.86E+01	1.09E+02	1.15E+02	7.02E+01	3.34E+01
2	[illegible]	[illegible]	[illegible]	[illegible]	6.72E+01	7.44E+01	6.91E+01	7.44E+01	[illegible]	7.02E+01	2.93E+01
1	[illegible]	5.55E+01	[illegible]	7.44E+01	7.44E+01	7.44E+01	7.44E+01	7.44E+01	7.44E+01	6.81E+01	

EXHIBIT 3-28. Continued.

	1	2	3	4	5	6	7	8	9	10	11
40	3.15E+00	3.09E+00	1.18E+00	5.94E+00	5.82E+00	5.80E+00	3.95E+00	1.99E+01	9.84E+00	4.48E+00	4.48E+00
39	3.18E+00	3.12E+00	1.37E+00	1.72E+00	5.83E+00	1.44E+01	1.52E+01	5.12E+01	9.84E+00	9.84E+00	5.24E+00
38	1.52E+00	1.46E+00	1.60E+00	1.75E+00	5.05E+00	5.18E+00	3.70E+00	1.18E+01	1.55E+01	4.50E+00	6.23E+00
37	1.59E+00	1.98E+00	2.24E+00	2.94E+00	5.05E+00	5.04E+00	6.31E+00	9.18E+00	4.50E+00	4.50E+00	4.50E+00
36	2.34E+00	2.26E+00	2.26E+00	2.98E+00	3.51E+00	2.36E+00	4.42E+00	1.09E+01	1.10E+01	5.88E+00	6.09E+00
35	3.71E+00	3.30E+00	1.78E+00	1.78E+00	4.07E+00	1.43E+00	2.05E+01	5.48E+00	8.49E+00	8.49E+00	6.42E+00
34	1.50E+01	1.08E+01	8.48E+00	4.44E+00	5.72E+00	6.70E+00	5.18E+00	5.49E+00	8.50E+00	8.50E+00	8.62E+00
33	1.54E+01	1.11E+01	1.42E+01	1.09E+01	6.09E+00	6.37E+00	5.18E+00	5.18E+00	8.02E+00	8.62E+00	8.62E+00
32	8.82E+00	2.51E+01	3.21E+01	1.10E+01	6.50E+00	7.30E+00	5.18E+00	6.52E+00	8.02E+00	4.16E+00	5.41E+01
31	9.03E+00	7.71E+00	1.92E+01	6.83E+00	5.03E+00	6.79E+00	6.88E+00	6.52E+00	8.02E+00	1.13E+01	4.71E+01
30	3.97E+00	4.77E+00	1.78E+01	4.67E+00	4.67E+00	6.22E+00	7.13E+00	4.81E+00	6.91E+00	6.91E+00	7.02E+01
29	3.60E+00	3.63E+00	4.51E+00	4.84E+00	4.84E+00	7.66E+00	7.16E+00	4.84E+00	1.93E+01	6.06E+00	1.47E+01
28	9.66E+00	9.67E+00	4.54E+00	8.17E+00	8.48E+00	7.28E+00	5.93E+00	4.25E+00	3.74E+00	9.38E+00	5.18E+00
27	9.63E+00	9.20E+00	9.20E+00	1.48E+01	8.01E+00	4.46E+00	3.29E+00	2.99E+00	1.71E+00	3.96E+00	3.96E+00
26	4.40E+01	9.20E+00	3.00E+00	1.48E+01	2.09E+01	4.46E+00	4.49E+00	2.56E+00	4.05E+00	4.05E+00	3.96E+00
25	5.27E+01	9.44E+00	1.83E+00	1.10E+01	1.35E+01	4.12E+01	3.29E+00	1.54E+00	3.56E+00	3.56E+00	3.56E+00
24	5.28E+00	5.29E+00	1.13E+00	1.03E+01	4.27E+00	4.25E+00	1.63E+00	2.62E+00	2.62E+00	3.40E+00	6.85E+00
23	7.98E+00	5.36E+00	5.36E+00	1.04E+01	4.32E+00	4.25E+00	2.62E+00	2.62E+00	2.62E+00	2.40E+01	1.86E+01
22	1.21E+00	1.31E+00	3.66E+00	3.66E+00	3.63E+00	3.36E+00	3.21E+00	2.62E+00	6.56E+00	6.56E+00	1.34E+01
21	5.08E+00	3.66E+00	3.66E+00	3.66E+00	3.63E+00	3.36E+00	3.21E+00	2.94E+00	2.94E+00	7.83E+00	1.34E+01
20	5.08E+00	1.06E+01	3.66E+00	3.63E+00	3.63E+00	3.74E+00	3.36E+00	3.14E+00	2.96E+00	7.83E+00	1.76E+00
19	5.08E+00	1.52E+00	1.52E+00	1.52E+00	3.63E+00	7.32E+00	7.60E+00	1.75E+00	1.69E+00	5.08E+00	4.96E+00
18	4.76E+00	4.87E+00	1.52E+00	7.72E+00	7.72E+00	1.63E+01	5.03E+00	5.03E+00	2.40E+01	2.16E+01	4.62E+01
17	4.76E+00	4.88E+00	2.70E+01	2.04E+01	8.05E+00	3.93E+00	4.32E+00	8.36E+00	2.40E+01	2.16E+01	5.48E+00
16	1.70E+01	1.74E+01	5.16E+00	5.16E+00	4.50E+00	4.50E+00	4.66E+00	8.36E+00	9.92E+00	1.03E+01	3.00E+01
15	2.61E+00	3.70E+00	2.30E+01	6.15E+00	2.29E+01	5.50E+00	9.43E+00	8.36E+00	9.36E+00	9.76E+00	9.76E+00
14	2.59E+00	6.43E+00	6.43E+00	1.63E+01	4.68E+01	2.19E+01	9.43E+00	8.86E+00	1.06E+01	1.09E+01	1.12E+01
13	8.54E+00	6.43E+00	6.97E+00	6.97E+00	7.26E+01	6.43E+00	2.04E+01	1.98E+01	3.22E+00	3.22E+00	7.33E+00
12	1.07E+01	3.05E+01	1.05E+01	1.05E+01	1.52E+01	1.39E+01	1.29E+01	4.48E+00	4.27E+00	1.75E+00	5.36E+00
11	1.03E+01	9.82E+00	4.64E+00	4.64E+00	4.64E+00	4.52E+00	4.66E+00	4.48E+00	4.27E+00	3.56E+00	3.34E+00
10	1.69E+00	9.15E+00	2.29E+00	2.33E+00	4.02E+00	4.04E+00	4.07E+00	2.87E+00	4.01E+00	3.34E+00	1.48E+01
9	9.84E-01	1.20E+00	3.37E+00	7.61E-01	3.08E+00	7.61E-01	2.40E+00	2.63E+00	2.63E+00	1.48E+01	1.48E+01
8	8.79E-01	3.37E+00	3.37E+00	3.37E+00	3.08E+00	3.08E+00	2.18E+00	2.63E+00	3.57E+00	7.67E+00	1.75E+01
7	7.62E-01	3.37E+00	3.37E+00	3.37E+00	3.08E+00	3.08E+00	7.61E-01	3.48E+00	3.57E+00	7.67E+00	4.73E+00
6	1.35E+00	1.89E+00	8.24E-01	8.24E-01	3.63E+00	4.19E+00	4.19E+00	3.33E+00	3.57E+00	7.67E+00	5.82E+00
5	1.23E+00	1.89E+00	1.89E+00	8.24E-01	3.63E+00	4.19E+00	4.19E+00	1.18E+00	1.41E+00	2.23E+00	5.82E+00
4	1.16E+00	1.87E+00	1.89E+00	1.89E+00	3.63E+00	4.19E+00	7.61E-01	1.10E+00	1.48E+00	2.37E+00	1.25E+01
3	0.00E+00	1.76E+00	1.89E+00	1.89E+00	1.15E+00	1.12E+00	1.41E+00	1.26E+01	1.27E+01	2.13E+00	1.59E+00
2	0.00E+00	1.66E+00	1.75E+00	2.59E+00	3.01E+00	3.12E+00	1.99E+00	3.12E+00	2.54E+01	2.13E+00	2.39E+00
1	0.00E+00	1.85E+00	3.12E+00	3.12E+00	3.12E+00	3.12E+00	3.12E+00	3.12E+00	3.12E+00	1.63E+00	1.34E+00

EXHIBIT 3-28. Continued.

Emissions of PART at 1.00 hour

	34	35	36	37	38	39	40
40	2.41E+00	3.21E+00	3.79E+00	2.85E+00	9.72E+00	9.15E+00	5.05E+01
39	6.48E+00	4.82E+00	8.89E+00	4.53E+00	2.02E+00	8.74E+00	7.91E+00
38	6.48E+00	1.74E+01	4.53E+00	4.53E+00	1.84E+00	1.04E+00	7.86E+00
37	5.00E+00	8.69E+00	7.34E+00	9.40E+00	1.18E+00	9.44E-01	6.79E+00
36	5.00E+00	8.68E+00	7.34E+00	7.34E+00	2.17E+00	5.14E+00	6.79E+00
35	4.34E+01	1.16E+01	7.48E+00	3.81E+00	2.79E+00	5.28E+00	5.25E+00
34	8.34E+01	9.30E+00	2.03E+01	3.85E+00	3.67E+00	5.51E+00	6.32E+00
33	3.73E+00	1.09E+01	9.61E+00	3.75E+00	3.05E+00	5.65E+00	5.65E+00
32	7.87E+00	1.97E+01	6.25E+00	5.61E+00	1.50E+00	5.65E+00	5.65E+00
31	7.87E+00	7.60E+00	5.86E+00	5.82E+00	2.14E+00	5.47E+00	5.47E+00
30	6.17E+00	8.54E+00	6.05E+00	2.37E+00	2.37E+00	5.69E+00	5.69E+00
29	1.69E+00	8.64E+00	8.74E+00	2.37E+00	2.89E+00	2.08E+01	5.69E+00
28	6.51E+00	5.65E+00	7.75E+00	3.01E+00	2.96E+00	2.93E+00	2.74E+00
27	6.51E+00	7.69E+00	7.91E+00	7.91E+00	1.88E+00	1.59E+01	3.05E+00
26	5.56E+01	5.60E+01	5.68E+01	3.01E+01	3.29E+01	1.68E+01	2.97E+00
25	6.87E+00	5.25E+00	6.61E+00	1.04E+01	1.44E+01	2.33E+01	4.09E+00
24	8.07E+00	1.28E+01	1.94E+01	4.44E+00	1.38E+01	2.96E+00	1.41E+01
23	6.09E+00	1.58E+00	1.83E+01	2.16E+00	2.16E+00	2.54E+00	2.26E+00
22	9.42E+00	1.58E+00	2.21E+00	1.00E+01	6.14E+00	6.14E+00	2.57E+00
21	1.75E+00	1.61E+00	3.44E+01	1.00E+01	5.19E+00	6.14E+00	2.16E+00
20	1.76E+00	9.21E+00	9.74E+00	4.29E+01	5.19E+00	6.80E+00	6.80E+00
19	9.30E+00	9.30E+00	2.84E+00	3.00E+00	3.00E+00	2.91E+00	3.58E+00
18	9.35E+00	3.40E+00	4.33E+00	4.49E+00	4.49E+00	2.90E+00	4.45E+00
17	1.74E+00	9.66E+00	5.35E+00	9.19E+00	9.19E+00	3.35E+00	5.14E+00
16	2.35E+01	2.51E+00	5.36E+00	3.11E+00	1.93E+00	8.34E+00	3.38E+00
15	3.50E+01	7.42E+00	6.88E+00	1.65E+00	1.81E+00	2.85E+00	2.85E+00
14	9.85E+00	5.60E+00	6.86E+00	3.70E+00	1.27E+00	2.85E+00	2.85E+00
13	5.60E+00	5.60E+00	3.14E+00	3.70E+00	3.38E+00	1.85E+00	2.85E+00
12	6.52E+00	2.59E+00	4.47E+00	4.27E+00	1.90E+00	1.86E+00	1.79E+00
11	2.24E+00	1.77E+00	1.59E+00	1.12E+00	1.82E+00	2.48E+00	2.47E+00
10	1.83E+00	7.04E-01	8.87E-01	3.48E+00	3.48E+00	2.48E+00	2.48E+00
9	4.14E+00	1.62E+00	1.78E+00	2.14E+00	2.14E+00	2.48E+00	1.96E+00
8	1.93E+00	1.62E+00	1.76E+00	2.74E+00	2.14E+00	2.13E+00	2.16E+00
7	1.29E+00	2.92E+00	3.96E+00	3.97E+00	1.10E+01	1.10E+01	3.17E+00
6	2.40E+00	2.72E+00	3.94E+00	3.95E+00	1.10E+01	3.17E+00	3.17E+00
5	2.40E+00	2.87E+00	3.94E+00	2.65E+00	2.65E+00	3.17E+00	3.17E+00
4	2.19E+00	2.72E+00	2.64E+00	2.65E+00	2.65E+00	2.65E+00	3.17E+00
3	1.96E+00	2.63E+00	2.45E+00	2.10E+00	1.78E+00	1.68E+00	1.47E+00
2	2.09E+00	2.21E+00	1.74E+00	6.16E-01	6.16E-01	6.16E-01	6.16E-01
1	2.02E+00	2.09E+00	2.12E+00	6.00E-01	6.16E-01	6.16E-01	6.16E-01

EXHIBIT 3-28. Concluded.

```
CONTROL


CONTROL
PTSOURCE
ATLANTA - ELEVATED POINT SOURCES
        15          0        113          1         20
        20          0          0
         1          0          0          0          0
        10          1
        11         12                    14         15         16
NO
NO2
OLE
PAR
TOL
XYL
FORM
ALD2
ETH
MEOH
ETOH
ISOP
SO2
CO
AERO
     84155          0      84155       2400
END
REGION
       0.0        0.0         16
  660000.0  3665000.0
    4000.0     4000.0
        40         40          5
         2          3         0.        50.       150.
END
POINT SOURCES
         1STD                691595.   3777799.      0011          1     110380
     305.0      10.70          422.    180000.
         2STD                704198.   3780998.      0008          1     110380
      12.0       0.90          422.     46440.
         3STD                704198.   3780998.      0008          2     110380
      12.0       1.10          422.     66600.
         4STD                704198.   3780998.      0008          3     110380
      58.0       1.20          536.    103320.
         5STD                704198.   3780998.      0008          4     110380
      66.0       1.50          533.     82800.
      .
      .
      .
       109STD                744307.   3812996.      0003          7     114100
       2.0       0.60          366.     58320.
       110STD                679094.   3762700.      0002          1     114160
      27.0       1.50          350.     46800.
       111STD                679094.   3762700.      0002          2     114160
      15.0       1.50          339.     14040.
       112STD                679094.   3762700.      0002          3     114160
      12.0       1.20          422.     72720.
       113STD                679094.   3762700.      0002          4     114160
       9.0       1.20          355.     17640.
END
```

EXHIBIT 3-29. Example of point source file (output from CENTEM, input to PTSRCE).

```
CONTROL

TIME INTERVAL
     84155          0     84155        100
METHOD
STD        ALL        ENVALUES  0.        50000.
END
VERTICAL METHODS
STD        ALL        PLUME RISE 0.       10000.
END
EMISSIONS VALUES
ALL        ALL              0.000
          1FLOWRATE     16273440.
          2FLOWRATE        30600.
          3FLOWRATE        59400.
          4FLOWRATE       108720.
          5FLOWRATE       151200.
          .
          .
        109FLOWRATE        16920.
        110FLOWRATE        85320.
        111FLOWRATE        25560.
        112FLOWRATE        84960.
        113FLOWRATE        20520.
          1NO          128577.539          0011        1     110380
          1NO2          14212.699          0011        1     110380
          1OLE             34.766          0011        1     110380
          1PAR            644.919          0011        1     110380
          1TOL             51.019          0011        1     110380
          1XYL            137.813          0011        1     110380
          1ALD2             9.147          0011        1     110380
          1SO2        479195.938           0011        1     110380
          1CO           4974.584           0011        1     110380
          1AERO         1064596.           0011        1     110380
          2NO              4.228           0008        1     110380
          2NO2             0.467           0008        1     110380
          2SO2             1.629           0008        1     110380
          2AERO          107.917           0008        1     110380
          3NO            144.034           0008        2     110380
          3NO2            15.921           0008        2     110380
          3PAR             4.865           0008        2     110380
          3TOL             0.012           0008        2     110380
          3FORM            1.887           0008        2     110380
          .
          .
        106PAR          2354.927           0025        1     113920
        106TOL            67.732           0025        1     113920
        106AERO          107.500           0025        1     113920
        107AERO         2071.250           0003        5     114100
        108SO2             1.598           0003        6     114100
        108AERO         2111.667           0003        6     114100
        109SO2             1.598           0003        7     114100
        109AERO         7074.583           0003        7     114100
        113AERO         3728.333           0002        4     114160
END
ENDTIME
TIME INTERVAL
```

EXHIBIT 3-29. Continued.

```
CONTROL


     84155        100      84155        200
METHOD
STD        ALL        EMVALUES  0.        50000.
END
VERTICAL METHODS
STD        ALL        PLUME RISE 0.       10000.
END
EMISSIONS VALUES
ALL        ALL              0.000
          1FLOWRATE    16273440.
          2FLOWRATE       30600.
          3FLOWRATE       59400.
          4FLOWRATE      108720.
          5FLOWRATE      151200.
          .
          .
        109FLOWRATE       16920.
        110FLOWRATE       85320.
        111FLOWRATE       25560.
        112FLOWRATE       84960.
        113FLOWRATE       20520.
          1NO         128577.539                0011        1    110380
          1NO2         14212.699                0011        1    110380
          1OLE            34.766                0011        1    110380
          1PAR           644.919                0011        1    110380
          1TOL            51.019                0011        1    110380
          1XYL           137.813                0011        1    110380
          1ALD2            9.147                0011        1    110380
          1SO2        479195.938                0011        1    110380
          1CO           4974.584                0011        1    110380
          1AERO         1064596.                0011        1    110380
          2NO              4.228                0008        1    110380
          2NO2             0.467                0008        1    110380
          2SO2             1.629                0008        1    110380
          2AERO          107.917                0008        1    110380
          3NO            144.034                0008        2    110380
          3NO2            15.921                0008        2    110380
          3PAR             4.865                0008        2    110380
          3TOL             0.012                0008        2    110380
          3FORM            1.887                0008        2    110380
          .
          .
        106PAR          2354.927                0025        1    113920
        106TOL            67.732                0025        1    113920
        106AERO          107.500                0025        1    113920
        107AERO         2071.250                0003        5    114100
        108SO2             1.598                0003        6    114100
        108AERO         2111.667                0003        6    114100
        109SO2             1.598                0003        7    114100
        109AERO         7074.583                0003        7    114100
        113AERO         3728.333                0002        4    114160
END
ENDTIME
.
.
```

EXHIBIT 3-29. Continued.

CENTEMS

```
CONTROL

TIME INTERVAL
     84155      2300      84155      2400
METHOD
STD        ALL        EMVALUES  0.        50000.
END
VERTICAL METHODS
STD        ALL        PLUME RISE 0.       10000.
END
EMISSIONS VALUES
ALL        ALL              0.000
           1FLOWRATE    16273440.
           2FLOWRATE       30600.
           3FLOWRATE       59400.
           4FLOWRATE      108720.
           5FLOWRATE      151200.
           .
           .
         109FLOWRATE       16920.
         110FLOWRATE       85320.
         111FLOWRATE       25560.
         112FLOWRATE       84960.
         113FLOWRATE       20520.
           1NO         128577.539          0011        1    110380
           1NO2         14212.699          0011        1    110380
           1OLE            34.766          0011        1    110380
           1PAR           644.919          0011        1    110380
           1TOL            51.019          0011        1    110380
           .
           .
         109SO2             1.598          0003        7    114100
         109AERO         7074.583          0003        7    114100
         113AERO         3728.333          0002        4    114160
END
ENDTIME
```

EXHIBIT 3-29. Concluded.

DESCRIPTION OF POSTEMS

POSTEMS merges the emission files created by CENTEMS and calculates emission totals for the final merged file of low-level emissions for input to the UAM. It also produces tables of emission totals summarized by activity, process, source, control, and hydrocarbon speciation code for quality control tracking and use in analysis. POSTEMS uses nine input files (Figure 3-6).

The user input file specifies the Julian date for the final merged UAM emission file, the number of paired files of input hourly emissions and total emissions by category created by CENTEMS, user-selected options, and UAM header information. Each run of CENTEMS creates a pair of files; the maximum number of pairs input to POSTEMS is six (Table 3-21 and Exhibit 3-30). The file pairs corresponding to a CENTEMS run are matched so that the emissions generated for the categorized emission tables are reflected in the UAM file. Typically, three pairs of files are produced: one pair each for area, motor vehicle, and point source emissions.

For all user options in this file a value of 0 (zero) rejects the option and a value of 1 (one) selects the option. The totals for the merged UAM emissions file can be printed (IOPTCH), and the totals by category can be merged and printed (IOPTBL). If no merged UAM emissions file is wanted, IOPTEM is set to zero. In addition, individual tables of each input file of categorized emission totals can be output. The options IOPTBL and IOPSEP are independent, i.e., if a run has only one pair of input files and IOPTBL and IOPSEP are both set to 1, two sets of identical tables will be generated. The final option (IOPCHK) allows the user to verify the emission checksum with the checksum on the paired file of categorized totals. If a mismatch is detected, the run will stop.

The UAM header information variables (e.g., file name and region specification) are discussed in Volume II (Section 4.2.2). POSTEMS verifies that the variables in the header information input by the user match those in the input UAM emissions file(s). These variables include the number of segments, easting and northing UTM coordinates, UTM zone, x and y dimensions of cells, number of cells in the x and y directions, and the segment offset. If a mismatch is detected, the run will stop.

Line 8 of the user input file identifies the types of emissions in the input files. This flag is followed by factors for each chemical species in the emission file. These adjustment factors are used for across-the-board changes to the inventory and will usually be set to 1.0 for base case inventories.

The next five input files define the codes contained in the file of emission totals by category. There is one file each for activity, process, source category, control, and profile codes (Table 3-22 to 3-26 and Exhibit 3-31 to 3-35). The codes are explained in Appendix A.

The chemical species data file contains information about the molecular organic compounds in the emissions inventory (Table 3-27 and Exhibit 3-36). The information in this file was obtained from the EPA's Air Emission Species Manual (1988).

The next two input files, an emissions file and a categorized total file, have a binary format. Tables 3-28 and 3-29 indicate the file record structure. Both files are produced by CENTEMS. The emissions file indicates the ground-level emissions (in g-mol/h) for each species for each hour. The file of emission totals by category contains totals for each CB-4 species by activity, process, source type, emission control, and hydrocarbon speciation profile.

POSTEMS produces three output files: a message file, a merged low-level emissions file (binary) for input to the UAM, and a file of emission totals by category. The message file indicates which program files were accessed, the number of records processed, the beginning and ending episode date and time, region description, and the hours extracted for each input file and the final merged output file (Exhibit 3-37). The categorized emissions tables include the total emissions of each chemical species by activity, process, source type, emission control, and hydrocarbon speciation profile (Exhibit 3-38) as supplied by the binary file of emission totals by category produced by CENTEMS.

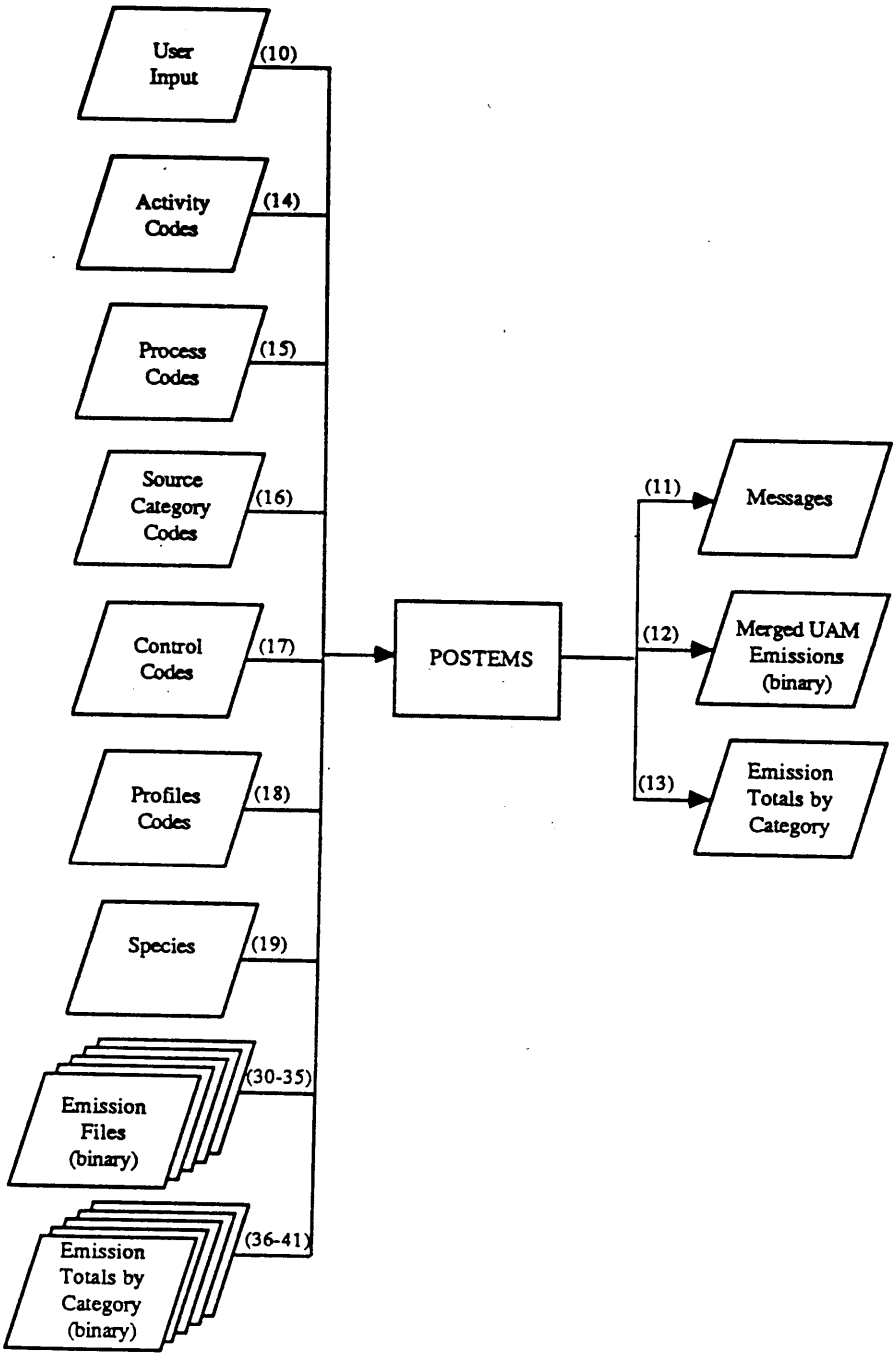

FIGURE 3-6. Input and output files used by POSTEMS.

EEE 89077

TABLE 3-21. User input file (unit 10) used by the POSTEMS program. (See Exhibit 3-30)

Line	Variable	Columns	Type	Description
1	JDAYIN	*	I	Julian date of output emission file
	NFILIN	*	I	Number of input file pairs (hourly and categorized emissions)
2	IOPTCH	*	I	Print emission totals (0 = no, 1 = yes)
	IOPTBL	*	I	Print categorized table for merged files
	IOPTEM	*	I	Create UAM binary emission file
	IOPSEP	*	I	Print categorized table for individual files
	IOPCHK	*	I	Verify checksum
3	MEMIS	1-10	A	Title "EMISSIONS" (not used, skipped)
	MFILID	11-70	A	Description of file contents
4	NSEG	*	I	Segment number (always = 1)
	NSPECS	*	I	Number of chemical species in file
	JBEG	*	I	Beginning Julian date (not used, skipped)
	TBEG	*	R	Beginning hour (not used, skipped)
	JEND	*	I	Ending Julian date (not used, skipped)
	TEND	*	R	Ending hour (not used, skipped)
5	UTMX	*	R	Easting origin (m)
	UTMY	*	R	Northing origin (m)
	IUTMZN	*	I	UTM zone
	ORGX	*	R	Easting origin offset (m)
	ORGY	*	R	Northing origin offset (m)
	DELTAX	*	R	x-direction cell width (m)
	DELTAY	*	R	y-direction cell width (m)
6	NXCELL	*	I	Number of east/west cells
	NYCELL	*	I	Number of north/south cells
	NZCELL	*	I	Number of vertical cells
	NZLOWR	*	I	Number of cells below mixing height

continued

TABLE 3-21. Concluded.

Line	Variable	Columns	Type	Description
	NZUPPR	*	I	Number of cells above mixing height
	HTSUR	*	R	Height of surface layer (m)
	HTLOW	*	R	Height of the lower layer (m)
	HTUPP	*	R	Height of the upper layer (m)
7	IXY	*	I	Segment offset (always set at 0)
	JXY	*	I	Segment offset (always set at 0)
	NXDUM	*	I	Number of east/west cells (same as NXCELL)
	NYDUM	*	I	Number of north/south cells (same as NYCELL)
8+	INTYP	*	I	Type of emissions in input file (1) area (2) motor vehicle (3) low-level point sources (4) biogenic (5) seeps (6) point sources without UTM coordinates
	FCTR	*	R	One factor for increasing or decreasing each species in emissions file
9	MTITLE	1-60	A	Title

90008 32

```
 84155 3
 1  1  1 0 1
EMISSIONS  Atlanta 85 base case
 1 15    -999    -9.   -999    -9.
000.    000.   16    660000.    3665000.   4000. 4000.
 40   40    5   2    3      0.     50.    150.
  0     0    40   40
 1      1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000
        1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000
 2      1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000
        1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000
 3      1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000
        1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000
Atlanta '85 base case -- area, mv and low-level points
```

EXHIBIT 3-30. Example of user input file to POSTEMS.

TABLE 3-22. File of activity codes (unit 14) used by the POSTEMS program. (See Exhibit 3-31)

Line	Variable	Columns	Type	Description
1+	IACOD	1-3	I	Activity code
	IAGLO	8-63	A	Code definition

```
100     RESOURCE DEVELOPMENT & AGRICULTURE
110         AGRICULTURAL PRODUCTION
111             AGRICULTURAL CROPS
112             AGRICULTURAL LIVESTOCK
113             AGRICULTURAL SERVICES
120         FORESTRY
130         MINING
131             METAL MINING
132             COAL MINING
133             STONE & CLAY (MINING)
134             CHEMICALS & FERTILIZER MINERAL
140         OIL & GAS EXTRACTION
141             LIQUID GAS PRODUCTION
200     MANUFACTURING & INDUSTRIAL
210         FOOD & KINDRED
211             FRUIT/VEG PRESERVATION
212             GRAIN MILL PRODUCTS
213             BAKERY PRODUCTS
214             VEGETABLE OIL
215             SUGAR MFG/REFINING
216             MALT BEVERAGES
217             WINES & BRANDY
220         LUMBER & WOOD PRODUCTS
230         PAPER & ALLIED
231             PULP & PAPER MILLS
240         CHEMICAL & ALLIED
241             RUBBER & PLASTICS MFG
242             DRUGS
243             CLEANING/TOILET PREP
244             PAINT MFG
245             AGRI CHEMICALS
260         PETROLEUM REFINING/RELATED
261             PETROLEUM REFINING
262             PAVING & ROOFING MATERIALS
263             PET COKE/BRIQUETTE
270         MINERAL PRODUCTS
271             GLASS/GLASS PRODUCTS
280         METALLURGICAL
281             IRON/STEEL PRODUCTION
282             IRON/STEEL FOUNDRY
283             NONFERROUS METALS
290         MISC. MANUFACTURING
291             TEXTILES & APPAREL
292             FURNITURE & FIXTURES
293             FABRICATED METAL
294             MACHINERY
295             TRANSPORTATION EQUIPMENT
296             RUBBER & PLASTICS FAB.
297             TOBACCO MANUFACTURING
298             INSTRUMENTS
300     SERVICES & COMMERCE
310         ELECTRIC UTILITIES
320         PETROLEUM & GAS MARKETING
321             BULK PLANTS
322             SERVICE STATIONS
323             PIPE LINES
330         MISC. SERVICES
331             STEAM SUPPLY
332             PRINTING & PUBLISHING
333             LAUNDRY & DRYCLEANERS
334             SANITARY & WATER
335             HEALTH SERVICES
336             EDUCATIONAL SERVICES
400     TRANSPORTATION
```

EXHIBIT 3-31. Example of activity codes file input to POSTEMS.

410	ON-ROAD TRAVEL
420	RAIL TRANSPORT
430	WATER BORNE
440	AIR TRANSPORTATION
500	DOMESTIC
510	RESIDENTIAL
520	RECREATIONAL
600	MISC. ACTIVITIES
610	CONSTRUCTION
611	BUILDING CONSTRUCTION
612	ROAD CONSTRUCTION
620	NATURAL SOURCES
630	GOVERNMENT
631	NATIONAL SECURITY
801	SEEPS/BIOGENIC
802	CHANNEL SHIPPING
803	OCS AND RELATED SOURCES
804	TIDELAND PLATFORMS
900	UNSPECIFIED ACTIVITIES

EXHIBIT 3-31 Concluded.

TABLE 3-23. File of process codes (unit 15) used by the POSTEMS program. (See Exhibit 3-32)

Line	Variable	Columns	Type	Description
1+	IPCOD	1-3	I	Process code
	IPGLO	8-63	A	Code definition

90008 32

```
100    FUEL COMBUSTION
110         BOILERS & HEATERS
111              BOILERS
112              SPACE HEATERS
113              ORCHARD HEATERS
114              PROCESS HEATERS
120         IN-PROCESS FUEL
130         STATIONARY I.C. ENGINES
131         TURBINE - CMBSTN GASES
140         EQUIPMENT
141             UTILITY EQUIPMENT
142             MOBILE EQUIPMENT
200    WASTE BURNING
210         INCINERATION
211             CONICAL BURNER
220         OPEN BURNING
221             AGRI DEBRIS
222             RANGE IMPROVEMENT
223             FOREST MANAGEMENT
300    SOLVENT USE
310         DRY CLEANING
320         DEGREASING
330         SURFACE COATING
340         ASPHALT PAVING
350         PRINTING
400    LIQUID STORAGE & TRANSFER
410         TANKS
420         TANK CARS & TRUCKS
430         MARINE VESSELS
440         VEHICLE REFUELING
500    INDUSTRIAL PROCESSES
510         CHEMICAL PROCESSES
520         FOOD & AGRICULTURAL
530         PETROLEUM & RELATED
540         MINERAL PROCESSES
550         METAL PROCESSES
551             PRIMARY METAL
552             SECONDARY METAL
553             METAL FABRICATION
560         WOOD & PAPER PROCESSES
570         RUBBER & PLASTICS
600    MISC PROCESSES
610         PESTICIDE APPLICATION
620         SOLID WASTE LAND FILL
621         WASTE DISPOSAL
630         FARMING OPERATIONS
640         CONSTRUCTION & DEMOLITION
650         ROAD TRAVEL
651             UNPAVED ROAD
652             PAVED ROAD
660         UNPLANNED FIRES
661             WILD FIRES
662             STRUCTURAL FIRES
700    VEHICULAR SOURCES
710         ON-ROAD MOTOR VEHICLES
720         OFF-ROAD MOTOR VEHICLES
730         TRAINS
740         SHIPS
750         AIRCRAFT
801    SEEPS/BIOGENIC
802    CHANNEL SHIPPING
803    OCS AND RELATED SOURCES
804    TIDELAND PLATFORMS
900    UNSPECIFIED PROCESSES
```

EXHIBIT 3-32. Example of process codes file input to POSTEMS.

TABLE 3-24. File of OIC source codes (unit 16) used by the POSTEMS program. (See Exhibit 3-33)

Line	Variable	Columns	Type	Description
1+	IOCOD	1-3	I	Source category code
	IOGLO	8-63	A	Code definition

90008 32

```
100    FUEL COMBUSTION
110         AGRICULTURAL
120         OIL AND GAS PRODUCTION
130         PETROLEUM REFINING
140         OTHER MANUFACTURING/INDUSTRIAL
150         ELECTRIC UTILITIES
160         OTHER SERVICES AND COMMERCE
170         RESIDENTIAL
199         OTHER
200    WASTE BURNING
210         AGRICULTURAL DEBRIS
220         RANGE MANAGEMENT
230         FOREST MANAGEMENT
240         INCINERATION
299         OTHER
300    SOLVENT USE
310         DRY CLEANING
320         DEGREASING
330         ARCHITECTURAL COATING
340         OTHER SURFACE COATING
350         ASPHALT PAVING
360         PRINTING
370         DOMESTIC
380         INDUSTRIAL SOLVENT USE
399         OTHER
400    PETROLEUM PROCESS, STORAGE & TRANSFER
410         OIL AND GAS EXTRACTION
420         PETROLEUM REFINING
430         PETROLEUM MARKETING
499         OTHER
500    INDUSTRIAL PROCESSES
510         CHEMICAL
520         FOOD AND AGRICULTURAL
560         MINERAL PROCESSES
570         METAL PROCESSES
580         WOOD AND PAPER
599         OTHER
600    MISC PROCESSES
610         PESTICIDE APPLICATION
620         FARMING OPERATIONS
630         CONSTRUCTION AND DEMOLITION
640         ENTRAINED ROAD DUST - PAVED
650         ENTRAINED ROAD DUST - UNPAVED
660         UNPLANNED FIRES
680         WASTE DISPOSAL
685         NATURAL SOURCES
699         OTHER
700    ON ROAD VEHICLES
710         LIGHT DUTY PASSENGER
720         LIGHT AND MEDIUM DUTY TRUCKS
730         HEAVY DUTY GAS TRUCKS
740         HEAVY DUTY DIESEL TRUCKS
750         MOTORCYCLES
799         OTHER
800    OTHER MOBILE
810         OFF ROAD VEHICLES
820         TRAINS
830         SHIPS
850         AIRCRAFT - GOVERNMENT
860         AIRCRAFT - OTHER
870         MOBILE EQUIPMENT
880         UTILITY EQUIPMENT
891    SEEPS/BIOGENIC
892    CHANNEL SHIPPING
```

EXHIBIT 3-33. Example of source category codes file input to POSTEMS.

893	OCS AND RELATED SOURCES
894	TIDELAND PLATFORMS
900	UNSPECIFIED SOURCES

EXHIBIT 3-33 Concluded.

TABLE 3-25. File of emission control codes (unit 17) used by the POSTEMS program. (See Exhibit 3-34)

Line	Variable	Columns	Type	Description
1+	ICCOD	1-4	I	Emission control code
	ICGLO	8-63	A	Code definition

```
 99   UNSPECIFIED
101   UTILITY BOILERS - LIQUID FUELS
102   UTILITY BOILERS - GASEOUS FUELS
103   REFINERY BOILERS & HEATERS - LIQ. FUEL
104   RESIDENTIAL SPACE HEATERS - NATURAL GAS
105   RESIDENTIAL WATER HEATERS - NATURAL GAS
107   NON-UTILITY I. C. ENGINES - GASEOUS
108   UTILITY RECIPROCAL - LIQUIDS
109   INDUSTRIAL BOILERS
110   CEMENT KILNS
111   GLASS MELTING FURN CONTNR/SOLM
112   MARINE DIESEL ENGINES
113   NON-FARM EQUIPMENT (DIESEL)
114   SULFUR IN FUEL
116   UTILITY TURBINES - LIQUIDS
117   REFINERY BOILERS & HEATERS - GAS. FUEL
118   STEAM GENERATORS - LIQUIDS
121   PIPELINE HEATERS
122   MARINE VESSELS - COMBUSTION
124   UTILITY TURBINES - GASEOUS
125   COGENERATION
126   TEOR STEAM GENERATORS - GASEOUS
127   NON-UTIL I.C. ENGINES - LIQUID
128   RESOURCE RECOVERY
129   BOILERS-SPACE HEATERS-LIQ FUEL
130   BOILERS-SPACE HEATERS-GAS FUEL
131   UTILITY RECIPROCAL - GASEOUS
201   FLARES
301   ARCHITECTURAL COATINGS - OIL BASED
302   ARCHITECTURAL COATINGS - WATER BASED
303   ARCHITECTURAL COATINGS - SOLVENTS
304   AUTO ASSEMBLY LINE - SURFACE COATING
305   AUTO ASSEMBLY LINE - SOLVENT USE
306   CAN & COIL - SURFACE COATING
307   CAN & COIL - SOLVENT USE
308   METAL PARTS & PROD. - SURFACE COATING
309   METAL PARTS & PROD. - SOLVENT USE
310   PAPER - SURFACE COATING
311   PAPER - SOLVENT USE
312   FABRIC - SURFACE COATING
313   FABRIC - SOLVENT USE
314   DEGREASING-NON-SYNTH&MISC-(IND)
315   DEGREASING-NON-SYNTH&MISC-(COMM)
316   CUTBACK ASPHALT PAVING MATERIALS
317   DRY CLEANING (NON-SYNTHETIC)
318   DRY CLEANING (SYNTHETIC&MISC)
319   GRAPHIC ARTS-EXCPT LITHO/L PTRS
320   WOOD FURNITURE - SURFACE COATINGS
321   WOOD FURNITURE - SOLVENT USE
323   AUTO REFINISHING - SURFACE COATINGS
325   SHIPS - SURFACE COATING
326   SHIPS - SOLVENT USE
327   AEROSPACE - SURFACE COATING
328   AEROSPACE - SOLVENT USE
331   DEGREASING SYNTHETIC (INDUS)
332   DEGREASING SYNTHETIC (COMM)
333   FLATWOOD PRODUCTS
334   GRAPHIC ARTS - LITHO/LTTR PRESS
398   OTHER INDUSTRIAL SURFACE COATING
399   UNSPECIFIED IND. SOLVENT USE
401   GASOLINE WORKING LOSS - BULK STORAGE
402   GASOLINE WORKING LOSS - TANK TRUCKS
403   GASOLINE WORKING LOSSES - UNDGRND TANK
404   GASOLINE WORKING LOSSES - VEHICLE TANK
```

EXHIBIT 3-34. Example of control codes file input to POSTEMS.

405	FIXED ROOF TANKS AT REFINERIES
406	FLOATING ROOF TANKS AT REFINERIES
407	MARINE VESSEL OPERATION - EVAP.
410	OIL PRODUCTION FIELDS STORAGE TANKS
411	MARINE LIGHTERING
412	GASOLINE BREATHING LOSS - UNDG
413	GASOLINE BREATHING LOSS - ABOVEG
501	REFINERY VALVES,FLANGES, & SEALS
502	PETROLEUM COKE CALCINING
503	SULFUR RECOVERY UNITS
504	SULFURIC ACID PLANTS
505	FLUID CATALYTIC CRACKING UNITS
506	GAS-OIL PROD.-VALVES,FLANGES,CONNECTORS
507	SMALL RELIEF VALVES
508	NON-REFINERY VALVES
510	VEGETABLE OIL PROCESSING
511	PAINT MANUFACTURING
512	RUBBER PRODUCTS FABRICATION
513	CHEMICAL MANUFACTURING
514	PHARMACEUTICAL MANUFACTURING
515	RUBBER PRODUCTS MANUFACTURING
518	OIL PROD. STEAM DRIVE WELL
519	WINERIES
520	CARBON BLACK MANUFACTURING
522	PUMPS & COMPRESSORS
523	REFINERY SEWERS & DRAINS
524	REFINERY PUMPS & COMPRESSORS
526	REFINERY VACUUM SYSTEM
530	OIL PROD. PUMP AND COMPRESSORS
531	OIL PROD. HEAVY OIL TEST STATION
532	OIL PROD. CYCLIC WELL VENTS
533	OIL PROD. PSEUDO-CYCLIC WELL
534	OIL PRODUCTION SUMPS AND PITS
535	NATURAL GAS PLANT FUGITIVES
601	CONSTRUCTION & DEMOLITION
602	WASTE SOLVENT DISPOSAL
603	PESTICIDES (SYNTHETIC)
604	ROOFING TAR POTS
605	PESTICIDES (NON-SYNTHETIC)
606	AEROSOL PROPELLANT SYNTHETIC
607	AEROSOL PROPELLANT NON-SYNTHETIC
608	WASTE DISPOSAL LANDFILL
609	DOMESTIC SOLVENT USE
610	AEROSOL CONSUM PROD PROPELLANT
611	AEROSOL CONSUM PROD SOLVENT
612	NON-AEROSOL CONSUM PROD SOLVNT
620	AGRICULTURAL PESTIC - SYNTHETIC
621	AGRICULTURAL PESTIC - NON-SYNTH
622	OTHER PESTIC - SYNTHETIC
623	OTHER PESTIC - NON-SYNTH
651	UNPAVED CITY/COUNTY ROAD DUST
711	LDGV - EXHAUST
712	LDA - HOT START
713	LDA - HOT STABILIZED
714	LDGV - EVAPORATIVE
715	LDGV - RUNNING LOSSES
716	LDA - CRANKCASE BLOWBY
717	LDA - TIRE WEAR
718	LDGV - REFUELING
719	GASV - OFF-HIGHWAY EXHAUST
720	GASV - OFF-HIGHWAY EVAPORATIVE
721	LDT - COLD START
722	LDT - HOT START
723	LDT - HOT STABILIZED
724	LDT - HOT SOAK EVAP.
725	LDT - DIURNAL EVAP.

EXHIBIT 3-34 Continued.

726	LDT - CRANKCASE BLOWBY
727	LDT - TIRE WEAR
731	HDGV - EXHAUST
732	HDT - HOT START
733	HDT - HOT STABILIZED
734	HDGV - EVAPORATIVE
735	HDGV - RUNNING LOSSES
736	HDT - CRANKCASE BLOWBY
737	HDT - TIRE WEAR
738	HDGV - REFUELING
741	HDGV - EXHAUST
742	HDG - HOT START
743	HDG - HOT STABILIZED
744	HDGV - EVAPORATIVE
745	HDGV - RUNNING LOSSES
746	HDG - CRANKCASE BLOWBY
747	HDG - TIRE WEAR
748	HDGV - REFUELING
751	HDD - EXHAUST
753	HDD - HOT STABILIZED
757	HDD - TIRE WEAR
759	HDD - OFF-HIGHWAY EXHAUST
761	MCY - COLD START
762	MCY - HOT START
763	MCY - HOT STABILIZED
764	MCY - HOT SOAK EVAP.
765	MCY - DIURNAL EVAP.
766	MCY - CRANKCASE BLOWBY
767	MCY - TIRE WEAR
801	NON-FARM EQUIPMENT (GASOLINE)
802	FARM EQUIPMENT (DIESEL)
803	LAWN & GARDEN EQUIP (UTILITY)
804	OFF-ROAD MOTORCYCLES
805	PLEASURE CRAFT (BOATS)
806	RAILROAD LINE HAUL OPERATIONS
807	COMM./CIVIL PISTON AIRCRAFT
808	COMM. JET AIRCRAFT
809	FARM EQUIPMENT (GASOLINE)
811	LDA - NCAT - COLD START
812	LDA - NCAT - HOT START
813	LDA - NCAT - HOT STABILIZED
814	LDA - NCAT - HOT SOAK
815	LDA - NCAT - DIURNAL
816	LDA - NCAT - CRANKCASE
817	LDA - NCAT - TIREWEAR
821	LDA - CAT - COLD START
822	LDA - CAT - HOT START
823	LDA - CAT - HOT STABILIZED
824	LDA - CAT - HOT SOAK
825	LDA - CAT - DIURNAL
827	LDA - CAT - TIREWEAR
831	LDA - DSL - COLD START
832	LDA - DSL - HOT START
833	LDA - DSL - HOT STABILIZED
837	LDA - DSL - TIREWEAR
841	LHDT - NCAT - COLD START
842	LHDT - NCAT - HOT START
843	LHDT - NCAT - HOT STABILIZED
844	LHDT - NCAT - HOT SOAK
845	LHDT - NCAT - DIURNAL
846	LHDT - NCAT - CRANKCASE
847	LHDT - NCAT - TIREWEAR
851	LHDT - CAT - COLD START
852	LHDT - CAT - HOT START
853	LHDT - CAT - HOT STABILIZED
854	LHDT - CAT - HOT SOAK

EXHIBIT 3-34 Continued.

855	LMDT - CAT - DIURNAL
857	LMDT - CAT - TIREWEAR
861	LMDT - DSL - COLD START
862	LMDT - DSL - HOT START
863	LMDT - DSL - HOT STABILIZED
867	LMDT - DSL - TIREWEAR
873	HDT - NCAT - HOT STABILIZED
874	HDT - NCAT - HOT SOAK
875	HDT - NCAT - DIURNAL
876	HDT - NCAT - CRANKCASE
877	HDT - NCAT - TIREWEAR
883	HDT - CAT - HOT STABILIZED
884	HDT - CAT - HOT SOAK
885	HDT - CAT - DIURNAL
887	HDT - CAT - TIREWEAR
891	SEEPS/BIOGENIC
892	CHANNEL SHIPPING
893	OCS AND RELATED SOURCES
894	TIDELAND PLATFORMS
901	FOREST MANAGEMENT CONTROL BURNING
902	WILD FIRES CONTROL BURNING
903	LIVESTOCK WASTE
999	MISC. CONTROL TACTICS

EXHIBIT 3-34 Concluded.

POSTEMS

TABLE 3-26. File of hydrocarbon speciation profile codes (unit 18) used by the POSTEMS program. (See Exhibit 3-35)

Line	Variable	Columns	Type	Description
1+	IFCOD	1-5	I	Hydrocarbon speciation profile code
	IFGLO	7-55	A	Code definition

90008 32

```
0000 Overall Average
0001 External Combustion Boiler - Residual Oil
0002 External Combustion Boiler - Distillate Oil
0003 External Combustion Boiler - Natural Gas
0004 External Combustion Boiler - Refinery Gas
0005 External Combustion Boiler - Coke Oven Gas
0007 Natural Gas Turbine
0008 Reciprocating Diesel Fuel Engine
0009 Reciprocating Distillate Oil Engine
0011 By-Product Coke Oven Stack Gas
0012 Blast Furnace Ore Charging and Agglomerate
0013 Iron Sintering
0014 Open Hearth Furnace with Oxygen Lance
0016 Basic Oxygen Furnace
0023 Asphalt Roofing - Spraying
0024 Asphalt Roofing - Tar Kettle
0025 Asphaltic Concrete - Natural Gas Rotary Dryer
0026 Asphaltic Concrete - In Place Road Asphalt
0029 Refinery Fluid Catalytic Cracker
0031 Refinery Fugitive Emissions - Covered Drainage/Separation Pits
0035 Refinery Fugitive Emissions - Cooling Towers
0039 Refinery Fugitive Emissions - Compressor Seals Refinery Gas
0047 Refinery Fugitive Emissions - Relief Valves, Liquified Petroleum Gas
0051 Natural Gas
0066 Varnish Manufacturing - Bodying Oil
.
.
.
9014 Rubber and Miscellaneous Plastics Products - Average
9015 Oil and Gas Production - Average
9016 Textile Products - Average
9017 Drycleaning/Degreasing - Average
9021 Surface Coating Operations - Average
9022 Solid Waste Disposal - Average
9023 Thinning Solvents - Average
9024 Petroleum Product Storage - Average
9025 Bulk Terminals - Petroleum Storage Tanks - Average
9026 Printing/Publishing - Average
9027 Transportation and Marketing of Petroleum Products - Average
9028 Organic Chemical Storage - Average
9029 Organic Chemical Storage - Fixed Roof Tanks - Alcohols - Average
9030 Organic Chemical Storage - Fixed Roof Tanks - Alkanes - Average
9031 Organic Chemical Storage - Fixed Roof Tanks - Alkenes - Average
9032 Organic Chemical Storage - Fixed Roof Tanks - Amines - Average
9033 Organic Chemical Storage - Fixed Roof Tanks - Aromatics - Average
9034 Organic Chemical Storage - Fixed Roof Tanks - Carboxylic Acids - Average
9035 Organic Chemical Storage - Fixed Roof Tanks - Esters - Average
9036 Organic Chemical Storage - Fixed Roof Tanks - Glycol Ethers - Average
9037 Organic Chemical Storage - Fixed Roof Tanks - Glycols - Average
9038 Organic Chemical Storage - Fixed Roof Tanks - Halogenated Organics - Average
9039 Organic Chemical Storage - Fixed Roof Tanks - Isocyanates - Average
9040 Organic Chemical Storage - Fixed Roof Tanks - Ketones - Average
9041 Organic Chemical Storage - Floating Roof Tanks - Aldehydes - Average
9042 Organic Chemical Storage - Floating Roof Tanks - Alkanes - Average
9043 Organic Chemical Storage - Floating Roof Tanks - Ethers - Average
9044 Organic Chemical Storage - Floating Roof Tanks - Halogenated Organics - Avg.
9046 Organic Chemical Storage - Pressure Tanks - Alkenes - Average
9047 Organic Solvent Evaporation - Miscellaneous - Average
```

EXHIBIT 3-35. Example of profile codes file input to POSTEMS.

TABLE 3-27. Chemical species data file (unit 19) used by the POSTEMS program. (See Exhibit 3-36)

Line	Variable	Columns	Type	Description
1+	ICHRAC(1)	1-5	I	SAROAD chemical species code
	WTMOL	6-13	R	Molecular weight of species
	ICHRAC(2)	14-15	I	Carbon number of species
	NAME	20-49	A	Species name
2+	ICAT	1-5	I	SAROAD chemical species code
	BNDFRC	36-77	R	Nine carbon bond fractions (OLE, PAR, TOL, XYL, FORM, ALD2, ETH, ISOP, NRX)
3	IDUM	1-4	A	Dummy variable
	NCAT	10-12	I	Number of categories
4+	PRF	1-5	I	Hydrocarbon speciation profile code
	ICODE	6-10	I	SAROAD chemical species code
	WTPCNT	11-20	R	Weight percent

90008 32

```
43105   86.18      ISOMERS OF HEXANE
43106  100.20      ISOMERS OF HEPTANE
43107  114.23      ISOMERS OF OCTANE
43108  128.26      ISOMERS OF NONANE
43109  142.28      ISOMERS OF DECANE
43110  156.31      ISOMERS OF UNDECANE
43111  170.34      ISOMERS OF DODECANE
43112  184.36      ISOMERS OF TRIDECANE
43113  198.39      ISOMERS OF TETRADECANE
43114  212.42      ISOMERS OF PENTADECANE
43115   98.19      C7 CYCLOPARAFFINS
43116  112.21      C8 CYCLOPARAFFINS
43117  126.24      C9 CYCLOPARAFFINS
43118  114.00      MINERAL SPIRITS
43119  114.23      LACTOL SPIRITS
.
.
.
99141  574.00      C41 COMPOUNDS (DIESEL EXHAUST)
99142  588.00      C42 COMPOUNDS (DIESEL EXHAUST)
99143  602.00      C43 COMPOUNDS (DIESEL EXHAUST)
99908  142.28      2,3-DIMETHYLOCTANE
99909  142.28      2,6-DIMETHYLOCTANE
99910  142.28      2,4-DIMETHYLOCTANE
99911  142.28      3,4-DIMETHYLOCTANE
99912  120.19      1-METHYL-3-ETHYLBENZENE
99913  120.19      1-METHYL-2-ETHYLBENZENE
99915  134.22      ISOBUTYLBENZENE
99916  134.22      1-METHYL-3-N-PROPYLBENZENE
99917  134.22      1-METHYL-3-ISOPROPYLBENZENE
99918  156.31      2-METHYLDECANE
99933   32.04      DENATURANT
99998  102.18      ETHYL-T-BUTYL ETHER
99999   86.18      UNIDENTIFIED
    0
43105        0.    6.     0.     0.     0.     0.     0.     0.     0.     0.     0.
43106        0.    7.     0.     0.     0.     0.     0.     0.     0.     0.     0.
43107        0.    8.     0.     0.     0.     0.     0.     0.     0.     0.     0.
43108        0.    9.     0.     0.     0.     0.     0.     0.     0.     0.     0.
43109        0.    10.    0.     0.     0.     0.     0.     0.     0.     0.     0.
43110        0.    11.    0.     0.     0.     0.     0.     0.     0.     0.     0.
43111        0.    12     0.     0.     0.     0.     0.     0.     0.     0.     0.
43112        0.    13.    0.     0.     0.     0.     0.     0.     0.     0.     0.
43113        0.    14.    0.     0.     0.     0.     0.     0.     0.     0.     0.
43114        0.    15.    0.     0.     0.     0.     0.     0.     0.     0.     0.
43115        0.    7.     0.     0.     0.     0.     0.     0.     0.     0.     0.
43116        0.    8.     0.     0.     0.     0.     0.     0.     0.     0.     0.
43117        0.    9.     0.     0.     0.     0.     0.     0.     0.     0.     0.
43118        0.    6.     0.     0.     0.     1.     0.     0.     0.     0.     0.
43119        0.    8.     0.     0.     0.     0.     0.     0.     0.     0.     0.
.
.
.
99101        0.   0.01    0.     0.     0.     0.     0.     0.     0.     0.     .99
99102        0.  .07702   0.     0.     0.     0.   .11411   0.     0.     0.   .09874
99103     .9036 1.0677    0.     0.     0.     0.     0.     0.     0.     0.   .12500
99104     .0389 3.7034    0.     0.     0.   .1094    0.     0.     0.     0.     0.
99105     .0438 4.7769    0.     0.     0.   .1553    0.     0.     0.     0.     0.
99106     .2177 4.5092    0.     0.     0.   .0645    0.     0.     0.     0.   1.0104
99107     0.    1.5319  .8022    0.     0.     0.     0.     0.     0.     0.     0.
99108     .2089 4.9058    0.   .3345    0.     0.     0.     0.     0.     0.     0.
99109     0.    3.6290  .05556 .6075    0.   .0609    0.     0.     0.     0.     0.
99110     .1885 5.4808  .28856 .2654    0.     0.     0.     0.     0.     0.     0.
99111     .1539 10.692    0.     0.     0.     0.     0.     0.     0.     0.     0.
```

EXHIBIT 3-36. Example of chemical species file input to POSTEMS.

```
99112     0.     5.     1.     0.     0.     0.     0.     0.     0.     0.     0.
99113     0.     6.     1.                                          0.     0.
99114            7.     1.                                          0.     0.
.
.
99915       0.   3.     1.     0.     0.     0.     0.     0.     0.     0.     0.
99916       0.   2.     0.     1.     0.     0.     0.     0.     0.     0.     0.
99917       0.   2.     0.     1.     0.     0.     0.     0.     0.     0.     0.
99918       0.   11.    0.     0.     0.     0.     0.     0.     0.     0.     0.
99933       0.   1.     0.     0.     0.     0.     0.     0.     0.     0.     0.
99998       0.   4.                          1.
99999       0.   6.     0.     0.     0.     0.     0.     0.     0.     0.     0.
      999
 0000431050.0054
 0000431060.0025
 0000431070.0015
 0000431080.0019
 0000431090.0040
 0000431100.0005
 0000431110.0046
 0000431130.0001
 0000431140.0042
 0000431150.0071
 0000431160.0005
 0000431170.0000
 0000431180.0064
 0000431190.0036
.
.
 1178452050.3923
 1178900140.0267
 1185432020.1779
 1185432030.0000
 1185432040.0520
 1185432050.0077
 1185432060.1543
 1185432120.0638
 1185432130.0609
 1185432140.0300
 1185432150.0000
 1185432200.0118
.
.
 9046900110.2000
 9047433690.1250
 9047433700.1250
 9047434410.1250
 9047453000.1250
 9047455030.1250
 9047458010.1250
 9047458050.1250
 9047462100.1250
 -99
```

EXHIBIT 3-36 Concluded.

TABLE 3-28. Binary file(s) of emissions (units 30-35) used by the POSTEMS program.

Record	Variable	Type	Description
1	MDUM	A	Not used
	MDUM	A	Not used
	NSG2	I	Number of segments (= 1)
	NSPEC2	I	Number of chemical species
	JTODY1	I	Beginning date of the file (Julian)
	BEGTIM	R	Beginning time of the file (hours)
	JTODY2	I	Ending date of the file (Julian)
	ENDTIM	R	Ending time of the file (hours)
2	UTMX2	R	X coordinate (UTM units)
	UTMY2	R	Y coordinate (UTM units)
	IUTMZ2	I	UTM zone
	DUM	R	Not used
	DUM	R	Not used
	DELTX2	R	Grid cell size, x direction
	DELTY2	R	Grid cell size, y direction
	NXC12	I	Number of grid cells, x direction
	NYC12	I	Number of grid cells, y direction
	NDUM	I	Not used
	NDUM	I	Not used
	DUM	R	Not used
	DUM	R	Not used
	DUM	R	Not used
3	IXY2	I	X location of segment origin with respect to modeling region origin (grid units)
	IXY2	I	Y location of segment origin with respect to modeling region origin (grid units)
	NXC12	I	Number of grid cells in segment, x direction
	NYC12	I	Number of grid cells in segment, y direction
4	MSPC2	A	Species name

continued

TABLE 3-28. Concluded.

Record	Variable	Type	Description
For each time interval:			
5+	JTODAY	I	Beginning date (Julian)
	BTIM	R	Beginning time (hours)
	JNEXT	I	Ending date (Julian)
	ETIM	R	Ending time (hours)
For each segment, for each species:			
6+	NSG2	I	Segment number
	MSPC2	A	Species name
	EMISIN	R	Ground-level emissions (g-mol/h)

90008 32

TABLE 3-29. Binary file(s) of emission totals by category (units 36-41) used by the POSTEMS program.

Record	Variable	Type	Description
1	NACT	I	Number of activity codes
	NIDX	I	Number of species
	INKSUM	I	Checksum for input emission file verification
2	CAT+	R	Array containing NACT*NIDX activity totals
3	NPRC	I	Number of process codes
	NIDX	I	Number of species
	INKSUM	I	Checksum for input emission file verification
4	CAT+	R	Array containing NPRC*NIDX process totals
5	NOLD	I	Number of source category codes
	NIDX	I	Number of species
	INKSUM	I	Checksum for input emission file verification
6	CAT+	R	Array containing NOLD*NIDX source category totals
7	NCON	I	Number of control codes
	NIDX	I	Number of species
	INKSUM	I	Checksum for input emission file verification
8	CAT+	R	Array containing NCON*NIDX control totals
9	NPRF	I	Number of profile codes
	NIDX	I	Number of species
	INKSUM	I	Checksum for input emission file verification
10	CAT+	R	Array containing NPRF*NIDX profile totals

```
 Opened input file:
 in.postat185
 Opened message file:
 msg.postat185
Emissions input file: /u2/epsl-4/atlanta/omef/emiss.area.at185
Input rptsort file: /u2/epsl-4/atlanta/omef/rptots.area.at185
Emissions input file: /u2/epsl-4/atlanta/omef/emiss.mv.at185
Input rptsort file: /u2/epsl-4/atlanta/omef/rptots.mv.at185
Emissions input file: /u2/epsl-4/atlanta/omef/emiss.pts.at185
Input rptsort file: /u2/epsl-4/atlanta/omef/rptots.pts.at185
 Output UAM file opened:
 /u2/epsl-4/atlanta/omef/emiss.anthro.at185
  on unit  12
 Output tables opened:
 act.at185
  on unit   13
 Activities code index:   1
 Process code index:  84
 Old category codes:  148
 Control code:   215
 Profile codes:  434
EMISSIONS Atlanta '85 base case -- area, mv and low-level points
 1 15  84155    0. 84155   24.
      0.0          0.0  16  660000.0  3665000.0  4000. 4000.  40  40   5   2   3     0.    50.   150.
   0    0   40   40
 24 hours extracted from input files
      84155    0. 84155    1.
      84155    1. 84155    2.
      84155    2. 84155    3.
      84155    3. 84155    4.
      84155    4. 84155    5.
      84155    5. 84155    6.
      84155    6. 84155    7.
      84155    7. 84155    8.
      84155    8. 84155    9.
      84155    9. 84155   10.
      84155   10. 84155   11.
      84155   11. 84155   12.
      84155   12. 84155   13.
      84155   13. 84155   14.
      84155   14. 84155   15.
      84155   15. 84155   16.
      84155   16. 84155   17.
      84155   17. 84155   18.
      84155   18. 84155   19.
      84155   19. 84155   20.
      84155   20. 84155   21.
      84155   21. 84155   22.
      84155   22. 84155   23.
      84155   23. 84155   24.
 Check sum:  6801    on   576000   data points
Report file from emissions type:   1 on unit  36
      84155    0. 84155    1.
      84155    1. 84155    2.
      84155    2. 84155    3.
      84155    3. 84155    4.
      84155    4. 84155    5.
      84155    5. 84155    6.
      84155    6. 84155    7.
      84155    7. 84155    8.
      84155    8. 84155    9.
      84155    9. 84155   10.
      84155   10. 84155   11.
      84155   11. 84155   12.
```

EXHIBIT 3-37. Example of message file output from POSTEMS.

```
84155   12. 84155   13.
84155   13. 84155   14.
84155   14. 84155   15.
84155   15. 84155   16.
84155   16. 84155   17.
84155   17. 84155   18.
84155   18. 84155   19.
84155   19. 84155   20.
84155   20. 84155   21.
84155   21. 84155   22.
84155   22. 84155   23.
84155   23. 84155   24.
 Check sum:  8100   on   576000   data points
 Report file from emissions type:   2 on unit  37
84155    0. 84155    1.
84155    1. 84155    2.
84155    2. 84155    3.
84155    3. 84155    4.
84155    4. 84155    5.
84155    5. 84155    6.
84155    6. 84155    7.
84155    7. 84155    8.
84155    8. 84155    9.
84155    9. 84155   10.
84155   10. 84155   11.
84155   11. 84155   12.
84155   12. 84155   13.
84155   13. 84155   14.
84155   14. 84155   15.
84155   15. 84155   16.
84155   16. 84155   17.
84155   17. 84155   18.
84155   18. 84155   19.
84155   19. 84155   20.
84155   20. 84155   21.
84155   21. 84155   22.
84155   22. 84155   23.
84155   23. 84155   24.
 Check sum:  15157   on   576000   data points
Report file from emissions type:   3 on unit  38
Emission type:Total He report file written
output underway-----
84155    0. 84155    1.
84155    1. 84155    2.
84155    2. 84155    3.
84155    3. 84155    4.
84155    4. 84155    5.
84155    5. 84155    6.
84155    6. 84155    7.
84155    7. 84155    8.
84155    8. 84155    9.
84155    9. 84155   10.
84155   10. 84155   11.
84155   11. 84155   12.
84155   12. 84155   13.
84155   13. 84155   14.
84155   14. 84155   15.
84155   15. 84155   16.
84155   16. 84155   17.
84155   17. 84155   18.
84155   18. 84155   19.
84155   19. 84155   20.
84155   20. 84155   21.
84155   21. 84155   22.
84155   22. 84155   23.
84155   23. 84155   24.
```

EXHIBIT 3-37 Concluded.

POSTEMS

Emissions type: Total Me by Activity (tons/day) for day 84155

CODE	Activity Name	THC	RHC	CO	NOx	SOx	TSP
100	RESOURCE DEVELOPMENT & AGRICULTURE	0.00	0.00	0.00	0.00	0.00	0.00
110	AGRICULTURAL PRODUCTION	0.00	0.00	0.00	0.00	0.00	0.00
111	AGRICULTURAL CROPS	0.70	0.55	4.11	0.09	0.00	0.62
112	AGRICULTURAL LIVESTOCK	0.00	0.00	0.00	0.00	0.00	0.00
113	AGRICULTURAL SERVICES	0.00	0.00	0.00	0.00	0.00	0.00
120	FORESTRY	0.00	0.00	0.00	0.00	0.00	0.00
130	MINING	0.00	0.00	0.00	0.00	0.00	0.00
131	METAL MINING	0.00	0.00	0.00	0.00	0.00	0.00
132	COAL MINING	0.00	0.00	0.00	0.00	0.00	0.00
133	STONE & CLAY (MINING)	0.00	0.00	0.00	0.00	0.00	0.13
134	CHEMICALS & FERTILIZER MINERAL	0.00	0.00	0.00	0.00	0.00	0.00
140	OIL & GAS EXTRACTION	12.61	4.89	0.00	0.00	0.00	0.00
141	LIQUID GAS PRODUCTION	0.00	0.00	0.00	0.00	0.00	0.00
200	MANUFACTURING & INDUSTRIAL	8.54	7.33	4.85	5.13	0.04	0.69
210	FOOD & KINDRED	0.00	0.00	0.00	0.00	0.00	0.00
211	FRUIT/VEG PRESERVATION	0.00	0.00	0.00	0.00	0.00	0.00
212	GRAIN MILL PRODUCTS	0.00	0.00	0.00	0.00	0.00	0.00
213	BAKERY PRODUCTS	0.87	0.58	0.00	0.00	0.00	0.00
214	VEGETABLE OIL	0.00	0.00	0.00	0.00	0.00	0.00
215	SUGAR MFG/REFINING	0.00	0.00	0.00	0.00	0.00	0.00
216	MALT BEVERAGES	0.00	0.00	0.00	0.00	0.00	0.00
217	WINES & BRANDY	0.00	0.00	0.00	0.00	0.00	0.00
220	LUMBER & WOOD PRODUCTS	19.65	19.32	0.00	0.00	0.00	0.00
230	PAPER & ALLIED	0.01	0.01	0.01	0.04	0.02	0.01
231	PULP & PAPER MILLS	0.00	0.00	0.00	0.00	0.00	0.00
240	CHEMICAL & ALLIED	0.00	0.00	0.00	0.30	6.12	0.25
241	RUBBER & PLASTICS MFG	23.64	22.91	0.00	0.00	0.00	0.00
242	DRUGS	2.56	1.69	0.00	0.00	0.00	0.00
243	CLEANING/TOILET PREP	0.00	0.00	0.00	0.00	0.00	0.00
244	PAINT MFG	0.00	0.00	0.00	0.00	0.00	0.00
245	AGRI CHEMICALS	12.03	7.96	0.00	0.00	0.00	0.00
260	PETROLEUM REFINING/RELATED	0.00	0.00	0.00	0.00	0.00	0.00
261	PETROLEUM REFINING	11.32	8.15	0.00	0.00	0.00	0.00
262	PAVING & ROOFING MATERIALS	0.93	0.91	0.16	0.08	0.08	0.07
263	PET COKE/BRIQUETTE	0.00	0.00	0.00	0.00	0.00	0.00
270	MINERAL PRODUCTS	1.37	1.01	0.08	2.77	7.18	1.96
271	GLASS/GLASS PRODUCTS	0.03	0.02	0.06	3.22	1.16	0.75
280	METALLURGICAL	0.00	0.00	0.00	0.00	0.00	0.00
281	IRON/STEEL PRODUCTION	0.00	0.00	0.06	0.81	0.06	1.06
282	IRON/STEEL FOUNDRY	0.00	0.00	0.00	0.00	0.00	0.00
283	NONFERROUS METALS	0.00	0.00	0.04	0.02	4.11	0.05
290	MISC. MANUFACTURING	35.66	23.82	0.00	0.00	0.00	0.00
291	TEXTILES & APPAREL	0.33	0.33	0.03	0.12	0.00	0.00
292	FURNITURE & FIXTURES	5.46	5.36	0.00	0.00	0.00	0.00
293	FABRICATED METAL	2.85	2.80	0.00	0.00	0.00	0.00
294	MACHINERY	1.59	1.57	0.00	0.00	0.00	0.00
295	TRANSPORTATION EQUIPMENT	41.34	40.64	0.00	0.00	0.00	0.87
296	RUBBER & PLASTICS FAB.	2.07	2.00	0.00	0.00	0.00	0.00
297	TOBACCO MANUFACTURING	0.00	0.00	0.00	0.00	0.00	0.00
298	INSTRUMENTS	0.00	0.00	0.00	0.00	0.00	0.00

EXHIBIT 3-38. Example of category report tables output from POSTEMS.

Emissions type: Total Me by Activity (tons/day) for day 84155

CODE	Activity Name	THC	RHC	CO	NOx	SOx	TSP
300	SERVICES & COMMERCE						
310	ELECTRIC UTILITIES	14.55	14.12	0.92	2.89	1.85	0.28
320	PETROLEUM & GAS MARKETING	0.02	0.01	0.06	1.38	0.16	0.04
321	BULK PLANTS	23.91	23.22	0.00	0.00	0.00	0.00
322	SERVICE STATIONS	9.30	8.86	0.00	0.00	0.00	0.00
323	PIPE LINES	0.00	0.00	0.00	0.00	0.00	0.00
330	MISC. SERVICES	0.00	0.00	0.00	0.00	0.00	0.00
331	STEAM SUPPLY	0.34	0.14	0.00	0.00	0.00	0.00
332	PRINTING & PUBLISHING	0.00	0.00	0.00	0.00	0.00	0.00
333	LAUNDRY & DRYCLEANERS	14.83	12.09	0.00	0.00	0.00	0.00
334	SANITARY & WATER	4.80	2.44	0.00	0.00	0.00	0.00
335	HEALTH SERVICES	0.44	0.17	0.00	0.00	0.00	0.00
336	EDUCATIONAL SERVICES	0.00	0.00	0.00	0.00	0.00	0.00
400	TRANSPORTATION	0.00	0.00	0.00	0.00	0.00	0.00
410	ON-ROAD TRAVEL	0.00	0.00	0.00	0.00	0.00	0.00
420	RAIL TRANSPORT	704.62	663.94	1170.65	313.36	27.40	197.45
430	WATER BORNE	4.29	3.89	6.71	19.11	2.94	1.29
440	AIR TRANSPORTATION	5.82	5.49	17.95	0.23	0.04	0.00
500	DOMESTIC	7.90	6.51	42.84	9.39	1.01	0.48
510	RESIDENTIAL	0.00	0.00	0.00	0.00	0.00	0.00
520	RECREATIONAL	18.07	15.25	51.23	6.02	0.55	11.01
600	MISC. ACTIVITIES	0.00	0.00	0.00	0.00	0.00	0.00
610	CONSTRUCTION	0.00	0.00	0.00	0.00	0.00	0.00
611	BUILDING CONSTRUCTION	0.00	0.00	0.00	0.00	0.00	0.00
612	ROAD CONSTRUCTION	0.00	0.00	0.00	0.00	0.00	0.00
620	NATURAL SOURCES	0.00	0.00	0.00	0.00	0.00	0.00
630	GOVERNMENT	0.00	0.00	0.00	0.00	0.00	0.00
631	NATIONAL SECURITY	0.00	0.00	0.00	0.00	0.00	0.00
801	SEEPS/BIOGENIC	1.17	0.97	2.19	0.47	0.06	0.93
802	CHANNEL SHIPPING	0.00	0.00	0.00	0.00	0.00	0.00
803	OCS AND RELATED SOURCES	0.00	0.00	0.00	0.00	0.00	0.00
804	TIDELAND PLATFORMS	0.00	0.00	0.00	0.00	0.00	0.00
900	UNSPECIFIED ACTIVITIES	109.08	85.59	35.50	367.94	2064.42	52.64
TOTAL		1102.71	994.57	1337.45	733.38	2117.20	270.59

EXHIBIT 3-38. Continued.

POSTEMS

Emissions type: Total Me by Activity (tons/day) for day 84155

CODE	Activity Name	OLE	PAR	TOL	XYL	FORM
100	RESOURCE DEVELOPMENT & AGRICULTURE	0.00	0.00	0.00	0.00	0.00
110	AGRICULTURAL PRODUCTION	0.00	0.00	0.00	0.00	0.00
111	AGRICULTURAL CROPS	0.03	0.38	0.00	0.00	0.00
112	AGRICULTURAL LIVESTOCK	0.00	0.00	0.00	0.00	0.00
113	AGRICULTURAL SERVICES	0.00	0.00	0.00	0.00	0.00
120	FORESTRY	0.00	0.00	0.00	0.00	0.00
130	MINING	0.00	0.00	0.00	0.00	0.00
131	METAL MINING	0.00	0.00	0.00	0.00	0.00
132	COAL MINING	0.00	0.00	0.00	0.00	0.00
133	STONE & CLAY (MINING)	0.00	0.00	0.00	0.00	0.00
134	CHEMICALS & FERTILIZER MINERAL	0.00	0.00	0.00	0.00	0.00
140	OIL & GAS EXTRACTION	0.00	0.00	0.00	0.00	0.00
141	LIQUID GAS PRODUCTION	0.00	4.89	0.00	0.00	0.00
200	MANUFACTURING & INDUSTRIAL	0.00	0.00	0.00	0.00	0.00
210	FOOD & KINDRED	0.20	4.33	1.30	0.59	0.01
211	FRUIT/VEG PRESERVATION	0.00	0.00	0.00	0.00	0.00
212	GRAIN MILL PRODUCTS	0.00	0.00	0.00	0.00	0.00
213	BAKERY PRODUCTS	0.00	0.00	0.00	0.00	0.00
214	VEGETABLE OIL	0.06	0.35	0.05	0.01	0.01
215	SUGAR MFG/REFINING	0.00	0.00	0.00	0.00	0.00
216	MALT BEVERAGES	0.00	0.00	0.00	0.00	0.00
217	WINES & BRANDY	0.00	0.00	0.00	0.00	0.00
220	LUMBER & WOOD PRODUCTS	0.00	0.00	0.00	0.00	0.00
230	PAPER & ALLIED	0.01	8.81	8.36	1.83	0.00
231	PULP & PAPER MILLS	0.00	0.00	0.00	0.00	0.00
240	CHEMICAL & ALLIED	0.00	0.00	0.00	0.00	0.00
241	RUBBER & PLASTICS MFG	0.00	0.00	0.00	0.00	0.00
242	DRUGS	5.25	14.70	2.96	0.00	0.00
243	CLEANING/TOILET PREP	0.21	0.83	0.21	0.02	0.02
244	PAINT MFG	0.00	0.00	0.00	0.00	0.00
245	AGRI CHEMICALS	0.00	0.00	0.00	0.00	0.00
260	PETROLEUM REFINING/RELATED	0.99	3.92	0.99	0.09	0.07
261	PETROLEUM REFINING	0.00	0.00	0.00	0.00	0.00
262	PAVING & ROOFING MATERIALS	0.15	7.40	0.06	0.02	0.52
263	PET COKE/BRIQUETTE	0.01	0.62	0.00	0.28	0.00
270	MINERAL PRODUCTS	0.00	0.00	0.00	0.00	0.00
271	GLASS/GLASS PRODUCTS	0.04	0.85	0.01	0.08	0.02
280	METALLURGICAL	0.00	0.02	0.00	0.00	0.00
281	IRON/STEEL PRODUCTION	0.00	0.00	0.00	0.00	0.00
282	IRON/STEEL FOUNDRY	0.00	0.00	0.00	0.00	0.00
283	NONFERROUS METALS	0.00	0.00	0.00	0.00	0.00
290	MISC. MANUFACTURING	0.00	0.00	0.00	0.00	0.00
291	TEXTILES & APPAREL	2.39	14.16	2.23	0.38	0.51
292	FURNITURE & FIXTURES	0.00	0.33	0.00	0.00	0.00
293	FABRICATED METAL	0.00	2.45	2.32	0.51	0.00
294	MACHINERY	0.00	1.28	1.21	0.27	0.00
295	TRANSPORTATION EQUIPMENT	0.00	0.71	0.68	0.15	0.00
296	RUBBER & PLASTICS FAB.	0.02	18.53	17.59	3.84	0.00
297	TOBACCO MANUFACTURING	0.46	1.28	0.26	0.00	0.00
298	INSTRUMENTS	0.00	0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00	0.00

EXHIBIT 3-38. Continued.

Emissions type: Total Me by Activity (tons/day) for day 84155

CODE	Activity Name	OLE	PAR	TOL	XYL	FORM
300	SERVICES & COMMERCE	0.33	7.13	3.02	3.36	0.01
310	ELECTRIC UTILITIES	0.00	0.01	0.00	0.00	0.00
320	PETROLEUM & GAS MARKETING	0.56	8.57	5.86	8.08	0.00
321	BULK PLANTS	0.15	6.96	0.65	0.80	0.02
322	SERVICE STATIONS	0.00	0.00	0.00	0.00	0.00
323	PIPE LINES	0.00	0.00	0.00	0.00	0.00
330	MISC. SERVICES	0.02	0.09	0.00	0.00	0.00
331	STEAM SUPPLY	0.00	0.00	0.00	0.00	0.00
332	PRINTING & PUBLISHING	0.02	11.13	0.74	0.15	0.00
333	LAUNDRY & DRYCLEANERS	0.03	2.09	0.14	0.17	0.00
334	SANITARY & WATER	0.02	0.11	0.00	0.00	0.00
335	HEALTH SERVICES	0.00	0.00	0.00	0.00	0.00
336	EDUCATIONAL SERVICES	0.00	0.00	0.00	0.00	0.00
400	TRANSPORTATION	0.00	0.00	0.00	0.00	0.00
410	ON-ROAD TRAVEL	19.93	467.61	70.06	61.60	2.53
420	RAIL TRANSPORT	0.24	2.09	0.92	0.08	0.22
430	WATER BORNE	0.14	4.15	0.27	0.39	0.01
440	AIR TRANSPORTATION	0.88	2.22	0.14	0.14	0.86
500	DOMESTIC	0.00	0.00	0.00	0.00	0.00
510	RESIDENTIAL	1.91	10.10	0.00	0.00	0.00
520	RECREATIONAL	0.00	0.00	0.00	0.00	0.00
600	MISC. ACTIVITIES	0.00	0.00	0.00	0.00	0.00
610	CONSTRUCTION	0.00	0.00	0.00	0.00	0.00
611	BUILDING CONSTRUCTION	0.00	0.00	0.00	0.00	0.00
612	ROAD CONSTRUCTION	0.00	0.00	0.00	0.00	0.00
620	NATURAL SOURCES	0.00	0.00	0.00	0.00	0.00
630	GOVERNMENT	0.00	0.00	0.00	0.00	0.00
631	NATIONAL SECURITY	0.13	0.31	0.02	0.02	0.13
801	SEEPS/BIOGENIC	0.00	0.00	0.00	0.00	0.00
802	CHANNEL SHIPPING	0.00	0.00	0.00	0.00	0.00
803	OCS AND RELATED SOURCES	0.00	0.00	0.00	0.00	0.00
804	TIDELAND PLATFORMS	0.00	0.00	0.00	0.00	0.00
900	UNSPECIFIED ACTIVITIES	1.37	50.94	4.36	1.73	0.46
TOTAL		35.54	659.36	124.41	84.62	5.40

EXHIBIT 3-38. Continued.

POSTEMS

Emissions type: Total He by Activity (tons/day) for day 84155

CODE	Activity Name	ALD2	ETH	MEOH	ETOH	ISOP
100	RESOURCE DEVELOPMENT & AGRICULTURE	0.00	0.00	0.00	0.00	0.00
110	AGRICULTURAL PRODUCTION	0.00	0.00	0.00	0.00	0.00
111	AGRICULTURAL CROPS	0.00	0.14	0.00	0.00	0.00
112	AGRICULTURAL LIVESTOCK	0.00	0.00	0.00	0.00	0.00
113	AGRICULTURAL SERVICES	0.00	0.00	0.00	0.00	0.00
120	FORESTRY	0.00	0.00	0.00	0.00	0.00
130	MINING	0.00	0.00	0.00	0.00	0.00
131	METAL MINING	0.00	0.00	0.00	0.00	0.00
132	COAL MINING	0.00	0.00	0.00	0.00	0.00
133	STONE & CLAY (MINING)	0.00	0.00	0.00	0.00	0.00
134	CHEMICALS & FERTILIZER MINERAL	0.00	0.00	0.00	0.00	0.00
140	OIL & GAS EXTRACTION	0.00	0.00	0.00	0.00	0.00
141	LIQUID GAS PRODUCTION	0.00	0.00	0.00	0.00	0.00
200	MANUFACTURING & INDUSTRIAL	0.04	0.86	0.00	0.00	0.00
210	FOOD & KINDRED	0.00	0.00	0.00	0.00	0.00
211	FRUIT/VEG PRESERVATION	0.00	0.00	0.00	0.00	0.00
212	GRAIN MILL PRODUCTS	0.00	0.00	0.00	0.00	0.00
213	BAKERY PRODUCTS	0.01	0.07	0.01	0.01	0.00
214	VEGETABLE OIL	0.00	0.00	0.00	0.00	0.00
215	SUGAR MFG/REFINING	0.00	0.00	0.00	0.00	0.00
216	MALT BEVERAGES	0.00	0.00	0.00	0.00	0.00
217	WINES & BRANDY	0.00	0.00	0.00	0.00	0.00
220	LUMBER & WOOD PRODUCTS	0.31	0.00	0.00	0.00	0.00
230	PAPER & ALLIED	0.00	0.00	0.00	0.00	0.00
231	PULP & PAPER MILLS	0.00	0.00	0.00	0.00	0.00
240	CHEMICAL & ALLIED	0.00	0.00	0.00	0.00	0.00
241	RUBBER & PLASTICS MFG	0.00	0.00	0.00	0.00	0.00
242	DRUGS	0.05	0.30	0.04	0.00	0.00
243	CLEANING/TOILET PREP	0.00	0.00	0.00	0.00	0.00
244	PAINT MFG	0.00	0.00	0.00	0.00	0.00
245	AGRI CHEMICALS	0.25	1.43	0.20	0.02	0.00
260	PETROLEUM REFINING/RELATED	0.00	0.00	0.00	0.00	0.00
261	PETROLEUM REFINING	0.00	0.00	0.00	0.00	0.00
262	PAVING & ROOFING MATERIALS	0.00	0.00	0.00	0.00	0.00
263	PET COKE/BRIQUETTE	0.00	0.00	0.00	0.00	0.00
270	MINERAL PRODUCTS	0.00	0.01	0.00	0.00	0.00
271	GLASS/GLASS PRODUCTS	0.00	0.00	0.00	0.00	0.00
280	METALLURGICAL	0.00	0.00	0.00	0.00	0.00
281	IRON/STEEL PRODUCTION	0.00	0.00	0.00	0.00	0.00
282	IRON/STEEL FOUNDRY	0.00	0.00	0.00	0.00	0.00
283	NONFERROUS METALS	0.00	0.00	0.00	0.00	0.00
290	MISC. MANUFACTURING	0.60	2.86	0.38	0.30	0.00
291	TEXTILES & APPAREL	0.00	0.00	0.00	0.00	0.00
292	FURNITURE & FIXTURES	0.09	0.00	0.00	0.00	0.00
293	FABRICATED METAL	0.05	0.00	0.00	0.00	0.00
294	MACHINERY	0.03	0.00	0.00	0.00	0.00
295	TRANSPORTATION EQUIPMENT	0.66	0.00	0.00	0.00	0.00
296	RUBBER & PLASTICS FAB.	0.00	0.00	0.00	0.00	0.00
297	TOBACCO MANUFACTURING	0.00	0.00	0.00	0.00	0.00
298	INSTRUMENTS	0.00	0.00	0.00	0.00	0.00

EXHIBIT 3-38. Continued.

Emissions type: Total He by Activity (tons/day) for day 84155

CODE	Activity Name	ALD2	ETH	MEOH	ETOH	ISOP
300	SERVICES & COMMERCE	0.24	0.02	0.00	0.00	0.00
310	ELECTRIC UTILITIES	0.00	0.00	0.00	0.00	0.00
320	PETROLEUM & GAS MARKETING	0.16	0.00	0.00	0.00	0.00
321	BULK PLANTS	0.28	0.00	0.00	0.00	0.00
322	SERVICE STATIONS	0.00	0.00	0.00	0.00	0.00
323	PIPE LINES	0.00	0.00	0.00	0.00	0.00
330	MISC. SERVICES	0.00	0.03	0.00	0.00	0.00
331	STEAM SUPPLY	0.00	0.00	0.00	0.00	0.00
332	PRINTING & PUBLISHING	0.05	0.00	0.00	0.00	0.00
333	LAUNDRY & DRYCLEANERS	0.00	0.00	0.00	0.00	0.00
334	SANITARY & WATER	0.00	0.04	0.00	0.00	0.00
335	HEALTH SERVICES	0.00	0.00	0.00	0.00	0.00
336	EDUCATIONAL SERVICES	0.00	0.00	0.00	0.00	0.00
400	TRANSPORTATION	0.00	0.00	0.00	0.00	0.00
410	ON-ROAD TRAVEL	20.25	21.51	0.00	0.00	0.45
420	RAIL TRANSPORT	0.21	0.12	0.00	0.00	0.00
430	WATER BORNE	0.26	0.26	0.00	0.00	0.01
440	AIR TRANSPORTATION	0.54	1.74	0.00	0.00	0.00
500	DOMESTIC	0.00	0.00	0.00	0.00	0.00
510	RESIDENTIAL	0.00	3.24	0.00	0.00	0.00
520	RECREATIONAL	0.00	0.00	0.00	0.00	0.00
600	MISC. ACTIVITIES	0.00	0.00	0.00	0.00	0.00
610	CONSTRUCTION	0.00	0.00	0.00	0.00	0.00
611	BUILDING CONSTRUCTION	0.00	0.00	0.00	0.00	0.00
612	ROAD CONSTRUCTION	0.00	0.00	0.00	0.00	0.00
620	NATURAL SOURCES	0.00	0.00	0.00	0.00	0.00
630	GOVERNMENT	0.00	0.00	0.00	0.00	0.00
631	NATIONAL SECURITY	0.08	0.27	0.00	0.00	0.00
801	SEEPS/BIOGENIC	0.00	0.00	0.00	0.00	0.00
802	CHANNEL SHIPPING	0.00	0.00	0.00	0.00	0.00
803	OCS AND RELATED SOURCES	0.00	0.00	0.00	0.00	0.00
804	TIDELAND PLATFORMS	0.00	0.00	0.00	0.00	0.00
900	UNSPECIFIED ACTIVITIES	1.18	0.37	0.04	25.16	0.00
TOTAL		25.34	33.29	0.67	25.49	0.45

EXHIBIT 3-38. Continued.

POSTEMS

Emissions type: Total Me by Process (tons/day) for day 84155

CODE	Process Name	THC	RHC	CO	NOx	SOx	TSP
100	FUEL COMBUSTION						
110	BOILERS & HEATERS	0.45	0.12	2.14	11.21	2.01	0.33
111	BOILERS	0.00	0.00	0.00	0.00	0.00	0.00
112	SPACE HEATERS	0.02	0.01	0.15	2.42	0.22	0.27
113	ORCHARD HEATERS	0.00	0.00	0.00	0.00	0.00	0.00
114	PROCESS HEATERS	0.00	0.00	0.00	0.00	0.00	0.00
120	IN-PROCESS FUEL	0.00	0.00	0.00	0.00	0.00	0.00
130	STATIONARY I.C. ENGINES	0.00	0.00	0.00	0.05	3.79	0.01
131	TURBINE - CMBSTN GASES	0.00	0.00	0.00	0.00	0.00	0.00
140	EQUIPMENT	0.00	0.00	0.00	0.00	0.00	0.00
141	UTILITY EQUIPMENT	0.00	0.00	0.00	0.00	0.00	0.00
142	MOBILE EQUIPMENT	0.01	0.01	0.03	0.17	0.15	0.03
200	WASTE BURNING	0.00	0.00	0.00	0.00	0.00	0.00
210	INCINERATION	0.00	0.00	0.00	0.00	0.00	0.00
211	CONICAL BURNER	2.73	0.36	7.93	0.05	0.03	0.98
220	OPEN BURNING	0.00	0.00	0.00	0.00	0.00	0.00
221	AGRI DEBRIS	16.58	16.26	46.93	2.78	0.40	10.67
222	RANGE IMPROVEMENT	0.70	0.55	4.11	0.09	0.00	0.62
223	FOREST MANAGEMENT	0.00	0.00	0.00	0.00	0.00	0.00
300	SOLVENT USE	0.00	0.00	0.00	0.00	0.00	0.00
310	DRY CLEANING	75.41	55.22	0.00	0.00	0.00	0.00
320	DEGREASING	4.80	2.44	0.00	0.00	0.00	0.00
330	SURFACE COATING	7.14	6.03	0.00	0.00	0.00	0.00
340	ASPHALT PAVING	83.55	81.41	0.00	0.00	0.00	0.00
350	PRINTING	0.00	0.00	0.00	0.00	0.00	0.87
400	LIQUID STORAGE & TRANSFER	13.23	10.52	0.00	0.00	0.00	0.00
410	TANKS	0.00	0.00	0.00	0.00	0.00	0.00
420	TANK CARS & TRUCKS	6.88	6.54	0.00	0.00	0.00	0.00
430	MARINE VESSELS	2.42	2.32	0.00	0.00	0.00	0.00
440	VEHICLE REFUELING	0.00	0.00	0.00	0.00	0.00	0.00
500	INDUSTRIAL PROCESSES	0.00	0.00	0.00	0.00	0.00	0.00
510	CHEMICAL PROCESSES	35.66	23.82	0.00	0.00	0.00	0.00
520	FOOD & AGRICULTURAL	14.59	9.66	0.00	0.10	6.07	0.25
530	PETROLEUM & RELATED	0.87	0.58	0.00	0.00	0.00	0.00
540	MINERAL PROCESSES	48.76	37.18	0.15	0.00	0.00	0.05
550	METAL PROCESSES	1.40	1.03	0.13	5.98	4.55	2.63
551	PRIMARY METAL	0.00	0.00	0.00	0.00	0.00	0.00
552	SECONDARY METAL	0.00	0.00	0.00	0.00	0.00	1.03
553	METAL FABRICATION	0.00	0.00	0.04	0.02	4.11	0.05
560	WOOD & PAPER PROCESSES	4.28	4.21	0.00	0.00	0.00	0.00
570	RUBBER & PLASTICS	18.83	18.52	0.00	0.00	0.00	0.00
600	MISC PROCESSES	25.70	24.91	0.00	0.00	0.00	0.00
610	PESTICIDE APPLICATION	0.00	0.00	0.00	0.00	0.00	0.00
620	SOLID WASTE LAND FILL	0.00	0.00	0.00	0.00	0.00	0.00
621	WASTE DISPOSAL	0.00	0.00	0.00	0.00	0.00	0.00
630	FARMING OPERATIONS	0.78	0.31	0.00	0.00	0.00	0.00
640	CONSTRUCTION & DEMOLITION	0.00	0.00	0.00	0.00	0.00	0.00
650	ROAD TRAVEL	0.00	0.00	0.00	0.00	0.00	0.00
651	UNPAVED ROAD	0.00	0.00	0.00	0.00	0.00	0.00
652	PAVED ROAD	0.00	0.00	0.00	0.00	0.00	0.00
.		704.62	663.94	1170.65	313.36	27.40	197.45
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EXHIBIT 3-38. Continued.

Emissions type: Total He by Source Category (tons/day) for day 84155

CODE	Source Name	THC	RHC	CO	NOx	SOx	TSP
100	FUEL COMBUSTION						
110	AGRICULTURAL	0.00	0.00	0.00	0.00	0.00	0.00
120	OIL AND GAS PRODUCTION	0.00	0.00	0.00	0.00	0.00	0.00
130	PETROLEUM REFINING	0.00	0.00	0.00	0.00	0.00	0.00
140	OTHER MANUFACTURING/INDUSTRIAL	0.00	0.00	0.01	0.08	0.08	0.01
150	ELECTRIC UTILITIES	0.14	0.06	0.97	6.10	3.93	0.30
160	OTHER SERVICES AND COMMERCE	0.02	0.01	0.06	1.38	0.16	0.04
170	RESIDENTIAL	0.14	0.06	0.58	2.85	1.83	0.18
199	OTHER	0.18	0.01	0.70	3.44	0.17	0.11
200	WASTE BURNING	0.00	0.00	0.00	0.00	0.00	0.00
210	AGRICULTURAL DEBRIS	0.00	0.00	0.00	0.00	0.00	0.00
220	RANGE MANAGEMENT	0.70	0.55	4.11	0.09	0.00	0.62
230	FOREST MANAGEMENT	0.00	0.00	0.00	0.00	0.00	0.00
240	INCINERATION	0.00	0.00	0.00	0.00	0.00	0.00
299	OTHER	2.73	0.36	7.93	0.05	0.03	0.98
300	SOLVENT USE	16.58	16.26	46.93	2.78	0.40	10.67
310	DRY CLEANING	0.00	0.00	0.00	0.00	0.00	0.00
320	DEGREASING	4.80	2.44	0.00	0.00	0.00	0.00
330	ARCHITECTURAL COATING	7.14	6.03	0.00	0.00	0.00	0.00
340	OTHER SURFACE COATING	19.57	18.60	0.00	0.00	0.00	0.00
350	ASPHALT PAVING	63.97	62.81	0.00	0.00	0.00	0.87
360	PRINTING	0.00	0.00	0.00	0.00	0.00	0.00
370	DOMESTIC	13.23	10.52	0.00	0.00	0.00	0.00
380	INDUSTRIAL SOLVENT USE	0.00	0.00	0.00	0.00	0.00	0.00
399	OTHER	0.00	0.00	0.00	0.00	0.00	0.00
400	PETROLEUM PROCESS, STORAGE & TRANSFER	75.41	55.22	0.00	0.00	0.00	0.00
410	OIL AND GAS EXTRACTION	0.00	0.00	0.00	0.00	0.00	0.00
420	PETROLEUM REFINING	12.61	4.89	0.00	0.00	0.00	0.00
430	PETROLEUM MARKETING	12.24	9.06	0.15	0.00	0.00	0.05
499	OTHER	33.21	32.08	0.00	0.00	0.00	0.00
500	INDUSTRIAL PROCESSES	0.00	0.00	0.00	0.00	0.00	0.00
510	CHEMICAL	0.00	0.00	0.00	0.00	0.00	0.00
520	FOOD AND AGRICULTURAL	14.59	9.66	0.00	0.10	6.07	0.25
560	MINERAL PROCESSES	0.87	0.58	0.00	0.00	0.00	0.00
570	METAL PROCESSES	1.40	1.03	0.13	5.98	4.55	2.63
580	WOOD AND PAPER	2.98	2.93	0.04	0.02	4.11	1.08
599	OTHER	18.83	18.52	0.00	0.00	0.00	0.00
600	MISC PROCESSES	62.67	50.01	0.00	0.00	0.00	0.00
610	PESTICIDE APPLICATION	0.00	0.00	0.00	0.00	0.00	0.00
620	FARMING OPERATIONS	0.00	0.00	0.00	0.00	0.00	0.00
630	CONSTRUCTION AND DEMOLITION	0.00	0.00	0.00	0.00	0.00	0.00
640	ENTRAINED ROAD DUST - PAVED	0.00	0.00	0.00	0.00	0.00	0.00
650	ENTRAINED ROAD DUST - UNPAVED	0.00	0.00	0.00	0.00	0.00	0.00
660	UNPLANNED FIRES	0.00	0.00	0.00	0.00	0.00	0.00
680	WASTE DISPOSAL	1.69	1.33	7.70	0.18	0.00	1.77
685	NATURAL SOURCES	0.78	0.31	0.00	0.00	0.00	0.00
699	OTHER	0.00	0.00	0.00	0.00	0.00	0.00
700	ON ROAD VEHICLES	0.32	0.24	0.02	0.02	0.01	0.47
710	LIGHT DUTY PASSENGER	0.00	0.00	0.00	0.00	0.00	0.00
720	LIGHT AND MEDIUM DUTY TRUCKS	519.07	490.04	646.52	140.92	9.42	133.82
		128.16	120.36	270.84	46.89	2.87	29.75

EXHIBIT 3-38. Continued.

POSTEMS

Emissions type: Total He by Control Category (tons/day)for day 84155

CODE	Control Name	THC	RHC	CO	NOx	SOx	TSP
99	UNSPECIFIED	53.64	43.26	94.79	376.72	2069.00	67.35
101	UTILITY BOILERS - LIQUID FUELS	0.00	0.00	0.01	0.05	0.14	0.01
102	UTILITY BOILERS - GASEOUS FUELS	0.01	0.00	0.05	1.32	0.02	0.03
103	REFINERY BOILERS & HEATERS - LIQ. FUEL	0.00	0.00	0.00	0.00	0.00	0.00
104	RESIDENTIAL SPACE HEATERS - NATURAL GAS	0.00	0.00	0.00	0.00	0.00	0.00
105	RESIDENTIAL WATER HEATERS - NATURAL GAS	0.00	0.00	0.00	0.00	0.00	0.00
107	NON-UTILITY I. C. ENGINES - GASEOUS	0.12	0.05	0.87	4.92	0.01	0.04
108	UTILITY RECIPROCAL - LIQUIDS	0.00	0.00	0.00	0.00	0.00	0.00
109	INDUSTRIAL BOILERS	0.02	0.01	0.11	1.21	0.21	0.26
110	CEMENT KILNS	0.09	0.05	0.07	2.48	7.16	0.19
111	GLASS MELTING FURN CONTNR/SDLM	0.02	0.02	0.05	3.20	1.16	0.73
112	MARINE DIESEL ENGINES	0.00	0.00	0.00	0.00	0.00	0.00
113	NON-FARM EQUIPMENT (DIESEL)	0.00	0.00	0.00	0.00	0.00	0.00
114	SULFUR IN FUEL	0.02	0.02	0.17	0.77	1.97	0.13
116	UTILITY TURBINES - LIQUIDS	0.00	0.00	0.00	0.00	0.00	0.00
117	REFINERY BOILERS & HEATERS - GAS. FUEL	0.00	0.00	0.00	0.00	0.00	0.00
118	STEAM GENERATORS - LIQUIDS	0.00	0.00	0.00	0.00	0.00	0.00
121	PIPELINE HEATERS	0.00	0.00	0.00	0.00	0.00	0.00
122	MARINE VESSELS - COMBUSTION	5.82	5.49	17.95	0.23	0.04	0.00
124	UTILITY TURBINES - GASEOUS	0.00	0.00	0.00	0.00	0.00	0.00
125	COGENERATION	0.00	0.00	0.00	0.00	0.00	0.00
126	TEOR STEAM GENERATORS - GASEOUS	0.00	0.00	0.00	0.00	0.00	0.00
127	NON-UTIL I.C. ENGINES - LIQUID	0.00	0.00	0.00	0.00	0.00	0.00
128	RESOURCE RECOVERY	0.00	0.00	0.00	0.00	0.00	0.00
129	BOILERS-SPACE HEATERS-LIQ FUEL	0.00	0.00	0.00	0.00	0.00	0.00
130	BOILERS-SPACE HEATERS-GAS FUEL	0.00	0.00	0.00	0.00	0.00	0.00
131	UTILITY RECIPROCAL - GASEOUS	0.00	0.00	0.00	0.00	0.00	0.00
201	FLARES	0.00	0.00	0.00	0.00	0.00	0.00
301	ARCHITECTURAL COATINGS - OIL BASED	0.00	0.00	0.00	0.00	0.00	0.00
302	ARCHITECTURAL COATINGS - WATER BASED	0.00	0.00	0.00	0.00	0.00	0.00
303	ARCHITECTURAL COATINGS - SOLVENTS	0.00	0.00	0.00	0.00	0.00	0.00
304	AUTO ASSEMBLY LINE - SURFACE COATING	19.57	18.60	0.00	0.00	0.00	0.00
305	AUTO ASSEMBLY LINE - SOLVENT USE	41.31	40.62	0.00	0.00	0.00	0.00
306	CAN & COIL - SURFACE COATING	0.00	0.00	0.00	0.00	0.00	0.87
307	CAN & COIL - SOLVENT USE	1.12	1.10	0.00	0.00	0.00	0.00
308	METAL PARTS & PROD. - SURFACE COATING	0.00	0.00	0.00	0.00	0.00	0.00
309	METAL PARTS & PROD. - SOLVENT USE	1.24	1.22	0.00	0.00	0.00	0.00
310	PAPER - SURFACE COATING	0.00	0.00	0.00	0.00	0.00	0.00
311	PAPER - SOLVENT USE	18.83	18.52	0.00	0.00	0.00	0.00
312	FABRIC - SURFACE COATING	0.00	0.00	0.00	0.00	0.00	0.00
313	FABRIC - SOLVENT USE	0.33	0.33	0.00	0.00	0.00	0.00
314	DEGREASING-NON-SYNTH&MISC-(IND)	0.00	0.00	0.00	0.00	0.00	0.00
315	DEGREASING-NON-SYNTH&MISC-(COMM)	7.14	6.03	0.00	0.00	0.00	0.00
316	CUTBACK ASPHALT PAVING MATERIALS	0.00	0.00	0.00	0.00	0.00	0.00
317	DRY CLEANING (NON-SYNTHETIC)	0.00	0.00	0.00	0.00	0.00	0.00
318	DRY CLEANING (SYNTHETIC&MISC)	0.00	0.00	0.00	0.00	0.00	0.00
319	GRAPHIC ARTS-EXCPT LITHO/L PTRS	4.80	2.44	0.00	0.00	0.00	0.00
320	WOOD FURNITURE - SURFACE COATINGS	14.83	12.09	0.00	0.00	0.00	0.00
321	WOOD FURNITURE - SOLVENT USE	5.46	5.36	0.00	0.00	0.00	0.00
323	AUTO REFINISHING - SURFACE COATINGS	0.00	0.00	0.00	0.00	0.00	0.00
		14.27	13.94	0.00	0.00	0.00	0.00

EXHIBIT 3-38. Continued.

Emissions type: Total Me Profile Category (tons/day) for day 84155

CODE	Profile Name	THC	RHC	CO	NOx	SOx	TSP
0	Overall Average	0.32	0.25	0.05	0.04	8.56	2.42
1	External Combustion Boiler - Residual Oil	0.02	0.01	0.07	0.77	3.54	0.22
2	External Combustion Boiler - Distillate Oil	0.02	0.02	0.16	0.69	0.98	0.11
3	External Combustion Boiler - Natural Gas	0.33	0.13	1.68	11.47	0.23	0.36
4	External Combustion Boiler - Refinery Gas	0.00	0.00	0.00	0.00	0.00	0.00
5	External Combustion Boiler - Coke Oven Gas	0.00	0.00	0.00	0.00	0.00	0.00
7	Natural Gas Turbine	0.00	0.00	0.00	0.00	0.00	0.00
8	Reciprocating Diesel Fuel Engine	0.00	0.00	0.00	0.00	0.00	0.00
9	Reciprocating Distillate Oil Engine	0.00	0.00	0.00	0.00	0.00	0.00
11	By-Product Coke Oven Stack Gas	0.00	0.00	0.00	0.00	0.00	0.00
12	Blast Furnace Ore Charging and Agglomerate	0.00	0.00	0.00	0.00	0.00	0.00
13	Iron Sintering	0.00	0.00	0.00	0.00	0.00	0.00
14	Open Hearth Furnace with Oxygen Lance	0.00	0.00	0.00	0.00	0.00	0.00
16	Basic Oxygen Furnace	0.00	0.00	19.73	0.00	0.04	0.90
23	Asphalt Roofing - Spraying	0.00	0.00	0.00	0.00	0.00	0.00
24	Asphalt Roofing - Tar Kettle	0.00	0.00	0.00	0.00	0.00	0.02
25	Asphaltic Concrete - Natural Gas Rotary Dryer	0.01	0.00	0.01	0.10	0.72	1.01
26	Asphaltic Concrete - In Place Road Asphalt	0.00	0.00	0.00	0.00	0.00	0.00
29	Refinery Fluid Catalytic Cracker	0.00	0.00	0.00	0.00	0.00	0.00
31	Refinery Fugitive Emissions - Covered Drainage/Sep	0.00	0.00	0.00	0.00	0.00	0.00
35	Refinery Fugitive Emissions - Cooling Towers	0.00	0.00	0.00	0.00	0.00	0.00
39	Refinery Fugitive Emissions - Compressor Seals Ref	0.00	0.00	0.00	0.00	0.00	0.00
47	Refinery Fugitive Emissions - Relief Valves, Liqui	0.00	0.00	0.00	0.00	0.00	0.00
51	Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00
66	Varnish Manufacturing - Bodying Oil	0.00	0.00	0.00	0.00	0.00	0.00
68	Manufacturing - Plastics - Polypropylene	0.00	0.00	0.00	0.00	0.00	0.00
72	Printing Ink Cooking	0.00	0.00	0.00	0.00	0.00	0.00
76	General Pesticides	0.00	0.00	0.00	0.00	0.00	0.00
78	Ethylene Dichloride - Direct Chlorination	0.00	0.00	0.00	0.00	0.00	0.00
79	Chemical Manufacturing - Flares	0.00	0.00	0.00	0.00	0.00	0.00
85	Perchloroethylene - Drycleaning	0.00	0.00	0.00	0.00	0.00	0.00
87	Degreasing - 1,1,1-Trichloroethane	0.00	0.00	0.00	0.00	0.00	0.00
88	Degreasing - Trichlorofluoromethane (Freon 11)	0.00	0.00	0.00	0.00	0.00	0.00
89	Degreasing - 1,1,2-Trichloroethane	0.00	0.00	0.00	0.00	0.00	0.00
90	Degreasing - Toluene	0.00	0.00	0.00	0.00	0.00	0.00
100	Fixed Roof Tank - Commercial Jet Fuel (Jet-A)	0.20	0.20	0.00	0.00	0.00	0.00
121	Open Burning Dump - Landscape/Pruning	16.58	16.26	46.93	2.78	0.40	10.67
122	Bar Screen Waste Incinerator	2.73	0.36	7.93	0.05	0.03	0.98
127	Surface Coating - Varnish/Shellac	0.00	0.00	0.00	0.00	0.00	0.00
166	Printing Press - Letterpress Inking Process	0.00	0.00	0.00	0.00	0.00	0.00
182	Printing Press - Gravure General Solvent	0.00	0.00	0.00	0.00	0.00	0.00
183	Printing Press - Gravure Printing Solvent	0.00	0.00	0.00	0.00	0.00	0.00
195	Residential Fuel - Natural Gas	0.18	0.00	0.67	3.35	0.02	0.10
197	Solvent Use - Domestic Solvents	75.41	55.22	0.00	0.00	0.00	0.00
202	Solid Waste Landfill Site - Class II	0.00	0.00	0.00	0.00	0.00	0.00
203	Solid Waste - Animal Waste Decomposition	0.00	0.00	0.00	0.00	0.00	0.00
217	Coke Oven Blast Furnace Gas	0.00	0.00	0.00	0.00	0.00	0.00
219	Surface Coating Paint Solvent - Acetone	0.00	0.00	0.00	0.00	0.00	0.00
220	Paint Solvent - Ethyl Acetate	0.00	0.00	0.00	0.00	0.00	0.00
221	Paint Solvent - Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.00	0.00
.		0.00	0.00	0.00	0.00	0.00	0.00
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EXHIBIT 3-38. Continued.

POSTEMS

Day 84155

Emissions by Organic Species
(Percent of Total Included Low-Level Sources)

Saroad Code	Name	Weight Percent	Weight Percent *
43105	ISOMERS OF HEXANE	0.375	0.375
43106	ISOMERS OF HEPTANE	0.166	0.166
43107	ISOMERS OF OCTANE	0.107	0.107
43108	ISOMERS OF NONANE	0.283	0.283
43109	ISOMERS OF DECANE	0.149	0.149
43110	ISOMERS OF UNDECANE	0.050	0.050
43111	ISOMERS OF DODECANE	0.019	0.019
43112	ISOMERS OF TRIDECANE	0.000	0.000
43113	ISOMERS OF TETRADECANE	0.007	0.007
43114	ISOMERS OF PENTADECANE	0.003	0.003
43115	C7 CYCLOPARAFFINS	0.460	0.460
43116	C8 CYCLOPARAFFINS	0.063	0.063
43117	C9 CYCLOPARAFFINS	0.002	0.002
43118	MINERAL SPIRITS	0.158	0.158
43119	LACTOL SPIRITS	0.000	0.000
43120	ISOMERS OF BUTENE	0.012	0.012
43121	ISOMERS OF PENTENE	0.187	0.187
43122	ISOMERS OF PENTANE	0.407	0.407
43123	TERPENES	0.000	0.000
43124	C9 OLEFINS	0.015	0.015
43125	C10 OLEFINS	0.137	0.137
43126	C2 ALKYLCYCLOHEXANE	0.051	0.051
43127	C3 ALKYLCYCLOHEXANE	0.035	0.035
43128	C5 ALKYL CYCLOHEXANE	0.016	0.016
43129	C4 SUBSTITUTED CYCLOHEXANE	0.051	0.051
43130	C5 SUBSTITUTED CYCLOHEXANE	0.006	0.006
43131	C6 SUBSTITUTED CYCLOHEXANE	0.004	0.004
43132	ALIPHATICS (per carbon)	0.007	0.007
43133	PARAFFINS (C16-C34)	0.001	0.001
43134	PARAFFINS/OLEFINS (C12-C16)	0.000	0.000
43135	C10 PARAFFINS	0.072	0.072
43136	C9 PARAFFIN	0.011	0.011
43137	C16 BRANCHED ALKANE	0.001	0.001
43138	C8 OLEFINS	0.007	0.007
43139	PARAFFINS (C2-C7)	0.000	0.000
43140	C7-C16	0.003	0.003
43141	C8 PARAFFIN	0.091	0.091
43142	C7 PARAFFINS	0.001	0.001
43143	C5 OLEFIN	0.045	0.045
43144	C5 PARAFFIN	0.050	0.050
43145	C5 PARAFFIN/OLEFIN	0.026	0.026
43146	C11 OLEFINS	0.003	0.003
43147	C12 OLEFINS	0.000	0.000
43148	ISOMERS OF C9H16	0.002	0.002
43149	C8H14	0.000	0.000
43150	ISOMERS OF C10H18	0.079	0.079
43151	ISOMERS OF C11H20	0.000	0.000
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* weight percentages excluding landfill emissions

EXHIBIT 3-38. Continued.

Day 84155

Emissions by Organic Species
(Percent of Total Included Low-Level Sources)

Saroad Code	Name	Weight Percent	Weight Percent *
99136	C36 COMPOUNDS (DIESEL EXHAUST)	0.004	0.004
99137	C37 COMPOUNDS (DIESEL EXHAUST)	0.002	0.002
99138	C38 COMPOUNDS (DIESEL EXHAUST)	0.001	0.001
99139	C39 COMPOUNDS (DIESEL EXHAUST)	0.002	0.002
99140	C40 COMPOUNDS (DIESEL EXHAUST)	0.000	0.000
99141	C41 COMPOUNDS (DIESEL EXHAUST)	0.001	0.001
99142	C42 COMPOUNDS (DIESEL EXHAUST)	0.000	0.000
99143	C43 COMPOUNDS (DIESEL EXHAUST)	0.000	0.000
99908	2,3-DIMETHYLOCTANE	0.022	0.022
99909	2,6-DIMETHYLOCTANE	0.003	0.003
99910	2,4-DIMETHYLOCTANE	0.092	0.092
99911	3,4-DIMETHYLOCTANE	0.341	0.341
99912	1-METHYL-3-ETHYLBENZENE	0.606	0.606
99913	1-METHYL-2-ETHYLBENZENE	0.067	0.067
99915	ISOBUTYLBENZENE	0.110	0.110
99916	1-METHYL-3-N-PROPYLBENZENE	0.093	0.093
99917	1-METHYL-3-ISOPROPYLBENZENE	0.152	0.152
99918	2-METHYLDECANE	0.371	0.371
99933	DENATURANT	0.015	0.015
99998	ETHYL-T-BUTYL ETHER	0.000	0.000
99999	UNIDENTIFIED	3.185	3.185

EXHIBIT 3-38. Continued.

POSTEMS

Hourly and total sums for NO across all emissions types
in tons per hour and per entire period.
period from hour 0. on day 84155 to 24. on 84155

hour	emiss. file type			
	Area	Motor Ve	Low Levl	
1	9.543E-01	2.712E+00	4.749E-03	3.671E+00
2	9.543E-01	2.712E+00	4.749E-03	3.671E+00
3	9.543E-01	2.712E+00	4.749E-03	3.671E+00
4	9.543E-01	2.712E+00	4.749E-03	3.671E+00
5	1.003E+00	2.712E+00	4.749E-03	3.719E+00
6	1.100E+00	1.627E+01	4.749E-03	1.738E+01
7	2.193E+00	2.712E+01	4.749E-03	2.932E+01
8	4.716E+00	1.627E+01	4.749E-03	2.099E+01
9	4.538E+00	1.356E+01	4.749E-03	1.810E+01
10	4.538E+00	1.356E+01	4.749E-03	1.810E+01
11	4.459E+00	1.356E+01	4.749E-03	1.802E+01
12	4.459E+00	1.356E+01	4.749E-03	1.802E+01
13	4.459E+00	1.356E+01	4.749E-03	1.802E+01
14	4.459E+00	1.356E+01	4.749E-03	1.802E+01
15	4.459E+00	1.627E+01	4.749E-03	2.073E+01
16	2.247E+00	2.712E+01	4.749E-03	2.937E+01
17	2.198E+00	2.169E+01	4.749E-03	2.390E+01
18	2.052E+00	1.627E+01	4.749E-03	1.833E+01
19	2.302E+00	1.085E+01	4.749E-03	1.315E+01
20	2.205E+00	2.712E+00	4.749E-03	4.922E+00
21	2.157E+00	2.712E+00	4.749E-03	4.873E+00
22	2.157E+00	2.712E+00	4.749E-03	4.873E+00
23	1.524E+00	2.712E+00	4.749E-03	4.240E+00
24	1.359E+00	2.712E+00	4.749E-03	4.075E+00
total	6.240E+01	2.603E+02	1.140E-01	3.228E+02

EXHIBIT 3-38. Continued.

Hourly and total sums for NO2	across all emissions types
Hourly and total sums for OLE	across all emissions types
Hourly and total sums for PAR	across all emissions types
Hourly and total sums for TOL	across all emissions types
Hourly and total sums for XYL	across all emissions types
Hourly and total sums for FORM	across all emissions types
Hourly and total sums for ALD2	across all emissions types
Hourly and total sums for ETH	across all emissions types
Hourly and total sums for MEOH	across all emissions types
Hourly and total sums for ETOH	across all emissions types
Hourly and total sums for ISOP	across all emissions types
Hourly and total sums for SO2	across all emissions types
Hourly and total sums for CO	across all emissions types
Hourly and total sums for AERO	across all emissions types

EXHIBIT 3-38. Continued.

POSTEMS

Hourly and total sums for RHC across all emissions types
in tons per hour and per entire period.
period from hour 0. on day 84155 to 24. on 84155

hour	emiss. file type			
	Area	Motor Ve	Low Levl	
1	2.239E+00	6.672E+00	4.044E-01	9.315E+00
2	2.239E+00	6.672E+00	4.044E-01	9.315E+00
3	2.239E+00	6.672E+00	4.044E-01	9.315E+00
4	2.239E+00	6.672E+00	4.044E-01	9.315E+00
5	2.620E+00	6.672E+00	4.044E-01	9.697E+00
6	3.383E+00	4.003E+01	4.248E-01	4.384E+01
7	4.755E+00	6.672E+01	4.248E-01	7.190E+01
8	2.014E+01	4.003E+01	2.907E+00	6.308E+01
9	2.059E+01	3.336E+01	2.907E+00	5.685E+01
10	2.059E+01	3.336E+01	2.907E+00	5.685E+01
11	2.058E+01	3.336E+01	2.907E+00	5.685E+01
12	2.058E+01	3.336E+01	2.907E+00	5.685E+01
13	2.058E+01	3.336E+01	2.907E+00	5.685E+01
14	2.058E+01	3.336E+01	2.907E+00	5.685E+01
15	2.058E+01	4.003E+01	2.907E+00	6.352E+01
16	1.553E+01	6.672E+01	2.907E+00	8.516E+01
17	1.515E+01	5.338E+01	2.907E+00	7.143E+01
18	1.400E+01	4.003E+01	2.907E+00	5.694E+01
19	1.286E+01	2.669E+01	2.907E+00	4.246E+01
20	1.210E+01	6.672E+00	2.907E+00	2.168E+01
21	1.172E+01	6.672E+00	2.907E+00	2.130E+01
22	1.172E+01	6.672E+00	2.907E+00	2.130E+01
23	1.171E+01	6.672E+00	2.907E+00	2.129E+01
24	2.521E+00	6.672E+00	4.044E-01	9.597E+00
total	2.913E+02	6.405E+02	4.979E+01	9.816E+02

EXHIBIT 3-38. Continued.

Species totals for output low-level emissions file on day

NO	3.228E+02
NO2	3.569E+01
OLE	3.459E+01
PAR	6.509E+02
TOL	1.234E+02
XYL	8.334E+01
FORM	5.240E+00
ALD2	2.430E+01
ETH	3.322E+01
MEOH	6.380E-01
ETOH	2.546E+01
ISOP	4.532E-01
SO2	3.302E+01
CO	1.308E+03
AERO	2.169E+02
RHC	9.816E+02

EXHIBIT 3-38. Concluded.

POSTEMS

DESCRIPTION OF MRGEMS

The MRGEMS program merges two low-level emissions files formatted for input to the UAM. In general, MRGEMS is used to merge the anthropogenic emissions file created with the EPS (for area, motor vehicle, and point sources) with a biogenic emissions file generated by another program. Figure 3-7 shows the file structure of MRGEMS.

MRGEMS output includes a merged low-level emission file (binary) for input to UAM and a message output file indicating total emissions from the antropogenic and biogenic files for each species (moles), and a total for each species (Exhibit 3-39).

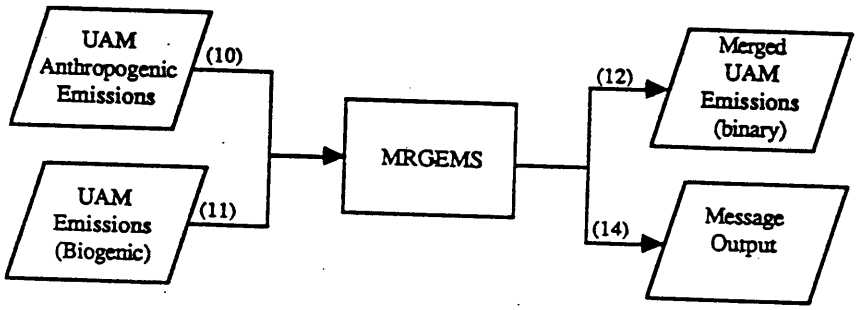

FIGURE 3-7. Input and output files used by MRGEMS.

EEE 89077

```
header species:
  1  NO
  2  NO2
  3  OLE
  4  PAR
  5  TOL
  6  XYL
  7  FORM
  8  ALD2
  9  ETH
 10  MEOH
 11  ETOH
 12  ISOP
 13  SO2
 14  CO
 15  AERO
new emissions file header info:
EMISSIONS
Atlanta '85 base case -- area, mv and low-level points
      1      15   84155    0.   84155    24.
 0.0  0.0  16   660000.   3.66500E+06   4000.00   4000.00  40  40  5  2  3  0.0
  50.0000   150.000
 0  0  40  40

NO
NO2
OLE
PAR
TOL
XYL
FORM
ALD2
ETH
MEOH
ETOH
ISOP
SO2
CO
AERO

      84155    0.00      84155    1.00
 em2:   84155  0.0  84155   1.00000
total emissions of NO        for   0. hour is    7.246E+04    0.000E+00    7.246E+04 moles
total emissions of NO2       for   0. hour is    8.010E+03    0.000E+00    8.010E+03 moles
total emissions of OLE       for   0. hour is    8.890E+03    2.049E+05    2.138E+05 moles
total emissions of PAR       for   0. hour is    3.517E+05    1.639E+06    1.991E+06 moles
total emissions of TOL       for   0. hour is    9.266E+03    0.000E+00    9.266E+03 moles
total emissions of XYL       for   0. hour is    7.112E+03    0.000E+00    7.112E+03 moles
total emissions of FORM      for   0. hour is    3.903E+03    0.000E+00    3.903E+03 moles
total emissions of ALD2      for   0. hour is    7.215E+03    0.000E+00    7.215E+03 moles
total emissions of ETH       for   0. hour is    9.074E+03    0.000E+00    9.074E+03 moles
total emissions of MEOH      for   0. hour is    6.103E+02    0.000E+00    6.103E+02 moles
total emissions of ETOH      for   0. hour is    3.774E+01    0.000E+00    3.774E+01 moles
total emissions of ISOP      for   0. hour is    4.853E+01    1.145E+03    1.194E+03 moles
total emissions of SO2       for   0. hour is    5.986E+03    0.000E+00    5.986E+03 moles
total emissions of CO        for   0. hour is    3.770E+05    0.000E+00    3.770E+05 moles
total emissions of AERO      for   0. hour is    2.025E+06    0.000E+00    2.025E+06 moles
```

EXHIBIT 3-39. Example of message file output from MRGEMS.

```
      84155   23.00      84155   24.00
em2:   84155   23.0000   84155   24.0000
total emissions of NO      for 23. hour is   8.044E+04   0.000E+00   8.044E+04 moles
total emissions of NO2     for 23. hour is   8.891E+03   0.000E+00   8.891E+03 moles
total emissions of OLE     for 23. hour is   9.976E+03   2.154E+05   2.254E+05 moles
total emissions of PAR     for 23. hour is   3.571E+05   1.723E+06   2.080E+06 moles
total emissions of TOL     for 23. hour is   9.315E+03   0.000E+00   9.315E+03 moles
total emissions of XYL     for 23. hour is   7.155E+03   0.000E+00   7.155E+03 moles
total emissions of FORM    for 23. hour is   6.027E+03   0.000E+00   6.027E+03 moles
total emissions of ALD2    for 23. hour is   7.877E+03   0.000E+00   7.877E+03 moles
total emissions of ETH     for 23. hour is   1.123E+04   0.000E+00   1.123E+04 moles
total emissions of MEOH    for 23. hour is   6.103E+02   0.000E+00   6.103E+02 moles
total emissions of ETOH    for 23. hour is   3.774E+01   0.000E+00   3.774E+01 moles
total emissions of ISOP    for 23. hour is   4.853E+01   1.207E+03   1.255E+03 moles
total emissions of SO2     for 23. hour is   6.647E+03   0.000E+00   6.647E+03 moles
total emissions of CO      for 23. hour is   4.165E+05   0.000E+00   4.165E+05 moles
total emissions of AERO    for 23. hour is   2.043E+06   0.000E+00   2.043E+06 moles
1

total emissions of NO      is  6.3726810E+06 0.0000000E+00 6.3726810E+06 moles/day
total emissions of NO2     is  7.0442288E+05 0.0000000E+00 7.0442288E+05 moles/day
total emissions of OLE     is  9.8164800E+05 6.8705500E+06 7.8521980E+06 moles/day
total emissions of PAR     is  3.6941220E+07 5.4964748E+07 9.1905944E+07 moles/day
total emissions of TOL     is  1.0003192E+06 0.0000000E+00 1.0003192E+06 moles/day
total emissions of XYL     is  5.9119094E+05 0.0000000E+00 5.9119094E+05 moles/day
total emissions of FORM    is  2.9736481E+05 0.0000000E+00 2.9736481E+05 moles/day
total emissions of ALD2    is  6.8948075E+05 0.0000000E+00 6.8948075E+05 moles/day
total emissions of ETH     is  9.4264294E+05 0.0000000E+00 9.4264294E+05 moles/day
total emissions of MEOH    is  3.6205848E+04 0.0000000E+00 3.6205848E+04 moles/day
total emissions of ETOH    is  7.2257906E+05 0.0000000E+00 7.2257906E+05 moles/day
total emissions of ISOP    is  5.1434404E+03 3.6835225E+06 3.6886680E+06 moles/day
total emissions of SO2     is  4.6853984E+05 0.0000000E+00 4.6853984E+05 moles/day
total emissions of CO      is  4.2422972E+07 0.0000000E+00 4.2422972E+07 moles/day
total emissions of AERO    is  1.9696792E+08 0.0000000E+00 1.9696792E+08 moles/day
```

EXHIBIT 3-39. Concluded.

4 CONSIDERATIONS IN PREPARING EMISSIONS INVENTORIES FOR USE IN THE URBAN AIRSHED MODEL

The emissions files used in the UAM are different from those used with source/receptor modeling techniques. The UAM calculates spatial and temporal distributions of ozone and precursor concentrations. This chapter describes some of the considerations in preparing emissions inventories for use in the UAM. Also discussed in this chapter are issues to be considered in preparing some of the inputs required by the emissions preprocessor system (EPS).

The emissions inventory used in photochemical simulations are more detailed than is generally necessary for inventories used in other techniques.

1. Emission estimates must be provided for each grid cell in the modeling region.

2. Hourly instead of annual emission estimates must be provided.

3. The total hydrocarbon compound (THC) estimates must be chemically speciated for each type of emission source.

The basic procedure for generating such an inventory is outlined below. In summary, three major groups of emission sources must be spatially and temporally resolved: on-road motor vehicles, area-wide sources, and point sources, which are further divided into elevated and low-level point sources. The latest U.S. EPA guidance should be followed when developing an emissions inventory that is resolved to the county or Statistical Metropolitan Area level.

TREATMENT OF MOBILE SOURCES

Inventories of mobile source emissions for photochemical modeling have several requirements. They must be spatially and temporally resolved to the level of the other modeling inputs; this generally involves a resolution of 4 to 25 km^2 for hourly emission estimates. They must reflect meteorological conditions, e.g., ambient temperature, characteristic of the pollutant episode being simulated. Motor vehicle inventories must also reflect the fleet makeup, technology, fuel characteristics, and vehicle emission control measures appropriate for the scenario being modeled. Differences in chemical speciation, temporal resolution, and other qualities require that motor vehicle emissions be disaggregated into different components, such as exhaust and evaporative. Also, individual vehicle classes (e.g., automobiles, trucks) must be treated separately in the inventory.

The NAPAP inventory includes annual averages of criteria pollutants for each county in the U.S. It provides emission estimates for four vehicle classes and four road types as well as for gasoline marketing. Inventories developed by the states for post-1987 SIPs may be expected to resemble the NAPAP inventories, with the exception that they would represent emission estimates for a particular day or season rather than annual averages. In addition, the inventories prepared by the states are more likely to incorporate region-specific characteristics of the motor vehicle fleet. The level of sophistication required of an inventory of motor vehicle emissions for photochemical modeling requires a significant amount of manipulation of either the NAPAP or post-1987 SIP inventories. Software incorporated into the EPS to facilitate this process is described next.

One of the files input to the PREGRD program of the EPS is a file of motor vehicle adjustment factors (see Table 3-7 and Exhibit 3-12). These factors are used to incorporate many of the episode and fleet characteristics discussed above into either NAPAP or SIP motor vehicle emission inventories. Eight groups of factors (see below) are each divided into three cases representing different combinations of inspection and maintenance (I/M) or anti-tampering programs (ATP). The first case is the situation in which no I/M or ATP program exists in either the base or scenario years, the second when a program exists both years, and the third when a program is in effect in the scenario year only. These three cases are coded by the PREGRD variable INIM (0, 1, or 2, respectively).

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The adjustment factors are based on the mobile source emission rates (exhaust and evaporative) used by the contributing agency in calculating the total mobile emissions in the unmodified inventory and the scenario-specific mobile emission rates. The purpose and derivation of the eight groups of factors are summarized below.

1. **Factors to account for changes in Reid vapor pressure (RVP) and fleet composition between the base and scenario years.** These are calculated by dividing the episode-specific emission rates for the scenario year by episode-specific rates for the base year. The exhaust and evaporative factors for base-year scenarios are unity (the base year being to the year for which the unmodified inventory was developed). Running loss and refueling factors for base-year scenarios are unity only when NAPAP-85 Version 1 is used.

2. **Factors to account for changes in fuel composition.** These are used for alternative fuel scenarios and modify the appropriate emission category by the fractional amount entered into the table. These factors are 1 for standard fuel composition.

3. **Factors to disaggregate exhaust and evaporative emissions** from the mobile source emissions category supplied by NAPAP. They represent the fraction of total mobile emissions that is exhaust, for each vehicle class and road type, based upon the emission factors used to create the unmodified inventory.

4. **Adjustment factors to implement stage II controls for refueling emissions.** The NAPAP inventory provides an estimate of gasoline marketing emissions, which PREGRD disaggregates into vehicle refueling and other gasoline marketing emissions. The adjustment factor is the ratio of the emission factor for refueling with stage II controls to the emission factor for refueling without stage II controls. This factor is applied to the disaggregated vehicle refueling emissions.

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5. **Factors to adjust inventory to an episode-specific basis,** calculated by dividing the episode-specific mobile emission rates for the base year by the mobile emission rates used to create the unmodified inventory.

   Mobile emission rates, both episode-specific and those used to create the unmodified inventory, are calculated by the EPA model MOBILE4. Episode-specific rates incorporate temperature, control measures, and fuel volatility information specific to the scenario being modeled, while annual average temperatures and fuel volatilities are used to calculate emission factors for creation of the unmodified inventory.

6. **Factors to estimate running loss emissions** from NAPAP-85 Version 1 or disaggregate the running loss emissions from NAPAP-85 Version 2. This factor is calculated either as the ratio between episode-specific running loss emission rates and exhaust rates (when running losses have not been included in the inventory) or as the fraction of running losses in the total mobile emissions in the unmodified inventory.

7. **Factors to adjust the exhaust portion of the mobile inventory for aldehydes,** which are missing in the 1985 NAPAP inventory. Adjustment factors for the aldehydes are supplied by the EPA Office of Mobile Sources.

8. **Vehicle miles traveled (VMT) growth factors,** expressing a fractional change in VMT by vehicle type from the base year to the scenario year.

Depending upon the scenario to be modeled and the method of derivation of the original mobile emissions estimates, some of these factors may be set to one, indicating no effect upon vehicle emissions.

Temporal profile codes are assigned to mobile source emissions in the PREGRD program of the EPS. The codes used are the diurnal and weekday factors (Appendix C, Tables C-1 and C-2, respectively). Spatial distribution of mobile emissions is handled by the program GRDEMS, which distributes mobile emissions throughout the

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modeling region based on surrogate activity data. Appendix B explains the surrogates used for each class of mobile emissions.

When using an inventory of mobile-source emissions with considerably more temporal and spatial detail than that found in NAPAP or state SIP inventories, such as an inventory prepared for the California Air Resources Board, one can generally bypass PREGRD and GRDEMS and reformat the mobile emissions so that they are compatible with the input format specified for CENTEMS. Motor vehicle emissions can be adjusted by providing inputs to CENTEMS that apply fractional changes, by species, for appropriate control categories. This is accomplished by providing factors specified in the user input file (Table 3-13, line 4+) to CENTEMS. The exact steps needed to prepare such an inventory for CENTEMS will differ from case to case.

GEOGRAPHIC ALLOCATION OF EMISSIONS

The 1985 NAPAP emissions inventory is the standard input in the UAM emissions preprocessing programs. If other emissions inventories are used, they must follow the formats for PREPNT and PREGRD as described in Chapter 3. The NAPAP emissions inventory contains emissions data for major point and area sources, including mobile sources. Point source records in the NAPAP inventory contain information on source locations that can easily be translated into grid cell coordinates for input into UAM. Since area emissions, including mobile sources, are reported on a county-wide basis, the allocation of these emissions is necessarily more complex.

The most straightforward approach to apportioning county-wide emissions to individual grid cells is to distribute county total emissions evenly over all grid cells within the entire county. Although this is the simplest approach, the resulting smoothing of the emissions data defeats the benefits of a sophisticated grid model such as the UAM. A more ideal approach is to match each area source category with a parameter whose spatial distribution is known for the county. For example, county total emissions related to residential fuel combustion could be paired with the number of houses or population distribution, easily determined from demographic data. The demographic data used to apportion county-wide area emissions are referred to as

surrogate 2 as indicated in Exhibit 3-17. To illustrate this procedure, suppose that for the example UAM application to Atlanta there had been gridded information on dry cleaning establishments for Fulton County (AEROS = 112260, FIP = 13121). To inform GRDEMS of the exception, a line would be added after line 3 in the user input file (see Table 3-8). This new line would assign surrogate code 14 to source category 79 for county 12121 (see Exhibit 4-1).

Emissions from on-road motor vehicles and other mobile source categories are best allocated by using digitized link data for roadways, railroads, airports, and marine terminals. A link is defined as a line connecting two end points or nodes. A link may be entirely contained in a single cell or span several cells. Each link must begin and terminate in the same county and all links for each type within a county must be included whether or not the link is within the modeling domain. Emissions associated to a link type are allocated to each cell transversed by the specified link type. Failure to digitize link lengths beyond the modeling domain for any county will cause EPS to allocate the total county emissions for the link type to only those cells along the digitized link, resulting in an overestimation of the emission for the affected cells. If digitized data for links are not available, other gridded surrogates, such as population, urban land use, or rural land use, may be used.

Emissions from point sources are allocated to grid cells based on the UTM coordinates of each source. Emissions from point sources with missing or incomplete location data can be treated as low-level emissions and allocated throughout the county using an appropriate surrogate, such as "urban land use".

TEMPORAL ADJUSTMENTS USED IN GRIDDING

Pollutant emission rates are usually reported as annual totals and must be converted to hourly rates for use in the UAM. In general, the equation used to convert annual average emissions in ton/yr to kg/h is

```
at14km
0    1.0000
Exception surrogate -- county cross reference:
    14        79 112260
 -9999
```

EXHIBIT 4-1. Sample of GRDEMS user's input file (Table 3-8) specifying exceptions to surrogate/NSC assignment provided by the cross-reference table (Table 3-9).

$$\text{hourly emissions} = \frac{\text{annual emisssions} * \text{monthly throughput} * \text{weekday factor} * 907.18474}{4.345 * \text{total hours}}$$

where

annual emissions = the pollutant emissions rate (ton/yr)

monthly throughput = emissions for the Source Classification Code (SCC) or NAPAP Source Category (NSC)

weekday factor = a factor incorporating the number of days per week for the SCC or NSC

907.184 = factor for converting tons to kg

4.345 = average number of weeks per month [(365/7)/12)]

total hours = the number of hours in the day that emissions are produced.

In the EPS annual emission rates are adjusted to hourly emissions by applying month-of-year, day-of-week, and diurnal factors with the program CENTEMS. Day-of-week and diurnal profile codes are provided as inputs to CENTEMS and specified in the merf record. The monthly factors are specified in the merf record. Monthly factors for point source emissions are calculated from the monthly throughput data provided by the NAPAP input; monthly factors for area and mobile emissions are assigned by GRDEMS. The second section of the cross-reference table contains the monthly factors and diurnal profile code for each NSC (see Table 3-9). The NSC/day-of-week profile codes are specified in the third section of the cross-reference file. Tables C-1 and C-2 in Appendix C lists the diurnal and weekday variation profiles and codes.

Day-specific emissions require special handling by the user. This data will need to be put in the merf format for input to CENTEMS. The monthly factor field (VMNTH) (see Table 3-20) changes; each record contains 12 hours of diurnal factors rather than the monthly factors. The diurnal code (IDYCOD) is set to -1 to represent the hours 1 - 12 and -2 to represent the hours 13 - 24. The weekday code variable (IWKCOD) is set to zero. This process allows the user to incorporate day-specific information reflecting the actual diurnal operation of the stationary source.

CHEMICAL SPECIATION PROFILES

Nitrogen oxides (NO_x) and total hydrocarbon (THC) emissions must be split into the Carbon-Bond Mechanism chemical species. NO_x is split into the species NO and NO_2. The split for THC depends on which version of the Carbon-Bond Mechanism is installed in the UAM. For CB-IV, THC is split into OLE, PAR, ETH, TOL, XYL, FORM, ALD2, MEOH, ETOH, ISOP and nonreactive. The task is performed by CENTEMS from the information in the hydrocarbon speciation profile file (see Table 3-16 and Exhibit 3-24). Note that this profile file also contains the split factors for NO_x. The default split factors are based on the speciation profiles established in EPA's Air Emissions Species Manual (1988). These profiles are assigned by SCC (or NSC) code in the speciation profile input file (Table 3-16 and Exhibit 3-24).

The split factors defined in the hydrocarbon speciation profile file are calculated outside EPS and have units of moles of species per gram of emissions. There are four steps to creating split factors for a profile:

(1) Obtain a chemical profile for each source type (SCC), which lists all chemicals by weight, and normalize to 1;

(2) Assuming 1 gram of emissions, calculate the number of moles for each compound in the profile;

(3) Split each compound into CB-IV chemical species (moles) based on the compound's characteristics (Hogo and Gery, 1988); and

(4) For all compounds in the profile, determine the total for each CB-IV species.

To replace any default profile, first follow the above four steps. Then identify the profile code assigned to the SCC in the hydrocarbon speciation profile file (Table 3-17) and substitute the new factors in the appropriate record of the speciation factors file (Table 3-16), including the NO_x split factors. The profile code file (Table 3-26) used as input to POSTEMS contains a description of the profile, which can be modified to reflect the special application. However, the file is not necessary for calculating emissions.

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PROJECTING FUTURE-YEAR INVENTORIES

Preparation of future-year emission inventories requires adjustment of estimates of current emissions based on estimated changes in activity levels. Activities can include projected economic growth, population, or vehicle miles traveled. This adjustment reflects expected changes in emissions due to changes in activity levels only, and does not incorporate the effects of proposed control measures not included in the base year inventory.

Mobile Sources. In addition to the effects of fleet turnover (which are calculated by the EPA program MOBILE4), emissions from on-road motor vehicles are adjusted to reflect projected changes in vehicle miles traveled (VMT). Projected VMT is disaggregated into five vehicle classes: light duty vehicles (both gasoline- and diesel-fueled), light duty gas trucks, light duty diesel trucks, heavy duty gas trucks, and heavy duty diesel trucks. Most projections are developed on the national level Consequently, the VMT growth factor (which is the ratio of future year to base year VMT) for a given vehicle class is identical for each state. Although this does not accurately reflect changes in a state's share of the national VMT due to changing economic and demographic patterns, more highly resolved data are not readily available.

Stationary Sources. Growth factors for stationary sources may be based on projected levels of economic activity and population provided by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA). The BEA Regional Projections include estimated population as well as per capita income by industry and employment by industry. These projections incorporate the following:

Population projections, including estimated effects of immigration, mortality, and fertility rates, from the U.S. Bureau of the Census;

Gross National Product projections from the Bureau of Labor Statistics (BLS);

Components of personal income;

Civilian employment estimates, accounting for estimated unemployment rates, from BLS; and

Estimates of distributions of employment and earnings by industry from BLS.

For emission inventory projections, the most applicable activity indicator from the data provided by BEA is a combination of projected population growth and projected employment by industry. In the NAPAP emissions inventory emissions records for major point sources include the SIC code for each facility. Accordingly, growth factors for these sources can be developed from ratios of future-year to base-year employment levels by industry using the SIC.

Emissions from minor stationary sources and other activities (such as agricultural field burning, vessels, and construction activities) are reported by NAPAP source category. Some NAPAP source categories can be directly matched with a major SIC group, in which case the projected growth for that SIC is used to adjust the emissions. For other source categories, no direct pairing with an industrial category can be made, because the category is either non-industrial or a composite of emission sources from many industrial categories. For these sources, the most applicable adjustment is either projected population growth (for such categories as residential fuel use) or no growth (for categories such as forest wild fires or managed burning).

Biogenic Emissions. Biogenic emissions (naturally occurring emissions from vegetative sources) are assumed to remain constant between base and future year inventories.

CONTROL SCENARIO IMPLEMENTATION

Control scenarios examine the potential reduction of emissions for selected source categories or SCCs (the control codes for the EPS are listed in Appendix A, Table A-3). Each NSC or SCC is assigned a specific control code in the category glossary

file (Table 3-15 and Exhibit 3-23). Implementation of a control strategy is accomplished through the user input file to CENTEMS. For each control the user must add a line at line number 4 (see Table 3-13). The inputs required are the appropriate control code and the amount of emissions remaining after the control, i.e., a 6% reduction will be reflected as '.94' on input. A separate factor is required for CO, NO_x, SO_x, THC and TSP. The resulting reductions to the emissions will be reflected in the total outputs from CENTEMS and the categorized totals from POSTEMS.

TABULATION OF EMISSION TOTALS

The emission data processed by the EPS are tabulated by several categories, providing the user different ways to summarize and analyze the emissions inventory. The categories include activity type, process type, old industrial codes, control codes, and chemical speciation. The different emissions categories are: activity, process, control, general source, and chemical speciation profile. These categories were originally developed by the California Air Resources Board and extended for general use by Systems Applications, Inc. (The categories are defined in Appendix A.) The five categories of emissions are used in the development of future-year control scenarios. The control category is used specifically to modify base-year emissions in the program CENTEMS.

Acronyms

ADT	Average daily traffic
AEROS	Aerometric and Emissions Reporting System
AIRS	Air Information Retrieval System
BEIS	Biogenics Emissions Inventory System
CBM	Carbon-Bond Mechanism (chemical kinetics mechanism)
CMSA	Consolidated Metropolitan Statistical Area
DWM	Diagnostic Wind Model
EKMA	Empirical Kinetic Modeling Approach
EPA	Environmental Protection Agency
EPS	Emissions Preprocessing System
FIP	Federal Implementation Plan
FIPS	Federal Information Processing Standards
FREDS	Flexible Regional Emissions Data System
FTP	Federal Test Procedure
HDGV	Heavy-duty gas vehicle
I/M	Inspection and maintenance
JCL	Job Control Language
LDGV	Light-duty gas vehicle
LDGT	Light-duty gas truck
MSA	Metropolitan Statistical Area

merf	model emission record format
NAPAP	National Acid Precipitation Assessment Program
NAAQS	National Ambient Air Quality Standard
NEDS	National Emission Data System
NSC	National Source Category
OIC	Old Inventory Category
RHC	Reactive hydrocarbons
ROG	Reactive organic gas
ROM	Regional Oxidant Model
RVP	Reid vapor pressure
SAMS	SIP Air Management System
SAROAD	Storage and Retrieval Air Quality Data
SCC	Source Classification Code
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SMSA	Standard Metropolitan Statistical Area
THC	Total hydrocarbons
TOG	Total Organic Gases
TSP	Total suspended particulates
UAM	Urban Airshed Model
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VMT	Vehicle miles traveled
VOC	Volatile organic compound

Glossary

Activity level - Any variable parameter associated with the operation of a source of emissions which is proportional to the quantity of pollutant emitted.

Biogenic (see "Emissions")

Carbon bond mechanism - A chemical kinetics mechanism in which various hydrocarbons are grouped according to bond type (e.g., carbon single bonds, carbon double bonds, or carbonyl bonds). This lumping technique categorizes the reactions of similar carbon bonds, whereas the molecular lumping approach groups the reactions of entire molecules.

Cold start - Motor vehicles, emissions occurring when an engine is started while at ambient temperature. Also called Bag 1. For catalyst-equipped vehicles, startup of an engine which has not been operated during the previous hour. For other vehicles, startup of an engine which has not been operated during the previous 4 hours.

Concentration background - The concentration of a pollutant in the ambient air of a region as measured by monitors unaffected by sources within the region (i.e., by "upwind" monitors).

Controls, emission (stage I and stage II) - Methods of decreasing emissions can be either behavioral (e.g., carpooling) or technology based. Stage I and II refer to different levels of technological reduction of vehicle refueling emissions. Stage I is controls on gasoline delivery; Stage II is controls on gasoline sales at the pump using vapor recovery system.

Deterioration rate - Estimated linear rate at which motor vehicle emission levels change (increase) as the vehicle ages.

Effective stack height - The sum of the actual stack height plus the plume rise. It is defined as the height at which a plume becomes passive and subsequently follows ambient air motion.

Emission factor - A factor usually expressed as mass pollutant/throughput or activity level, used to estimate emissions for a given activity.

Emission inventory - A list of the amount of pollutants from all sources entering the air in a given time period. Often includes associated parameters such as process.

Emissions, anthropogenic - Emissions from man-made sources which can be subdivided into area, mobile, and point emissions.

Emissions, area - Emissions from residential, commercial, off-road vehicles, and small industrial sources of which allocation will be assigned according to the "land use" file.

Emissions, biogenic - Emissions from naturally occurring sources such as vegetation.

Emissions, evaporative - Emissions resulting from the volatilization of gasoline and solvents due to rising ambient temperatures or engine heat after vehicle shutdown.

Emissions, exhaust - Emissions resulting from the combustion processes associated with motor vehicles.

Emissions, mobile - Emissions from on-road motor vehicles. General category which includes emission from different operational modes, cold start, hot stabilized, hot start, hot soak, running loses, diurnal.

Emissions, point - Emissions from large industrial sources of which location and stack parameters (if any) are known.

Evaporative losses (see "Emissions")

Grid cell - The three-dimensional box-like cell of a grid system.

Grid layer - The horizontal layer of grid cells. The grid model domain may consist of a number of grid layers in the vertical.

Grid model - An air quality simulation model that provides estimates of pollutant concentrations for a gridded network of receptors, using assumptions regarding the exchange of air between hypothetical box-like cells in the atmosphere above an emission grid system. Mathematically, this is known as an "Eulerian" model (cf. "Trajectory model").

Hot start - Condition of motor vehicle engine that has been restarted after being turned off, but not cooled to ambient temperature.

Julian date - A date reference method where days are numbered consecutively from the arbitrarily selected point. The form of the date is YYDDD where YY is the year and DDD is the day of year from January 1, e.g., May 3, 1990 = 90123.

Land use - A description of the major natural or man-made features contained in an area of land or a description of the way the land area is being used. Examples of land use include forest, desert, cropland, uran, grassland, or wetland areas.

Link - A surrogate generated to model limited access roads, airports, ports, and railroads for the allocation of specific mobile and area emissions. It takes the form of a line, or a group of lines, and allocation is performed on the basis of link length per grid cell.

Loss, evaporative (see "Emissions")

Lumping - In chemical mechanisms, the stratagem of representing certain components by surrogate or hypothetical species in order to reduce the assumed number of elementary reactions to a manageable number.

Nitrogen oxides In air pollution usage nitrogen oxides (NO_x) comprises nitric oxide (NO) and nitrogen dioxide (NO_2).

Plume rise - The height above a stack at which exit gases rise as a result of the buoyancy effects of the emissions (due either to higher temperature or to the momentum of the emissions as they leave the stack).

Profile - The particular mix of hydrocarbon species in the emissions from a particular activity, such as natural gas combustion in a boiler. (See "Speciation".)

Reactivity - Measure of the tendency of a chemical to react with other species.

Receptor - A hypothetical sensor or monitoring instrument, usually a unit of a hypothetical network overlaid on the map of an area being modeled. In Eulerian "grid" models one receptor is usually assumed at the center of each grid square.

Resolution, spatial - Allocation of emissions to grid cells based on other facility locations or spatial distribution of some surrogate indicator. (1) The process of determining or estimating what emissions may be associated with individual grid cells or other subcounty areas, given totals for a larger area such as a county. (2) The degree to which a source can be pinpointed geographically in an emission inventory.

Resolution, temporal - Disaggregation of annual or daily emissions into hourly emissions. (1) The process of determining or estimating what emissions may be associated with various seasons of the year, days of the week or hours of the day, given annual totals or averages. (2) A measure of the smallest time interval with which emissions can be associated in an inventory.

Resolution, vertical - Allocation of emissions to vertical layers based on plume calculations. In regard to meteorological parameters and concentrations of pollutants in ambient air, the provision (in a model) of means for taking into account various values at different heights above ground.

Seasonal adjustment - Adjustment of emissions from annual to seasonal level, generally based on seasonal variations in activity or temperature.

Source (see "Emissions")

Source/receptor relationship - A model that predicts ambient pollutant concentrations based on precursor emission strengths. Photochemical simulation models are one type of source/receptor relationship for ozone.

Speciation - Disaggregation of total hydrocarbons into the chemical species or classes specific to a chemical mechanism, such as the Carbon-Bond Mechanism, employed in a photochemical model.

Split factor - The factor by which total VOC emissions in a given category must be multiplied to give VOC emissions belonging to a certain class of compounds, as required for use in a photochemical simulation model. Also, the factor by which NO_x emissions must be multiplied to determine NO or NO_2 emissions.

Stack parameters - Parameters characteristic of a stack and its associated plume, as required for input to some models. Typically, these are stack height, inner diameter, volume flow rate, temperature of gas (needed to calculate plume rise).

Stage I (Stage II) (see "Controls")

Surrogate - (1) For spatial resolution, a quantity whose areal distribution is known or has been estimated and may be assumed to be similar to that of the emissions from some source category whose areal distribution is unknown. (2) For growth, a quantity for which official growth projections are available and whose growth may be assumed to be similar to that of activity in some source category for which projections are needed.

Throughput - A measure of activity in a facility, indicating how much of a substance is handled over a specified time period.

Trajectory - The path (over the map of a region) described by a hypothetical parcel of air moved by winds. The air parcel is identified as being at a given location at a given time, and the trajectory connects its hypothetical locations at earlier and later times of day.

Trajectory model - An air quality simulation model that provides estimates of pollutant concentrations at selected points and times on the trajectories of hypothetical air parcels that move over an emission grid system. Mathematically, this is known as a "Lagrangian" model (cf. "Grid model").

Volatile organic compounds - Any hydrocarbon or other carbon compound present in the gas phase in the atmosphere, with the exception of carbon monoxide, carbon dioxide, carbonic acid, carbonates, and metallic carbides.

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Appendix A

CODES FOR EMISSION CATEGORIES

Table A-1: Activity Codes
Table A-2: Process Codes
Table A-3: Control Codes
Table A-4: Source Category Codes
Table A-5: Hydrocarbon Speciation Profile Codes

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TABLE A-1. Activity codes used in the emissions preprocessor system.

Code	Description
100	Resource Development & Agriculture
110	Agricultural Production
111	Agricultural Crops
112	Agricultural Livestock
113	Agricultural Services
120	Forestry
130	Mining
131	Metal Mining
132	Coal Mining
133	Stone & Clay (Mining)
134	Chemicals & Fertilizer Mineral
140	Oil & Gas Extraction
141	Liquid Gas Production
200	Manufacturing & Industrial
210	Food & Kindred Products
211	Fruit/Vegetable Preservation
212	Grain Mill Products
213	Bakery Products
214	Vegetable Oil
215	Sugar Mfg./Refining
216	Malt Beverages
217	Wines & Brandy
220	Lumber & Wood Products
230	Paper & Allied
231	Pulp & Paper Mills
240	Chemical & Allied
241	Rubber & Plastics Manufacturing
242	Drugs
243	Cleaning/Toilet Preparations
244	Paint Manufacturing
245	Agricultural Chemicals
260	Petroleum Refining/Related
261	Petroleum Refining
262	Paving & Roofing Materials
263	Petroleum Coke/Briquette
270	Mineral Products
271	Glass/Glass Products
280	Metallurgical

continued

TABLE A-1. Continued.

Code	Description
281	Iron/Steel Production
282	Iron/Steel Foundry
283	Nonferrous Metals
290	Misc. Manufacturing
291	Textiles & Apparel
292	Furniture & Fixtures
293	Fabricated Metal
294	Machinery
295	Transportation Equipment
296	Rubber & Plastics Fabrication
297	Tobacco Manufacturing
298	Instruments
300	Services & Commerce
310	Electric Utilities
320	Petroleum & Gas Marketing
321	Bulk Plants
322	Service Stations
323	Pipe Lines
330	Misc. Services
331	Steam Supply
332	Printing & Publishing
333	Laundry & Drycleaners
334	Sanitary & Water
335	Health Services
336	Educational Services
400	Transportation
410	On-road Travel
420	Rail Transport
430	Water Borne
440	Air Transportation
500	Domestic
510	Residential
520	Recreational
600	Misc. Activities
610	Construction
611	Building Construction
612	Road Construction
620	Natural Sources
630	Government

continued

TABLE A-1. Concluded.

Code	Description
631	National Security
801	Seeps/Biogenic
802	Channel Shipping
803	OCS And Related Sources
804	Tideland Platforms
900	Unspecified Activities

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TABLE A-2. Process codes used in the emissions preprocessor system.

Code	Description
100	Fuel Combustion
110	Boilers & Heaters
111	Boilers
112	Space Heaters
113	Orchard Heaters
114	Process Heaters
120	In-process Fuel
130	Stationary I.C. Engines
131	Turbine - Combustion Gases
140	Equipment
141	Utility Equipment
142	Mobile Equipment
200	Waste Burning
210	Incineration
211	Conical Burner
220	Open Burning
221	Agricultural Debris
222	Range Improvement
223	Forest Management
300	Solvent Use
310	Dry Cleaning
320	Degreasing
330	Surface Coating
340	Asphalt Paving
350	Printing
400	Liquid Storage & Transfer
410	Tanks
420	Tank Cars & Trucks
430	Marine Vessels
440	Vehicle Refueling
500	Industrial Processes
510	Chemical Processes
520	Food & Agricultural
530	Petroleum & Related
540	Mineral Processes
550	Metal Processes
551	Primary Metal
552	Secondary Metal
553	Metal Fabrication

continued

TABLE A-2. Concluded.

Code	Description
560	Wood & Paper Processes
570	Rubber & Plastics
600	Misc. Processes
610	Pesticide Application
620	Solid Waste Land Fill
621	Waste Disposal
630	Farming Operations
640	Construction & Demolition
650	Road Travel
651	Unpaved Road
652	Paved Road
660	Unplanned Fires
661	Wild Fires
662	Structural Fires
700	Vehicular Sources
710	On-road Motor Vehicles
720	Off-road Motor Vehicles
540	Mineral Processes
550	Metal Processes
551	Primary Metal
552	Secondary Metal
553	Metal Fabrication
560	Wood & Paper Processes
570	Rubber & Plastics
600	Misc. Processes
730	Trains
740	Ships
750	Aircraft
801	Seeps/Biogenic
802	Channel Shipping
803	OCS And Related Sources
804	Tideland Platforms
900	Unspecified Processes

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TABLE A-3. Control codes used in the emissions preprocessor system. Abbreviations are defined at the end of the table.

Code	Description
99	Unspecified
101	Utility Boilers - Liquid Fuels
102	Utility Boilers - Gaseous Fuels
103	Refinery Boilers & Heaters - Liquid Fuel
104	Residential Space Heaters - Natural Gas
105	Residential Water Heaters - Natural Gas
107	Non-utility I.C. Engines - Gaseous
108	Utility Reciprocal - Liquids
109	Industrial Boilers
110	Cement Kilns
111	Glass Melting Furnace
112	Marine Diesel Engines
113	Non-farm Equipment (Diesel)
114	Sulfur in Fuel
116	Utility Turbines - Liquids
117	Refinery Boilers & Heaters - Gas. Fuel
118	Steam Generators - Liquids
121	Pipeline Heaters
122	Marine Vessels - Combustion
124	Utility Turbines - Gaseous
125	Cogeneration
126	TEOR Steam Generators - Gaseous
127	Non-utility I.C. Engines - Liquid
128	Resource Recovery
129	Boilers-Space Heaters - Liquid Fuel
130	Boilers-Space Heaters - Gas Fuel
131	Utility Reciprocal - Gaseous
201	Flares
301	Architectural Coatings - Oil Based
302	Architectural Coatings - Water Based
303	Architectural Coatings - Solvents
304	Auto Assembly Line - Surface Coating
305	Auto Assembly Line - Solvent Use
306	Can & Coil - Surface Coating
307	Can & Coil - Solvent Use
308	Metal Parts & Products - Surface Coating
309	Metal Parts & Products - Solvent Use
310	Paper - Surface Coating
311	Paper - Solvent Use

continued

TABLE A-3. Continued.

Code	Description
312	Fabric - Surface Coating
313	Fabric - Solvent Use
314	Degreasing - nonsynthetic & misc. (Industrial)
315	Degreasing - nonsynthetic & misc. (Commercial)
316	Cutback Asphalt Paving Materials
317	Dry Cleaning - nonsynthetic
318	Dry Cleaning - synthetic & misc.
319	Graphic Arts - Except Litho/Letterpress
320	Wood Furniture - Surface Coatings
321	Wood Furniture - Solvent Use
323	Auto Refinishing - Surface Coatings
325	Ships - Surface Coating
326	Ships - Solvent Use
327	Aerospace - Surface Coating
328	Aerospace - Solvent Use
331	Degreasing - Synthetic (Industrial)
332	Degreasing - Synthetic (Commercial)
333	Flatwood Products
334	Graphic Arts - Litho/Letterpress
398	Other Industrial Surface Coating
399	Unspecified Industrial Solvent Use
401	Gasoline Working Loss - Bulk Storage
402	Gasoline Working Loss - Tank Trucks
403	Gasoline Working Losses - Underground Tank
404	Gasoline Working Losses - Vehicle Tank
405	Fixed Roof Tanks at Refineries
406	Floating Roof Tanks at Refineries
407	Marine Vessel Operation - Evaporative
410	Oil Production Fields Storage Tanks
411	Marine Lightering
412	Gasoline Breathing Loss - Underground
413	Gasoline Breathing Loss - Aboveground
501	Refinery Valves, Flanges, & Seals
502	Petroleum Coke Calcining
503	Sulfur Recovery Units
504	Sulfuric Acid Plants
505	Fluid Catalytic Cracking Units
506	Gas-Oil Production - Valves, Flanges, Connectors
507	Small Relief Valves

continued

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TABLE A-3. Continued.

Code	Description
508	Non-refinery Valves
510	Vegetable Oil Processing
511	Paint Manufacturing
512	Rubber Products Fabrication
513	Chemical Manufacturing
514	Pharmaceutical Manufacturing
515	Rubber Products Manufacturing
518	Oil Production Steam Drive Well
519	Wineries
520	Carbon Black Manufacturing
522	Pumps & Compressors
523	Refinery Sewers & Drains
524	Refinery Pumps & Compressors
526	Refinery Vacuum System
530	Oil Production - Pump and Compressors
531	Oil Production - Heavy Oil Test Station
532	Oil Production - Cyclic Well Vents
533	Oil Production - Pseudo-cyclic Well
534	Oil Production - Sumps and Pits
535	Natural Gas Plant Fugitives
601	Construction & Demolition
602	Waste Solvent Disposal
603	Pesticides - Synthetic
604	Roofing Tar Pots
605	Pesticides - Nonsynthetic
606	Aerosol Propellant - Synthetic
607	Aerosol Propellant - Nonsynthetic
608	Waste Disposal Landfill
609	Domestic Solvent Use
610	Aerosol Consum Prod Propellant
611	Aerosol Consum Prod Solvent
612	Non-aerosol Consum Prod Solvent
620	Agricultural Pesticide - Synthetic
621	Agricultural Pesticide - Nonsynthetic
622	Other Pesticide - Synthetic
623	Other Pesticide - Nonsynthetic
651	Unpaved City/County Road Dust
711	LDA - Exhaust
712	LDA - Hot Start

continued

TABLE A-3. Continued.

Code	Description
713	LDA - Hot Stabilized
714	LDA - Evaporative
715	LDA - Running Losses
716	LDA - Crankcase Blowby
717	LDA - Tire Wear
718	LD - Refueling
719	Off-road Gasoline Exhaust
720	Off-road Gasoline Evaporative
721	LDT - Cold Start
722	LDT - Hot Start
723	LDT - Hot Stabilized
724	LDT - Hot Soak Evaporative
725	LDT - Diurnal Evaporative
726	LDT - Crankcase Blowby
727	LDT - Tire Wear
731	MDT - Exhaust
732	MDT - Hot Start
733	MDT - Hot Stabilized
734	MDT - Evaporative
735	MDT - Running Losses
736	MDT - Crankcase Blowby
737	MDT - Tire Wear
738	MDT - Refueling
741	HD - Exhaust
742	HD - Evaporative
743	HDG - Hot Stabilized
744	HDG - Evaporative
745	HDG - Running Losses
746	HDG - Crankcase Blowby
747	HDG - Tire Wear
748	HDG - Refueling
751	DDD - Exhaust
753	HDD - Hot Stabilized
757	HDD - Tire Wear
759	Off-road Diesel
761	MCY - Cold Start
762	MCY - Hot Start
763	MCY - Hot Stabilized
764	MCY - Hot Soak Evaporative
765	MCY - Diurnal Evaporative
766	MCY - Crankcase Blowby
767	MCY - Tire Wear

continued

TABLE A-3. Continued.

Code	Description
801	Non-farm Equipment (Gasoline)
802	Farm Equipment (Diesel)
803	Lawn & Garden Equip (Utility)
804	Off-road Motorcycles
805	Pleasure Craft (Boats)
806	Railroad Line Haul Operations
807	Commercial/Civil Piston Aircraft
808	Commercial Jet Aircraft
809	Farm Equipment (gasoline)
811	LDA - Ncat - Cold Start
812	LDA - Ncat - Hot Start
813	LDA - Ncat - Hot Stabilized
814	LDA - Ncat - Hot Soak
815	LDA - Ncat - Diurnal
816	LDA - Ncat - Crankcase
817	LDA - Ncat - Tirewear
821	LDA - Cat - Cold Start
822	LDA - Cat - Hot Start
823	LDA - Cat - Hot Stabilized
824	LDA - Cat - Hot Soak
825	LDA - Cat - Diurnal
827	LDA - Cat - Tirewear
831	LDA - Dsl - Cold Start
832	LDA - Dsl - Hot Start
833	LDA - Dsl - Hot Stabilized
837	LDA - Dsl - Tirewear
841	LMDT - Ncat - Cold Start
842	LMDT - Ncat - Hot Start
843	LMDT - Ncat - Hot Stabilized
844	LMDT - Ncat - Hot Soak
845	LMDT - Ncat - Diurnal
846	LMDT - Ncat - Crankcase
847	LMDT - Ncat - Tirewear
851	LMDT - Cat - Cold Start
852	LMDT - Cat - Hot Start
853	LMDT - Cat - Hot Stabilized
854	LMDT - Cat - Hot Soak
855	LMDT - Cat - Diurnal
857	LMDT - Cat - Tirewear
861	LMDT - Dsl - Cold Start
862	LMDT - Dsl - Hot Start
863	LMDT - Dsl - Hot Stabilized

continued

TABLE A-3. Concluded.

Code	Description
867	LMDT - Dsl - Tirewear
873	HDT - Ncat - Hot Stabilized
874	HDT - Ncat - Hot Soak
875	HDT - Ncat - Diurnal
876	HDT - Ncat - Crankcase
877	HDT - Ncat - Tirewear
883	HDT - Cat - Hot Stabilized
884	HDT - Cat - Hot Soak
885	HDT - Cat - Diurnal
887	HDT - Cat - Tirewear
891	Seeps/Biogenic
892	Channel Shipping
893	OCS and Related Sources
894	Tideland Platforms
901	Forest Management Control Burning
902	Wild Fires Control Burning
903	Livestock Waste
999	Misc. Control Tactics

Cat = catalytic
Ncat = noncatalytic
Dsl - diesel
LDA = light-duty auto
LDT = light-duty truck
LMDT = light-medium-duty truck
MDT = medium-duty truck
HDG = heavy-duty gas
HDD = heavy-duty diesel
MCY = motorcycle

TABLE A-4. Source category codes used in the emissions preprocessor system.

Code	Description
100	Fuel Combustion
110	Agricultural
120	Oil and Gas Production
130	Petroleum Refining
140	Other Manufacturing/Industrial
150	Electric Utilities
160	Other Services and Commerce
170	Residential
199	Other
200	Waste Burning
210	Agricultural Debris
220	Range Management
230	Forest Management
240	Incineration
299	Other
300	Solvent Use
310	Dry Cleaning
320	Degreasing
330	Architectural Coating
340	Other Surface Coating
350	Asphalt Paving
360	Printing
370	Domestic
380	Industrial Solvent Use
399	Other
400	Petroleum Process, Storage & Transfer
410	Oil and Gas Extraction
420	Petroleum Refining
430	Petroleum Marketing
499	Other
500	Industrial Processes
510	Chemical
520	Food and Agricultural
560	Mineral Processes
570	Metal Processes
580	Wood and Paper
599	Other
600	Misc Processes

continued

TABLE A-4. Concluded.

Code	Description
610	Pesticide Application
620	Farming Operations
630	Construction and Demolition
640	Entrained Road Dust - Paved
650	Entrained Road Dust - Unpaved
660	Unplanned Fires
680	Waste Disposal
685	Natural Sources
699	Other
700	On Road Vehicles
710	Light Duty Passenger
720	Light and Medium Duty Trucks
730	Heavy Duty Gas Trucks
740	Heavy Duty Diesel Trucks
750	Motorcycles
799	Other
800	Other Mobile
810	Off Road Vehicles
820	Trains
830	Ships
850	Aircraft - Government
860	Aircraft - Other
870	Mobile Equipment
880	Utility Equipment
891	Seeps/Biogenic
892	Channel Shipping
893	OCS and Related Sources
894	Tideland Platforms
900	Unspecified Sources

TABLE A-5. Hydrocarbon speciation profile codes used in the emissions preprocessor system. (Based on EPA, 1988)

Code	Description
0000	Overall Average
0001	External Combustion Boiler - Residual Oil
0002	External Combustion Boiler - Distillate Oil
0003	External Combustion Boiler - Natural Gas
0004	External Combustion Boiler - Refinery Gas
0005	External Combustion Boiler - Coke Oven Gas
0007	Natural Gas Turbine
0008	Reciprocating Diesel Fuel Engine
0009	Reciprocating Distillate Oil Engine
0011	By-Product Coke Oven Stack Gas
0012	Blast Furnace Ore Charging and Agglomerate
0013	Iron Sintering
0014	Open Hearth Furnace with Oxygen Lance
0016	Basic Oxygen Furnace
0023	Asphalt Roofing - Spraying
0024	Asphalt Roofing - Tar Kettle
0025	Asphaltic Concrete - Natural Gas Rotary Dryer
0026	Asphaltic Concrete - In Place Road Asphalt
0029	Refinery Fluid Catalytic Cracker
0031	Refinery Fugitive Emissions-Covered Drainage/Separation Pits
0035	Refinery Fugitive Emissions - Cooling Towers
0039	Refinery Fugitive Emissions - Compressor Seals Refinery Gas
0047	Refinery Fugitive Emissions - Relief Valves, Liquified Petroleum Gas
0051	Natural Gas
0066	Varnish Manufacturing - Bodying Oil
0068	Manufacturing - Plastics - Polypropylene
0072	Printing Ink Cooking
0076	General Pesticides
0078	Ethylene Dichloride - Direct Chlorination
0079	Chemical Manufacturing - Flares
0085	Perchloroethylene - Drycleaning
0087	Degreasing - 1,1,1-Trichloroethane
0088	Degreasing - Trichlorofluoromethane (Freon 11)
0089	Degreasing - 1,1,2-Trichloroethane
0090	Degreasing - Toluene
0100	Fixed Roof Tank - Commercial Jet Fuel (Jet-A)
0121	Open Burning Dump - Landscape/Pruning
0122	Bar Screen Waste Incinerator
0127	Surface Coating - Varnish/Shellac

continued

TABLE A-5. Continued.

Code	Description
0166	Printing Press - Letterpress Inking Process
0182	Printing Press - Gravure General Solvent
0183	Printing Press - Gravure Printing Solvent
0195	Residential Fuel - Natural Gas
0197	Solvent Use - Domestic Solvents
0202	Solid Waste Landfill Site - Class II
0203	Solid Waste - Animal Waste Decomposition
0217	Coke Oven Blast Furnace Gas
0219	Surface Coating Paint Solvent - Acetone
0220	Paint Solvent - Ethyl Acetate
0221	Paint Solvent - Methyl Ethyl Ketone
0222	Surface Coating - Enamel - Cellosolve Acetate
0223	Surface Coating - Varnish/Shellac Solvent - Xylene
0225	Surface Coating - Primer- Mineral Spirits
0226	Surface Coating Solvent - Ethyl Alcohol
0227	Surface Coating Solvent - Isopropyl Alcohol
0228	Surface Coating Solvent - Isopropyl Acetate
0229	Surface Coating Solvent - Lactol Spirits
0230	Fixed Roof Tank - Hexane
0271	Degreasing - Trichloroethylene
0272	Automotive Tires - Tuber Adhesive
0273	Automotive Tires - Tuber Adhesive White Sidewall
0274	Automotive Tire Production
0275	Degreasing - Dichloromethane
0277	Degreasing - Trichlorotrifluoroethane (Freon 113)
0282	Surface Coating Primer - Naphtha
0288	Surface Coating Solvent - Butyl Acetate
0289	Surface Coating Solvent - Butyl Alcohol
0290	Surface Coating Solvent - Cellosolve
0291	Surface Coating Solvent - Methyl Alcohol
0292	Surface Coating Solvent - Dimethylformamide
0296	Fixed Roof Tank - Crude Oil Production
0297	Fixed Roof Tank - Crude Oil Refinery
0299	Fixed Roof Tank - Cyclohexane
0301	Fixed Roof Tank - Heptane
0304	Printing Press - Flexographic, n-Propyl Alcohol
0305	Fixed Roof Tank - Crude Oil Marine Terminal
0307	Miscellaneous Burning - Forest Fires
0316	Pipe/Valve Flanges

continued

TABLE A-5. Continued.

Code	Description
0321	Pump Seals - Composite
0332	Printing Press - Lithography Inking and Drying
0333	Lithography - Inking and Drying-Direct Fired Dryer
1001	Internal Combustion Engine - Natural Gas
1002	Chemical Menufacturing - Carbon Black Production
1003	Surface Coating Operations - Coating Application - Solvent-base Paint
1004	Plastics Production - Polystyrene
1005	Plastics Production - Polyester Resins
1006	Phthalic Anhydride - o-Xylene Oxidation - Main Process Stream
1007	Mineral Products - Asphaltic Concrete
1008	Rubber and Misc. Plastics Products - Styrene/Butadiene
1009	Plastics Production - Acrylonitrile - Butadiene - Styrene Resin
1010	Oil and Gas Production - Fugitives - Unclassified
1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas service
1013	Surface Coating Operations - Coating Application - Water-base Paint
1014	Gasoline - Summer Blend
1015	Gasoline - Winter Blend
1016	Surface Coating Operations - Thinning Solvents - Composite
1017	Surface Coating Operations - Coating Application - Lacquer
1018	Surface Coating Operations - Coating Application - Enamel
1019	Surface Coating Operations - Coating Application - Primer
1020	Surface Coating Operations - Coating Application - Adhesives
1021	Degreasing - Open Top - Chlorosolve
1022	Printing/Publishing - Ink Thinning Solvents - Methyl Isobutyl Ketone
1023	Terephthalic Acid/Dimethyl Terephthalate - Crystal-, Separat-, Drying Vat
1024	Terephthalic Acid/Dimethyl Terephthalate - Distillation and Recovery Vent
1025	Terephthalic Acid/Dimethyl Terephthalate - Product Transfer Vent
1026	Surface Coating Operations - Thinning Solvent - Hexylene Glycol
1027	Ketone Production - Methyl Ethyl Ketone (MEK)
1028	Acetone - Light Ends Distillation Vent
1029	Acetone - Acetone Finishing Column
1030	Aldehydes Production - Formaldehyde - Absorber Vent
1031	Surface Coating Operations - Thinning Solvent - Ethylene Oxide
1032	Aldehydes Production - Acrolein - Distillation System
1033	Aldehydes Production - Acrolein - Reactor Blowoff Gas
1034	Chloroprene - Butadiene Dryer

continued

TABLE A-5. Continued.

Code	Description
1035	Chloroprene - Chloroprene Stripper and Brine Stripper
1036	Secondary Aluminum - Pouring and Casting
1037	Organohalogens - Ethylene Dichloride - Direct Chlorination - Distillation Ven
1038	Organohalogens Production - Ethylene Dichloride - Via Oxychlorination
1039	Organohalogens Production - Ethylene Dichloride - Caustic Scrubber
1040	Fluorocarbons/Chlorofluorocarbons - General
1041	Fluorocarbons/Chlorofluorocarbons - Distillation Column
1042	Fluorocarbons/Chlorofluorocarbons - Fugitive Emissions - General
1043	Acrylic Acid - Quench Absorber
1044	Organic Acids Production - Formic Acid
1045	Organic Acids Production - Acetic Anhydride - Distillation Column Vent
1046	Esters Production - Acrylates - Ethyl Acrylate
1047	Esters Production - Butyl Acrylate
1048	Cumene Production - Cumene Distillation System Vent
1049	Cyclohexane - General
1050	Cyclohexanone/Cyclohexanol - Phenol Hydrogenation Process - Distillation Vent
1051	Vinyl Acetate - Inert Gas Purge Vent
1052	Vinyl Acetate - CO2 Purge Vent
1053	Vinyl Acetate - Inhibitor Mix Tank Discharge
1054	Vinyl Acetate - Refining Column Vent
1055	Organic Chemical Storage - Methylamyl Ketone
1056	Ethylene Oxide - Oxygen Oxidation Process Reactor - CO2 Purge Vent
1057	Ethylene Oxide - Oxygen Oxidation Process Reactor - Argon Purge Vent
1058	Ethylene Oxide - Stripper Purge Vent
1059	Methyl Methacrylate (MMA) - Hydrolysis Reactor, Light Ends, Distillation Unit
1060	Methyl Methacrylate (MMA) - Acid Distillation and MMA Purification
1061	Nitrobenzene - Reactor and Separator Vent - Washer and Neutralizer Vent
1062	Benzene
1064	Olefins Production - Ethylene - Compressor Lube Oil Vent
1065	Propylene Oxide - Chlorohydronation Process - General
1066	Styrene - General
1067	Styrene - Benzene Recycle
1068	Styrene - Styrene Purification
1069	Organic Chemical Storage - N-Propyl Acetate
1070	Alcohols Production - Methanol - Purge Gas Vent
1071	Alcohols Production - Methanol - Distillation Vent

continued

TABLE A-5. Continued.

Code	Description
1072	Chlorobenzene - Tail Gas Scrubber
1073	Chlorobenzene - Benzene Drying Distillation
1074	Monochlorobenzene
1075	Chlorobenzene - Vacuum System Vent
1076	Chlorobenzene - Dichlorobenzene Crystallization
1077	Chlorobenzene - Dichlorobenzene Crystal Handling/Loading
1078	Railcar Cleaning - Low Vapor Press., High Viscosity Cargo (Ethylene Glycol)
1079	Railcar Cleaning - Low Vapor Press., Medium Viscosity Cargo (o-Dichlorobenzene)
1080	Railcar Cleaning - Low Vapor Pressure, High Viscosity Cargo (Creosote)
1081	Tank Truck Cleaning - Med. Vapor Press., Med. Visc. Cargo (Methyl Methacrylate)
1082	Tank Truck Cleaning - Low Vapor Pressure, Low Viscosity Cargo (Phenol)
1083	Tank Truck Cleaning - Low Vapor Press., High Visc.Cargo (Propylene Glycol)
1084	Residential Wood Combustion (C1-C6)
1085	External Combustion Boiler - Coal-Slurry Fired
1086	Printing/Flexographic
1087	Organic Chemical Storage/i-Butyl i-Butyrate
1088	Surface Coating Operations - Adhesive Application
1089	Secondary Metal Production - Gray Iron Foundries - Pouring/Casting
1090	Fluorocarbon Manufacturing - CF 12/11
1091	Plastics Production - Polyvinyl Chlorides and Copolymers
1092	Synthetic Organic Fiber Production - Nylon Batch Production Process
1093	Fluorocarbon Manufacturing - CF 23/22
1094	Paint Manufacture - Blending Kettle
1095	Textile Products - General Fabric Operations - Dyeing and Curing
1096	Textile Products - General Fabric Operations - Tenter Frame
1097	Aircraft Landing/Takeoff (LTO) - Military
1098	Aircraft Landing/Takeoff (LTO) - Commercial
1099	Aircraft Landing/Takeoff (LTO) - General Aviation
1100	Gasoline Refueling
1101	Light Duty Gasoline Vehicles
1103	1-Pentene
1104	Acetaldehyde
1105	Acetic Acid
1106	Acetic Anhydride
1107	Acrolein

continued

TABLE A-5. Continued.

Code	Description
1108	Acrylic Acid
1109	Acrylonitrile
1110	Adipic Acid
1111	Aniline
1112	Benzyl Chloride
1114	Butyl Acrylate
1115	Butyl Carbitol
1116	Butyl Cellosolve
1118	Carbitol
1119	Carbon Tetrachloride
1120	Acetylene
1121	Chloroform
1122	Cresol
1123	Cumene
1124	Cyclohexanol
1125	Cyclohexanone
1126	Cyclopentene
1127	Diethylene Glycol
1128	Diisopropyl Benzene
1129	Dipropylene Glycol
1130	Dodecene
1131	Epichlorohydrin
1132	Ethanolamines
1134	Ethyl Acrylate
1135	Ethyl Benzene
1136	Ethyl Ether
1137	Ethyl Mercaptan
1138	Ethyl Dibromide
1139	Ethyleneamines
1140	Formaldehyde
1141	Formic Acid
1142	Furfural
1144	Heptenes
1145	Isobutyraldehyde
1146	Isobutyl Acrylate
1147	Isobutyl Alcohol
1148	Isoprene
1149	Methanol
1150	Methyl Acetate

continued

TABLE A-5. Continued.

Code	Description
1151	Methyl Acrylate
1152	Methyl Carbitol
1153	Methyl Cellosolve
1154	Methyl Styrene
1155	Methylallene
1158	Methyl t-Butyl Ether
1159	m-Xylene
1160	Nitrobenzene
1162	N-Butyraldehyde
1163	N-Decane
1164	N-Dodecane
1165	o-Xylene
1166	Pentadecane
1167	Residential Wood Combustion
1168	Piperylene
1171	Propionaldehyde
1172	Propionic Acid
1173	Propylene Oxide
1174	p-Xylene
1175	Tert-Butyl Alcohol
1176	Toluene Diisocyanate
1178	Coal-Fired Boiler - Electric Generation
1185	Coal-Fired Boiler - Industrial
1186	Heavy-Duty Gasoline Trucks
1187	Citrus Coating
1188	Fermentation Processes
1189	Pulp and Paper Industry - Plywood Veneer Dryer
1190	Gasoline Marketed
1191	Graphic Arts - Printing
1192	Degreasing
1193	Drycleaning
1194	Auto Body Repair
1195	Degreasing Composite
1196	Drycleaning Composite
1197	Isooctane
1198	Pentane
1199	Isopentane
1200	Cyclopentane
1201	Light-Duty Diesel Vehicles

continued

TABLE A-5. Continued.

Code	Description
1202	Primary Aluminum Production
1203	Light-Duty Gasoline Vehicles - Exhaust Emissions
1204	Light-Duty Gasoline Vehicles - Evaporative Emissions
9001	External Combustion Boilers - Industrial - Average
9002	Internal Combustion - Average
9003	Industrial Processes - Average
9004	Chemical Manufacturing - Average
9005	Plastics Production - Average
9006	Synthetic Organic Fiber Production - Average
9007	Alcohols Production - Average
9008	Food and Agriculture - Average
9009	Primary Metal Production - Average
9010	Secondary Metal Production - Average
9011	Mineral Products - Average
9012	Petroleum Industry - Average
9013	Pulp and Paper Industry - Average
9014	Rubber and Miscellaneous Plastics Products - Average
9015	Oil and Gas Production - Average
9016	Textile Products - Average
9017	Drycleaning/Degreasing - Average
9021	Surface Coating Operations - Average
9022	Solid Waste Disposal - Average
9023	Thinning Solvents - Average
9024	Petroleum Product Storage - Average
9025	Bulk Terminals - Petroleum Storage Tanks - Average
9026	Printing/Publishing - Average
9027	Transportation and Marketing of Petroleum Products - Average
9028	Organic Chemical Storage - Average
9029	Organic Chemical Storage - Fixed Roof Tanks - Alcohols - Average
9030	Organic Chemical Storage - Fixed Roof Tanks - Alkanes - Average
9031	Organic Chemical Storage - Fixed Roof Tanks - Alkenes - Average
9032	Organic Chemical Storage - Fixed Roof Tanks - Amines - Average
9033	Organic Chemical Storage - Fixed Roof Tanks - Aromatics - Average
9034	Organic Chemical Storage - Fixed Roof Tanks - Carboxylic Acids - Average
9035	Organic Chemical Storage - Fixed Roof Tanks - Esters - Average
9036	Organic Chemical Storage - Fixed Roof Tanks - Glycol Ethers - Average
9037	Organic Chemical Storage - Fixed Roof Tanks - Glycols - Average

continued

TABLE A-5. Concluded.

Code	Description
9038	Organic Chemical Storage - Fixed Roof Tanks - Halogenated Organics - Average
9039	Organic Chemical Storage - Fixed Roof Tanks - Isocyanates - Average
9040	Organic Chemical Storage - Fixed Roof Tanks - Ketones - Average
9041	Organic Chemical Storage - Floating Roof Tanks - Aldehydes - Average
9042	Organic Chemical Storage - Floating Roof Tanks - Alkanes - Average
9043	Organic Chemical Storage - Floating Roof Tanks - Ethers - Average
9044	Organic Chemical Storage - Floating Roof Tanks - Halogenated Organics - Average
9046	Organic Chemica. Storage - Pressure Tanks - Alkenes - Average
9047	Organic Solvent Evaporation - Miscellaneous - Average

Appendix B

SURROGATES FOR AREA SOURCE CATEGORIES

90008 29

Allocation of on-road motor vehicle emissions and other mobile source categories are best spatially distributed by using digitized roadway, railroad, airports, and marine terminal data. Scaled road maps provided from transportation departments provide the best means of digitizing the roadways. However, if such digitized data are not available, other gridded surrogates may be appropriate, such as different types of land use or population. The first 109 categories are the standard ones used in current NAPAP inventories. Subsequent categories have been devised by SAI by subdividing some of the NAPAP categories. For example, the "LDGV Limited Access Road" category must be subdivided into evaporative and exhaust emissions for speciation purposes. These are put into SAI categories with code numbers greater than 109. All of these SAI categories are labeled "SAI NSC" in the table.

Surrogate		Area Source Category*	
Code	Name	Code	Name
2	Population	1	Residential Fuel - Anthracite Coal
2	Population	2	Residential Fuel - Bituminous Coal
2	Population	3	Residential Fuel - Distillate Oil
2	Population	4	Residential Fuel - Residual Oil
2	Population	5	Residential Fuel - Natural Gas
2	Population	6	Residential Fuel - Wood
4	Urban	7	Commercial/Institutional Fuel - Anthracite Coal
4	Urban	8	Commercial/Institutional Fuel - Bituminous Coal
4	Urban	9	Commercial/Institutional Fuel - Distillate Oil
4	Urban	10	Commercial/Institutional Fuel - Residual Oil
4	Urban	11	Commercial/Institutional Fuel - Natural Gas
4	Urban	12	Commercial/Institutional Fuel - Wood
4	Urban	13	Industrial Fuel - Anthracite Coal
4	Urban	14	Industrial Fuel - Bituminous Coal
4	Urban	15	Industrial Fuel - Coke
4	Urban	16	Industrial Fuel - Distillate Oil
4	Urban	17	Industrial Fuel - Residual Oil
4	Urban	18	Industrial Fuel - Natural Gas
4	Urban	19	Industrial Fuel - Wood
4	Urban	20	Industrial Fuel - Process Gas

* Abbreviations are explained at the end of the table.

2	Population	21	On-Site Incineration - Residential
4	Urban	22	On-Site Incineration - Industrial
4	Urban	23	On-site Incineration - Commercial/Institutional
2	Population	24	Open Burning - Residential
4	Urban	25	Open Burning - Industrial
4	Urban	26	Open Burning - Commercial/Institutional
101	Limited Access Roads	27	LDGV - Limited Access Roads
15	Rural	28	LDGV - Rural Roads
2	Population	29	LDGV - Suburban Roads
4	Urban	30	LDGV - Urban Roads
101	Limited Access Roads	31	MDGV - Limited Access Roads
15	Rural	32	MDGV - Rural Roads
2	Population	33	MDGV - Suburban Roads
4	Urban	34	MDGV - Urban Roads
101	Limited Access Roads	35	HDGV Limited Access Roads
15	Rural	36	HDGV - Rural Roads
2	Population	37	HDGV - Suburban Roads
4	Urban	38	HDGV - Urban Roads
15	Rural	39	Off Highway Gasoline Vehicles
101	Limited Access Roads	40	HDDV - Limited Access Roads
15	Rural	41	HDDV - Rural Roads
2	Population	42	HDDV - Suburban Roads
4	Urban	43	HDDV - Urban Roads
15	Rural	44	Off Highway Diesel Vehicles
4	Urban	45	Railroad Locomotives
1	County Area	46	Aircraft LTOs - Military
1	County Area	47	Aircraft LTOs - Civil
103	Airports	48	Aircraft LTOs - Commercial
10	Water	49	Vessels - Coal
10	Water	50	Vessels - Diesel Oil
10	Water	51	Vessels - Residual Oil
10	Water	52	Vessels - Gasoline

4	Urban	53	Solvents Purchased
2	Population	54	Gasoline Marketed
15	Rural	55	Unpaved Road Travel
1	County Area	56	Unpaved Airstrip LTOs
15	Rural	60	Forest Wild Fires
15	Rural	61	Managed Burning - Prescribed
5	Agriculture	62	Agricultural Field Burning
5	Agriculture	63	Frost control - Orchard Heaters
2	Population	64	Structural Fires
2	Population	66	Ammonia Emissions - LDGV
2	Population	67	Ammonia Emissions - HDGV
2	Population	68	Ammonia Emissions - HDDV
5	Agriculture	69	Livestock Waste Management - Turkeys
5	Agriculture	70	Livestock Waste Management - Sheep
5	Agriculture	71	Livestock Waste Management - Beef Cattle
5	Agriculture	72	Livestock Waste Management - Dairy Cattle
5	Agriculture	73	Livestock Waste Management - Swine
5	Agriculture	74	Livestock Waste Management - Broilers
5	Agriculture	75	Livestock Waste Management - Other Chickens
5	Agriculture	76	Anhydrous Ammonia Fertilizer Application
5	Agriculture	77	Beef Cattle Feed Lots
4	Urban	78	Degreasing
2	Population	79	Dry Cleaning
4	Urban	80	Graphic Arts/Printing
4	Urban	81	Rubber and Plastics Manufacture
2	Population	82	Architectural Coatings
4	Urban	83	Auto Body Repair
4	Urban	84	Motor Vehicle Manufacture
4	Urban	85	Paper Coating
4	Urban	86	Fabricated Metals
4	Urban	87	Machinery Manufacture
4	Urban	88	Furniture Manufacture
4	Urban	89	Flatwood Products
4	Urban	90	Other Transportation Equipment Manufacture
4	Urban	91	Electrical Equipment Manufacture
10	Water	92	Shipbuilding and Repairing
4	Urban	93	Miscellaneous Industrial Manufacture
1	County Area	94	Miscellaneous Solvent Use
4	Urban	95	Miscellaneous Solvent Use

4	Urban	96	Minor points - Coal boilers
4	Urban	97	Minor points - Oil boilers
4	Urban	98	Minor points - Gas boilers
4	Urban	99	Minor points - Other
2	Population	100	Publicly Owned Treatment Works (POTWs)
2	Population	101	Cutback Asphalt Paving Operation
4	Urban	102	Fugitive from Synthetic Organic Chemical Manufacture
4	Urban	103	Bulk Terminal and Bulk Plants
4	Urban	104	Fugitive from Petroleum Refinery Operations
4	Urban	105	Process Emissions from Bakeries
4	Urban	106	Process Emissions from Pharamaceutical Manufacture
4	Urban	107	Process Emissions from Synthetic Fibers Manufacture
6	Range	108	Crude Oil and Natural Gas Production Fields
4	Urban	109	Hazardous Waste Treatment, Storage, and Disposal

The following categories are for evaporative emissions

101	Limited Access Roads	227	LDGV - Limited Access Roads (SAI NSC)
15	Rural	228	LDGV - Rural Roads (SAI NSC)
2	Population	229	LDGV - Suburban Roads (SAI NSC)
4	Urban	230	LDGV - Urban Roads (SAI NSC)
101	Limited Access Roads	231	MDGV - Limited Access Roads (SAI NSC)
15	Rural	232	MDGV - Rural Roads (SAI NSC)
2	Population	233	MDGV - Suburban Roads (SAI NSC)
4	Urban	234	MDGV - Urban Roads (SAI NSC)
101	Limited Access Roads	235	HDGV - Limited Access Roads (SAI NSC)
15	Rural	236	HDGV - Rural Roads (SAI NSC)
2	Population	237	HDGV - Suburban Roads (SAI NSC)
4	Urban	238	HDGV - Urban Roads (SAI NSC)
15	Rural	239	Off Highway Gasoline Vehicles (SAI NSC)
101	Limited Access Roads	240	HDDV - Limited Access Roads (SAI NSC)
15	Rural	241	HDDV - Rural Roads (SAI NSC)
2	Population	242	HDDV - Suburban Roads (SAI NSC)
4	Urban	243	HDDV - Urban Roads (SAI NSC)

15	Rural	244	Off Highway Diesel Vehicles (SAI NSC)
2	Population	266	Ammonia Emissions - LDGV (SAI NSC)
2	Population	267	Ammonia Emissions - HDGV (SAI NSC)
2	Population	268	Ammonia Emissions - HDDV (SAI NSC)

The following categories are for refueling emissions

101	Limited Access Roads	327	LDGV - Limited Access Roads (SAI NSC)
15	Rural	328	LDGV - Rural Roads (SAI NSC)
2	Population	329	LDGV - Suburban Roads (SAI NSC)
4	Urban	330	LDGV - Urban Roads (SAI NSC)
101	Limited Access Roads	331	MDGV - Limited Access Roads (SAI NSC)
15	Rural	332	MDGV - Rural Roads (SAI NSC)
2	Population	333	MDGV - Suburban Roads (SAI NSC)
4	Urban	334	MDGV - Urban Roads (SAI NSC)
101	Limited Access Roads	335	HDGV - Limited Access Roads (SAI NSC)
15	Rural	336	HDGV - Rural Roads (SAI NSC)
2	Population	337	HDGV - Suburban Roads (SAI NSC)
4	Urban	338	HDGV - Urban Roads (SAI NSC)
15	Rural	339	Off Highway Gasoline Vehicles (SAI NSC)
101	Limited Access Roads	340	HDDV - Limited Access Roads (SAI NSC)
15	Rural	341	HDDV - Rural Roads (SAI NSC)
2	Population	342	HDDV - Suburban Roads (SAI NSC)
4	Urban	343	HDDV - Urban Roads (SAI NSC)
15	Rural	344	Off Highway Diesel Vehicles (SAI NSC)
2	Population	366	Ammonia Emissions - LDGV (SAI NSC)
2	Population	367	Ammonia Emissions - HDGV (SAI NSC)
2	Population	368	Ammonia Emissions - HDDV (SAI NSC)

The following categories are for running loss emissions

101	Limited Access Roads	427	LDGV - Limited Access Roads (SAI NSC)
15	Rural	428	LDGV - Rural Roads (SAI NSC)
2	Population	429	LDGV - Suburban Roads (SAI NSC)
4	Urban	430	LDGV - Urban Roads (SAI NSC)

101	Limited Access Roads	431	MDGV - Limited Access Roads (SAI NSC)
15	Rural	432	MDGV - Rural Roads (SAI NSC)
2	Population	433	MDGV - Suburban Roads (SAI NSC)
4	Urban	434	MDGV - Urban Roads (SAI NSC)
101	Limited Access Roads	435	HDGV - Limited Access Roads (SAI NSC)
15	Rural	436	HDGV - Rural Roads (SAI NSC)
2	Population	437	HDGV - Suburban Roads (SAI NSC)
4	Urban	438	HDGV - Urban Roads (SAI NSC)
15	Rural	439	Off Highway Gasoline Vehicles (SAI NSC)
101	Limited Access Roads	440	HDDV - Limited Access Roads (SAI NSC)
15	Rural	441	HDDV - Rural Roads (SAI NSC)
2	Population	442	HDDV - Suburban Roads (SAI NSC)
4	Urban	443	HDDV - Urban Roads (SAI NSC)
15	Rural	444	Off Highway Diesel Vehicles (SAI NSC)
2	Population	466	Ammonia Emissions - LDGV (SAI NSC)
2	Population	467	Ammonia Emissions - HDGV (SAI NSC)
2	Population	468	Ammonia Emissions - HDDV (SAI NSC)

LDGV = light-duty gas vehicles

MDGV = medium-duty gas vehicles

HDGV = heavy-duty gas vehicles

HDDV = heavy-duty diesel vehicles

Appendix C

DEFINITION OF DIURNAL AND WEEKDAY VARIATION CODES

TABLE C-1. Diurnal variation codes used in the emissions preprocessor system.

Code	Emissions Contribution by Hour (0-23)	Daily
1	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	8
2	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	8
3	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	8
4	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	8
5	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	8
6	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	8
7	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	8
8	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	8
9	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	8
10	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	8
11	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	8
12	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	8
13	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	16
14	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	16
15	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	16
16	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	16
17	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	16
18	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	16
19	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	16
20	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	24
21	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	24
22	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	24
23	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	24
24	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	24
25		
26		
27		
28		
29		
30		
31	3 1 1 1 1 1 1 5 5 5 5 5 5 5 5 5 510101010 7 7 3	116
32		
33	2 2 2 2 2 2 21010 6 6 5 5 5 5 5 5 5 510101010 2	128
34	0 8 8 8 810101010 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	72
35	10 1 1 1 1 1 1 8 8101010101010101010101010101010	182

continued

TABLE C-1. Concluded.

Code	Emissions Contribution by Hour (0-23)	Daily
36		
37	0 0 0 0 0 1 3 6 9101010101010101010 9 6 3 1 0 0 0	118
38	0 0 0 0 0 2 6 6 2 2 1 2 4 4 2 1 1 310 8 7 6 1 0	68
39		
40	0 0 0 0 2 3 4 4 4 4 4 4 3 3 2 2 1 1 0 0 0 0 0 0	41
41	0 0 0 0 0 0185923 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	100
42	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0283735 0 0 0 0 0 0	100
43	1411 3 2 41927 050788894999399 3 3 3987050443314	999
44	8 8 2 1 1 4123648547072716875768478655642352 5 8	999
45		
46		
47		
48		
49		
50	1 1 1 1 1 1 610 6 5 5 5 5 5 5 610 8 6 4 1 1 1 1	96
51	0 0 0 0 0 0 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0	6
52	0 0 0 0 0 1 61010101010 6 3 3 3 3 4 4 0 0 0 0 0	83
53	0 0 0 0 0 0 0 2 2 2 2 2 0 1 0 0 0 0 0 0 0 0 0 0	11
54		
55	0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0	22
56	0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	23
57	0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0	21
58	0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0	19
59	0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0	20
60	0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0	12
61	0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	18
62	0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0	10
63	0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0	11
64	0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	17
65	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0	9
66	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0	13
67	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0	14
68	0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0	15
69	0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0	7

TABLE C-2. Weekday variation codes used in the emissions preprocessor system.

Code	Emissions contribution by (Mon-Sun)	Total Days
1	1 1 1 1 1 0 0	5
2	0 0 0 0 0 1 1	2
3	1 1 1 1 1 0 0	5
4	1 1 1 1 1 0 0	5
5	1 1 1 1 1 0 0	5
6	1 1 1 1 1 1 0	6
7	1 1 1 1 1 1 1	7
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21	1 1 1 1 1 2 2	9
22	1010101010 7 4	61
23	5 5 5 5 5 4 4	33

Appendix D

BIOGENIC EMISSIONS INVENTORY SYSTEM (BEIS)

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Appendix D

BIOGENIC EMISSIONS INVENTORY SYSTEM (BEIS)

The Biogenic Emissions Inventory System (BEIS) is a stand-alone processor that prepares biogenic emissions data for use in the UAM. BEIS first merges county-level land area data and biomass density data (file CNTYBIO, provided by EPA) to calculate biomass information, and grids these data based on a county-to-grid allocation file (file CNTYALO, provided by the user). The program next adjusts the biomass values using correction factors computed with meteorology data supplied by (1) the user (file RAWMET), (2) UAM meteorology preprocessors (files TPBIN and WDBIN), and (3) EPA (file FLUX). BEIS then calculates emission rates for four chemical species (monoterpenes, α-pinenes, isoprenes, and unknowns) and groups them into emission rates for five Carbon Bond Mechanism IV (CBM-IV)[1] species: olefins, paraffins, isoprenes, aldehydes, and nonreactives.[2] BEIS also calculates emission rates for nitric oxide (NO) and nitrogen dioxide (NO_2). The BEIS output file (BIBIN) can be used directly by the UAM, or it can be merged with the UAM area-source emissions file (using the program MRGEMS) before being input to the UAM. The BEIS flow of information is shown in Figure D-1.

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[1] M.W. Gery, G. Z. Whitten, J. P. Killus, and M. C. Dodge. 1989. A photochemical kinetics mechanism for urban and regional scale computer modeling. Journal of Geophysical Research, 94:12,925-12,956.

[2] Although the current version of BEIS calculates emission rates for nonreactives, it does not output this information because the UAM does not use this species.

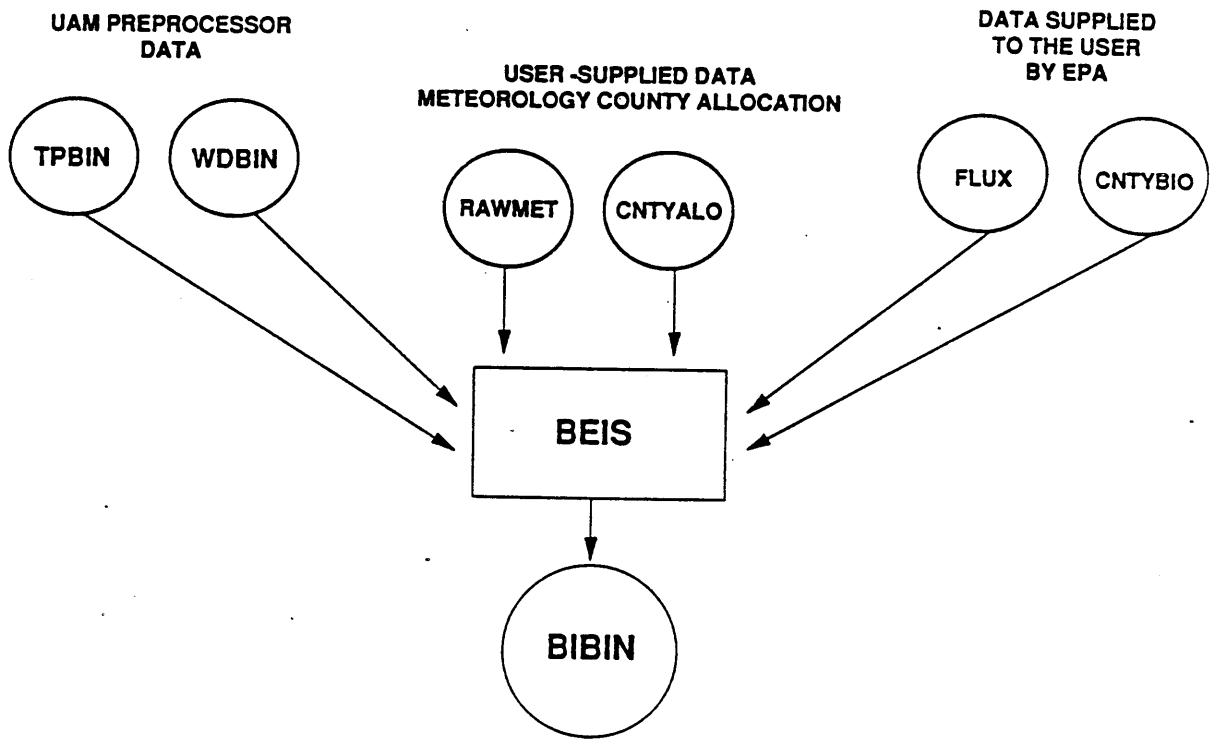

FIGURE D-1. UAM stand-alone biogenics processor.

INPUT AND OUTPUT FILES

Input Files

WDBIN

WDBIN is produced by the UAM winds preprocessor and contains hourly, gridded surface wind speed data. This file is read using the READ and FORMAT statements listed below; the READ loop for the u-component and v-component wind speeds [WWX(I,J) and WWY(I,J)] also includes a conversion from meters per hour to meters per second, and a calculation of the true wind speed from the two components. The variables included in WDBIN are listed in Table 1 (tables appear at the end of the appendix). Three variables that appear below control the reading of records 6 and 7 in Table 1: NZLY is the number of layers in the domain, CCOLS is the number of columns in the domain, and CROWS is the number of rows in the domain.

```
READ (18) IFILE, NOTE, NSEG, NSPECS, JDATE, BEGTIM, IDATE, ENDTIM
READ (18) ORGX, ORGY, IZONE, UTMX, UTMY, DELTAX, DELTAY,
&     NX, NY, NZ, NZLOWR, NZUPPR, HTSUR, HTLOW, HTUPP
READ (18) IX, IY, NXCLL, NYCLL

      READ  (18,END=999) WDATE, TDATA, JDATE, TNEXT
      READ  (18) ISEG, REF, XMX, YMX, WEST, EAST, SOUTH, NORTH
      DO 90 K = 1, NZLY
         READ (18) ISEG, WINDX, ((WWX(I, J), I=1, CCOLS),J = 1, CROWS)
         READ (18) JSEG, WINDY, ((WWY(I, J), I=1, CCOLS),J = 1, CROWS)
```

TPBIN

TPBIN is produced by the UAM temperature preprocessor and contains hourly, gridded temperature data. This file is read using the READ and FORMAT statements listed below; as in the WDBIN READ statements, CCOLS is the number of columns in the domain and CROWS is the number of rows in the domain. The variables included in TPBIN are listed in Table 2.

```
      READ(17) IFILET, NOTET, NSEGT, NSPECST, IDATET, BEGTIMT,
     &         JDATET, ENDTIMT
      READ(17) ORGXT, ORGYT, IZONET, UTMXT, UTMYT, DELTAXT, DELTAYT,
     &         NXT, NYT, NZT, NZLOWRT, NZUPPRT, HTSURT, HTLOWT, HTUPPT
      READ(17) IXT, IYT, NXCLLT, NYCLLT

      READ (17,END=999) IBGDAT, BEGTIME, IENDAT, ENDTIM
      READ (17) ISEG, (MNAME(M), M=1,10), ((TSFC(I, J),
     &     I=1,CCOLS), J=1,CROWS)
```

RAWMET

RAWMET contains surface meteorology information on relative humidity, cloud coverage, and cloud height. The file addresses only one station within the particular UAM domain. This file is read using the READ and FORMAT statements listed below and contains the variables listed in Table 3.

```
      READ (16, 1001, END=600, IOSTAT=IOST9) STATID, YR, IM, ID,
     &              MTHOUR, LAT, LONG
 1001 FORMAT (1X, I5.5, 4I2, F6.2, F7.2)

      READ (16, 1021, END=75 , ERR=80 )
     &        RELHUM, COVER, DESCRI,
     &        PERCNT(1), HGT(1), PERCNT(2),
     &        HGT(2), PERCNT(3), HGT(3)
 1021 FORMAT (1X, F5.4, F5.0, I3, 1X, 3(1X, F4.0, F6.0))
```

CNTYBIO

CNTYBIO contains the following data, at a county level, for the contiguous United States: (1) hectare values for canopy, noncanopy, and urban tree areas; and (2) canopy biomass density (kg/ha) for oak species, other deciduous species, and coniferous species, by month. Biomass density (kg/ha) for noncanopy species are not included in CNTYBIO but instead are contained within the BEIS main program. For each county, CNTYBIO also contains 12 on/off flags for the noncanopy biomass density (one flag for each month), and each flag has a value of 0 or 1. For each month, the flag's value is multiplied by the noncanopy biomass density value (kg/ha)

contained within BEIS; thus, if the flag is set to zero (as it might be for the winter months), there is no noncanopy biomass density for that month and therefore no noncanopy biogenic emissions. CNTYBIO contains the variables listed in Tables 4a and 4b.

FLUX

FLUX contains actinic (spherically integrated) flux data. The file's gridded columns represent ten zenith angles: 0°, 10°, 20°, 30°, 40°, 50°, 60° , 70°, 78°, and 86°. The 52 rows in the grid represent different wavelengths of the solar spectrum, from 290 nm (ultraviolet) to 800 nm (near infrared); the wavelengths are in increments of 10 nm. This file is read using the READ and FORMAT statements listed below and contains the variables listed in Table 5.

```
      DO 5 I=1,52
         READ(15,100) (XJ(I,J), J=1,10)
100      FORMAT(10F10.7)
5     CONTINUE
```

CNTYALO

CNTYALO contains the county allocation for each grid cell; in other words, each record in the file contains the percent of a given county that is in a given grid cell. To speed processing, the file should be ordered by FIPS county code. CNTYALO is read using the READ and FORMAT statements listed below and contains the variables listed in Table 6.

```
         READ(19, 1051, IOSTAT = IOST1) CTYALLO, ALLCOL, ALLROW, ALLPER
1051     FORMAT(1X, I5, 1X, I3, 1X, I3, F7.3)
```

Output Files

BIBIN

BIBIN contains hourly gridded biogenic emission rates for olefins, paraffins, isoprenes, aldehydes, NO, and NO_2. This file is written using the WRITE and FORMAT statements listed below and contains the variables listed in Table 7. Two variables that appear in the set of WRITE statements but that are not contained in BIBIN are defined as follows: NCOLS1 is the number of columns in the domain and NROWS1 is the number of rows in the domain (values for these variables are input using the DCL file).

```
   WRITE (9) AFILE,ANOTE,NSEG,NSPECS4,JDATE,BEGTIM,IDATE,ENDTIM

   WRITE (9) ORGX,ORGY,IZONE,UTMX,UTMY,DELTAX,DELTAY,NX,NY,
    &        NZ,NZLOWR,NZUPPR,HTSUR,HTLOW,HTUPP

   WRITE (9) IX,IY,NXCLL,NYCLL

   WRITE (9) ((MSPECB(I,J),I=1,10),J=1,NSPECS4)

   WRITE (9) JYYDDD, RHOUR, JYYDDD, NEXTHR

   DO 895 K = 1,  NSPECS4
         WRITE (9) ISEG,(MSPECB(M,K),M=1,10),((FINEMIS(I,J,K),
    &                I = 1, NCOLS1),J = 1, NROWS1)
895  CONTINUE
```

EQUATIONS USED

For a scientific overview of the calculations performed by BEIS, refer to the attached paper, "Development of a Biogenic Emissions Inventory System for Regional-Scale Air Pollution Models" (paper 90-94.3), presented at the 83rd Air and Waste Management Association Annual Meeting (June 24-29, 1990, Pittsburgh, PA).

CONTROL CARDS

The control cards shown below are used to input control data; on the first one, the entries must be separated by commas, as shown. The variables are defined in Table 8. To indicate the end of the list of FIPS county codes, a value of -9999 must be input. A control card example is contained in the JCL file shown on pages 242-243.

```
SDATE,SHOUR,EDATE,EHOUR,MONTH,NCOLS1,NROWS1,GMT
NUMCNTY
COUNTY(I)
```

RESOURCE SUMMARY FOR A 40-COLUMN, 40-ROW, 24-HOUR SCENARIO ON AN IBM 3090 V

Memory Requirements

FORTRAN source file: 99,840 bytes
Object file: 58,880 bytes
Executable file: 47,104 bytes

Execution Time Requirements (Representative Values for a 24-Hour Scenario)

Charged CPU time (hh:mm:ss) 00:00:43
Virtual address space: 12,796

Space Requirements: Log and Print Files

BEIS.LOG:	104,448 bytes
Print files:	None

Space Requirements: Input and Output Files

Table 9 shows the input file and output file space requirements.

Space Requirements: Tape Files

None

JCL FILE FOR A TYPICAL RUN ON AN IBM 3090 VI

```
//UIDXXX JOB (ACCOUNT,BIN#),'J. USER',MSGCLASS=F,
//  PRTY=2,TIME=(0,45),NOTIFY=VMQ
//*
/*ROUTE PRINT HOLD
//STEP1 EXEC PGM=BEIS
//STEPLIB  DD DSN=DUMMY.UAM.LOAD,DISP=SHR
//* THIS IS THE INPUT FILE
//DATA1      DD DSN=DUMMY.CNTYBIO,DISP=SHR,
//         DCB=(DSORG=DA,RECFM=U,LRECL=724)
//FT19F001   DD DSN=DUMMY.UAM.ATL.CNTYALO,DISP=SHR
//FT16F001   DD DSN=DUMMY.UAM.ATL.RAWMET,DISP=SHR
//FT14F001   DD DSN=DUMMY.UAM.FLUX,DISP=SHR
//FT18F001   DD DSN=DUMMY.UAMW.PREOUT.B.J4.WIND(ATL),DISP=SHR
//*            SPACE=(TRK,(100,10)),UNIT=SYSDA,
//*           DCB=(DSORG=DA,RECFM=U,LRECL=724)
//FT17F001   DD DSN=DUMMY.UAMW.PREOUT.B.J34.TMPR(ATL),DISP=SHR
//*            SPACE=(TRK,(100,10)),UNIT=SYSDA,
//*           DCB=(DSORG=DA,RECFM=U,LRECL=724)
//* THIS IS THE OUTPUT FILE
//FT09F001   DD DSN=UIDACCT.UAM.ATL.JUN4.BIBIN,
//         DISP=(NEW,CATLG,CATLG),
//         SPACE=(CYL,(100,10),RLSE),UNIT=SYSDA,
//        DCB=(RECFM=UVB,LRECL=6444,BLKSIZE=6448)
*
//FT05F001 DD *
84156,00,84156,24,06,40,40,05
45
1017
1111
13011
13013
```

13015
13035
13045
13055
13057
13063
13067
13077
13085
13089
13097
13113
13115
13117
13121
13129
13135
13137
13139
13143
13149
13151
13157
13159
13169
13171
13187
13199
13207
13211
13217
13219
13223
13227
13231
13233
13247
[PB]13255
13285
13297
13311
-9999
/*
//* THIS IS END OF DATA
//

MAIN PROGRAM, SUBROUTINES, AND FUNCTIONS REQUIRED

Main Program

BEIS

Subroutines and Functions

BIOMASS
CLDATN
CORRECT
FLXEIN
IBLKR
IOCL
JULIAN
RDREC
SOLENG
SOLRAN

TABLE 1. WDBIN variables.

Record Number	Variable Number	Variable Name	Unit	Data Type	Description
1	1	IFILE		Integer*4	File name
	2	NOTE		Integer*4	File identifier
	3	NSEG		Integer*4	Number of segments
	4	NSPECS		Integer*4	Number of species
	5	JDATE		Integer*4	Beginning date of the file (Julian)
	6	BEGTIM		Real*4	Beginning hour of the file
	7	IDATE		Integer*4	Ending date of the file (Julian)
	8	ENDTIM		Real*4	Ending hour of the file
2	9	ORGX	m	Real*4	x coordinate (UTM unit)
	10	ORGY	m	Real*4	y coordinate (UTM unit)
	11	IZONE		Integer*4	UTM zone
	12	UTMX	m	Real*4	x location
	13	UTMY	m	Real*4	y location
	14	DELTAX	m	Real*4	Cell size in x direction
	15	DELTAY	m	Real*4	Cell size in y direction
	16	NX		Integer*4	Number of cells in x direction
	17	NY		Integer*4	Number of cells in y direction
	18	NZ		Integer*4	Number of cells in z direction
	19	NZLOWR		Integer*4	Number of cells between surface layer and diffusion break
	20	NZUPPR		Integer*4	Number of cells between diffusion break and top of region
	21	HTSUR	m	Real*4	Height of surface layer
	22	HTLOW	m	Real*4	Minimum height of cell between surface layer and diffusion break
	23	HTUPP	m	Real*4	Minimum height of cell between diffusion break and top of region
3	24	IX		Integer*4	x location of segment origin with respect to origin of modeling region
	25	IY		Integer*4	y location of segment origin with respect to origin of modeling region

continued

TABLE 1. concluded

Record Number	Variable Number	Variable Name	Unit	Data Type	Description
	26	NXCLL		Integer*4	Number of cells in x direction
	27	NYCLL		Integer*4	Number of cells in y direction
4	28	WDATE		Integer*4	Beginning date for each time interval (Julian)
	29	TDATA		Real*4	Beginning hour for each time interval
	30	JDATE		Integer*4	Ending date for each time interval (Julian)
	31	TNEXT		Real*4	Ending hour for each time interval
5	32	ISEG		Integer*4	Segment number
	33	REF	m	Real*4	Anemometer height
	34	XMX	m/h	Real*4	Maximum absolute value of u-component data
	35	YMX	m/h	Real*4	Maximum absolute value of v-component data
	36	WEST	m/h	Real*4	Average wind speed at west boundary
	37	EAST	m/h	Real*4	Average wind speed at east boundary
	38	SOUTH	m/h	Real*4	Average wind speed at south boundary
	39	NORTH	m/h	Real*4	Average wind speed at north boundary
The following two records are repeated for each layer in the domain:					
6	40	ISEG		Integer*4	Segment number
	41	WINDX		Real*4	Variable name
	42	WWX(I,J)*	m/h	Real*4	u-component wind speed
7	43	JSEG		Integer*4	Segment number
	44	WINDY		Real*4	Variable name
	45	WWY(I,J)*	m/h	Real*4	v-component wind speed

* The indices i and j (variables 42 and 45) refer to the grid column number and row number, in that order.

TABLE 2. TPBIN variables.

Record Number	Variable Number	Variable Name	Unit	Data Type	Description
1	1	IFILET		Integer*4	File name
	2	NOTET		Integer*4	File identifier
	3	NSEGT		Integer*4	Number of segments
	4	NSPECST		Integer*4	Number of species
	5	IDATET		Integer*4	Beginning date of the file (Julian)
	6	BEGTIMT		Real*4	Beginning hour of the file
	7	JDATET		Integer*4	Ending date of the file (Julian)
	8	ENDTIMT		Real*4	Ending hour of the file
2	9	ORGXT	m	Real*4	x coordinate (UTM unit)
	10	ORGYT	m	Real*4	y coordinate (UTM unit)
	11	IZONET		Integer*4	UTM zone
	12	UTMXT	m	Real*4	x location
	13	UTMYT	m	Real*4	y location
	14	DELTAXT	m	Real*4	Cell size in x direction
	15	DELTAYT	m	Real*4	Cell size in y direction
	16	NXT		Integer*4	Number of cells in x direction
	17	NYT		Integer*4	Number of cells in y direction
	18	NZT		Integer*4	Number of cells in z direction
	19	NZLOWRT		Integer*4	Number of cells between surface layer and diffusion break
	20	NZUPPRT		Integer*4	Number of cells between diffusion break and top of region
	21	HTSURT	m	Real*4	Height of surface layer
	22	HTLOWT	m	Real*4	Minimum height of cell between surface layer and diffusion break
	23	HTUPPT	m	Real*4	Minimum height of cell between diffusion break and top of region
3	24	IXT		Integer*4	x location of segment origin with respect to origin of modeling region

continued

TABLE 2. concluded

Record Number	Variable Number	Variable Name	Unit	Data Type	Description
	25	IYT		Integer*4	y location of segment origin with respect to origin of modeling region
	26	NXCLLT		Integer*4	Number of cells in x direction
	27	NYCLLT		Integer*4	Number of cells in y direction
4	28	IBGDAT		Integer*4	Beginning date for each time interval (Julian)
	29	BEGTIME		Real*4	Beginning hour for each time interval
	30	IENDAT		Integer*4	Ending date for each time interval (Julian)
	31	ENDTIM		Real*4	Ending hour for each time interval
5	32	ISEG		Integer*4	Segment number
	33	MNAME(M)*		Real*4	Variable name
	34	TSFC(I,J)*	K	Real*4	Surface temperature

* The index m (variable 33) refers to a letter in the name of the temperature variable. The indices i and j (variable 34) refer to the grid column number and row number, in that order.

TABLE 3. RAWMET variables.

Record Number	Variable Number	Variable Name	Unit	Data Type	Description
1	1	STATID		Integer*4	Station ID number
	2	YR		Integer*4	Scenario year
	3	IM		Integer*4	Scenario month
	4	ID		Integer*4	Scenario day
	5	MTHOUR		Integer*4	Scenario hour
	6	LAT	°N	Real*4	Latitude
	7	LONG	°W	Real*4	Longitude
2	8	RELHUM		Real*4	Relative humidity (decimal fraction)
	9	COVER	%	Real*4	Total opaque sky cover
	10	DESCRI		Integer*4	Total sky coverage (National Weather Service coded form): 0 = clear 1 = partial obscuration 2 = thin scattered 3 = thin broken 4 = thin overcast 5 = scattered 6 = broken 7 = overcast 8 = obscured -99 = indeterminate
	11	PERCNT(1)	%	Real*4	Coverage, lowest cloud layer
	12	HGT(1)	m	Real*4	Lowest cloud layer base height
	13	PERCNT(2)	%	Real*4	Coverage, second-lowest cloud layer
	14	HGT(2)	m	Real*4	Second-lowest cloud layer base height
	15	PERCNT(3)	%	Real*4	Coverage, third-lowest cloud layer
	16	HGT(3)	m	Real*4	Third-lowest cloud layer base height

TABLE 4a. CNTYBIO header variables.

Record Number	Variable Number	Variable Name	Data Type	Description
1	1	FCOUNT	Integer*4	Number of FIPS counties
	2	FIPS(I)	Integer*4	Listing of FIPS county codes

TABLE 4b. CNTYBIO record variables.

Record Number	Var. No.	Array Number	Logical Name	Unit	Data Type	Description
2+	1	AREC(1)	AFLAG(1)		Integer*4	January noncanopy biomass density flag
	2	AREC(2)	AFLAG(2)		Integer*4	February noncanopy biomass density flag
	3	AREC(3)	AFLAG(3)		Integer*4	March noncanopy biomass density flag
	4	AREC(4)	AFLAG(4)		Integer*4	April noncanopy biomass density flag
	5	AREC(5)	AFLAG(5)		Integer*4	May noncanopy biomass density flag
	6	AREC(6)	AFLAG(6)		Integer*4	June noncanopy biomass density flag
	7	AREC(7)	AFLAG(7)		Integer*4	July noncanopy biomass density flag
	8	AREC(8)	AFLAG(8)		Integer*4	August noncanopy biomass density flag
	9	AREC(9)	AFLAG(9)		Integer*4	September noncanopy biomass density flag
	10	AREC(10)	AFLAG(10)		Integer*4	October noncanopy biomass density flag
	11	AREC(11)	AFLAG(11)		Integer*4	November noncanopy biomass density flag
	12	AREC(12)	AFLAG(12)		Integer*4	December noncanopy biomass density flag
	13	AREC(13)	ROAK	ha	Real*4	Oak forest area
	14	AREC(14)	RDECID	ha	Real*4	Deciduous forest area
	15	AREC(15)	RCONIF	ha	Real*4	Coniferous forest area

continued

TABLE 4b. continued

Record Number	Var. No.	Array Number	Logical Name	Unit	Data Type	Description
	16	AREC(16)	UOAK	ha	Real*4	Urban oak forest area
	17	AREC(17)	UDECID	ha	Real*4	Urban deciduous forest area
	18	AREC(18)	UCONIF	ha	Real*4	Urban coniferous forest area
	19	AREC(19)	AUSE(1)	ha	Real*4	Alfalfa area
	20	AREC(20)	AUSE(2)	ha	Real*4	Sorghum area
	21	AREC(21)	AUSE(3)	ha	Real*4	Hay area
	22	AREC(22)	AUSE(4)	ha	Real*4	Soybean area
	23	AREC(23)	AUSE(5)	ha	Real*4	Corn area
	24	AREC(24)	AUSE(6)	ha	Real*4	Potato area
	25	AREC(25)	AUSE(7)	ha	Real*4	Tobacco area
	26	AREC(26)	AUSE(8)	ha	Real*4	Wheat area
	27	AREC(27)	AUSE(9)	ha	Real*4	Cotton area
	28	AREC(28)	AUSE(10)	ha	Real*4	Rye area
	29	AREC(29)	AUSE(11)	ha	Real*4	Rice area
	30	AREC(30)	AUSE(12)	ha	Real*4	Peanut area
	31	AREC(31)	AUSE(13)	ha	Real*4	Barley area
	32	AREC(32)	AUSE(14)	ha	Real*4	Oats area
	33	AREC(33)	AUSE(15)	ha	Real*4	Scrub area
	34	AREC(34)	AUSE(16)	ha	Real*4	Grass area
	35	AREC(35)	AUSE(17)	ha	Real*4	Urban grass area
	36	AREC(36)	AUSE(18)	ha	Real*4	Miscellaneous crops area
	37	AREC(37)	AUSE(19)	ha	Real*4	Water area
						January biomass density for
	38	AREC(38)	BIODEN(1,1)*	kg/ha	Real*4	Oak--high isoprene
	39	AREC(39)	BIODEN(1,2)	kg/ha	Real*4	Oak--low isoprene
	40	AREC(40)	BIODEN(1,3)	kg/ha	Real*4	Oak--no isoprene
	41	AREC(41)	BIODEN(1,4)	kg/ha	Real*4	Coniferous biomass density in oak forest
	42	AREC(42)	BIODEN(1,5)	kg/ha	Real*4	Deciduous--high isoprene
	43	AREC(43)	BIODEN(1,6)	kg/ha	Real*4	Deciduous--low isoprene
	44	AREC(44)	BIODEN(1,7)	kg/ha	Real*4	Deciduous--no isoprene
	45	AREC(45)	BIODEN(1,8)	kg/ha	Real*4	Coniferous biomass density in deciduous forest

continued

* (I,J), I = month, J = species

TABLE 4b. concluded.

Record Number	Var. No.	Array Number	Logical Name	Unit	Data Type	Description
	46	AREC(46)	BIODEN(1,9)	kg/ha	Real*4	Coniferous--high isoprene
	47	AREC(47)	BIODEN(1,10)	kg/ha	Real*4	Coniferous--low isoprene
	48	AREC(48)	BIODEN(1,11)	kg/ha	Real*4	Coniferous--no isoprene
	49	AREC(49)	BIODEN(1,12)	kg/ha	Real*4	Coniferous biomass density in coniferous forest
						February biomass density for
	50	AREC(50)	BIODEN(2,1)	kg/ha	Real*4	Oak--high isoprene
	51	AREC(51)	BIODEN(2,2)	kg/ha	Real*4	Oak--low isoprene
	.	.	.	.	.	.
	.	.	.	.	.	.
	.	.	.	.	.	.
	61	AREC(61)	BIODEN(2,12)	kg/ha	Real*4	Coniferous biomass density in coniferous forest
						March biomass density for
	.	.	.	.	.	.
	.	.	.	.	.	.
	.	.	.	.	.	.
						December biomass density for
	.	.	.	.	.	.
	.	.	.	.	.	.
	.	.	.	.	.	.
	181	AREC(181)	BIODEN(12,12)	kg/ha	Real*4	Coniferous biomass density in coniferous forest

+1 record per county identified by FIPS county code.

TABLE 5. FLUX variables.

Record Number	Variable Number	Variable Name	Unit	Data Type	Description
					Actinic flux at
1	1	XJ(1,1)	photons/cm^2/s	Real*4	Wavelength = 290 nm, zenith angle = 10
	2	XJ(1,2)	photons/cm^2/s	Real*4	Wavelength = 290 nm, zenith angle = 20
	3	XJ(1,3)	photons/cm^2/s	Real*4	Wavelength = 290 nm, zenith angle = 30
	.	.	.	.	.
	.	.	.	.	.
	.	.	.	.	.
52	520	XJ(52,10)	photons/cm^2/s	Real*4	Wavelength = 800 nm, zenith angle = 86

TABLE 6. CNTYALO variables.

Record Number	Variable Number	Variable Name	Unit	Data Type	Description
1	1	CTYALLO		Integer*4	FIPS county code
	2	ALLCOL		Integer*4	Column number of a grid cell that lies within (or partially within) the county read in
	3	ALLROW		Integer*4	Row number of a grid cell that lies within (or partially within) the county read in
	4	ALLPER	%	Real*4	Percentage of the county that lies in the grid cell defined by the values in ALLCOL and ALLROW
	.				
	.				
	.				
(Number of columns times number of rows)					

TABLE 7. BIBIN variables.

Record Number	Variable Number	Variable Name	Unit	Data Type	Description
1	1	AFILE		Integer*4	File name
	2	ANOTE		Integer*4	File identifier
	3	NSEG		Integer*4	Number of segments
	4	NSPECS4		Integer*4	Number of species
	5	JDATE		Integer*4	Beginning date of the file (Julian)
	6	BEGTIM		Real*4	Beginning hour of the file
	7	IDATE		Integer*4	Ending date of the file (Julian)
	8	ENDTIM		Real*4	Ending hour of the file
2	9	ORGX	m	Real*4	x coordinate (UTM unit)
	10	ORGY	m	Real*4	y coordinate (UTM unit)
	11	IZONE		Integer*4	UTM zone
	12	UTMX	m	Real*4	x location
	13	UTMY	m	Real*4	y location
	14	DELTAX	m	Real*4	Cell size in x direction
	15	DELTAY	m	Real*4	Cell size in y direction
	16	NX		Integer*4	Number of cells in x direction
	17	NY		Integer*4	Number of cells in y direction
	18	NZ		Integer*4	Number of cells in z direction
	19	NZLOWR		Integer*4	Number of cells between surface layer and diffusion break
	20	NZUPPR		Integer*4	Number of cells between diffusion break and top of region
	21	HTSUR	m	Real*4	Height of surface layer
	22	HTLOW	m	Real*4	Minimum height of cell between surface layer and diffusion break
	23	HTUPP	m	Real*4	Minimum height of cell between diffusion break and top of region

continued

TABLE 7. concluded

Record Number	Variable Number	Variable Name	Unit	Data Type	Description
3	24	IX		Integer*4	x location of segment origin with respect to origin of modeling region
	25	IY		Integer*4	y location of segment origin with respect to origin of modeling region
	26	NXCLL		Integer*4	Number of cells in x direction
	27	NYCLL		Integer*4	Number of cells in y direction
4	28	MSPECB(I,J)		Integer*4	Species in the header
	29	JYYDDD		Integer*4	Beginning date for each time interval (Julian)
	30	RHOUR		Real*4	Beginning hour for each time interval
5	31	JYYDDD		Integer*4	Ending date for each time interval (Julian)
	32	NEXTHR		Real*4	Ending hour for each time interval
The following record is repeated for each species:					
6	33	ISEG		Integer*4	Segment number
	34	MSPECB(M,K)		Integer*4	Variable name
	35	FINEMIS(I,J,1)	mol/h	Real*4	Nitric oxide emission rate
	36	FINEMIS(I,J,2)	mol/h	Real*4	Nitrogen dioxide emission rate
	37	FINEMIS(I,J,3)	mol/h	Real*4	Paraffins emission rate
	38	FINEMIS(I,J,4)	mol/h	Real*4	Olefins emission rate
	39	FINEMIS(I,J,5)	mol/h	Real*4	Aldehydes emission rate
	40	FINEMIS(I,J,6)	mol/h	Real*4	Isoprenes emission rate

Note: The indices i and j (variable 28) refer to the species-name letter and the species number for which the letters are being read in, respectively; the indices m and k (variable 34) are defined the same way. The indices i, j, and k (variables 35-40) refer to the grid column number, grid row number, and species number, in that order.

TABLE 8. Control card variables.

Record Number	Variable Name	Description
1	SDATE	Scenario starting date (Julian)
	SHOUR	Scenario starting hour
	EDATE	Scenario ending date (Julian)
	EHOUR	Scenario ending hour
	MONTH	Month of scenario
	NCOLS1	Number of columns
	NROWS1	Number of rows
	GMT	Number of hours from GMT
2	NUMCNTY	Number of counties to be processed
3	COUNTY(I)	FIPS codes of counties to be processed

TABLE 9. I/O file space requirements.

File Group	File Name	Storage (in bytes)	Scenario Data Span
	TPBIN	153,088	48 h
	RAWMET	58,880	48 h
	CNTYBIO	2,265,600	1 y
	FLUX	5,120	
	CNTYALO	1,8432	
		4,017,664	
Output	BIBIN	6,722,560	48 h

90-94.3

Development of a Biogenic Emissions Inventory System for Regional Scale Air Pollution Models

by

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INTRODUCTION

The abundance of naturally-occurring hydrocarbons in the atmosphere has been recognized for at least 20 years[1-3]. It was not until recently, however, that modeling studies[4,5] suggested the need to consider biogenic hydrocarbon emissions for estimating the production of photochemical oxidant smog. Even before the publication of these studies, EPA in 1986 reported on the development of a computer algorithm for estimating biogenic emissions[6]. This system, called the Biogenic Emissions Software System (BESS), was designed to produce hourly gridded hydrocarbon emissions for an early version of the Regional Oxidant Model (ROM). More or less parallel to the efforts at the EPA, researchers at Washington State University[7] devised a method for estimating seasonal, county-wide hydrocarbon emissions across the United States. These estimates were used for early parts of the National Acid Precipitation Assessment Program (NAPAP). In preparing for the 1985 NAPAP emissions inventory and while testing later versions of the ROM[8], researchers at Washington State University and EPA collaborated on combining features of their two biogenic emission systems. An outcome of this collaboration was the development of a generalized scheme that could estimate hourly gridded biogenic hydrocarbon emissions for use with either the ROM or the Regional Acid Deposition Model (RADM).

This paper discusses the formulation of this new system, called the Biogenic Emissions Inventory System (BEIS), and presents some estimates provided by BEIS. This paper also serves as a companion paper to Roselle and Schere[9] who report on a sensitivity study of ROM to changes in biogenic emissions.

TECHNICAL DESCRIPTION

Calculations with the Biogenic Emissions Inventory System (BEIS) require consideration of biomass, emission, and environmental factors. The basic equation for these calculations can be expressed as follows:

$$ER_i = \sum_j [BF_j \, EF_{ij} \, F(S,T)]$$

where ER is the emission rate (in g/sec per model grid cell), i is the chemical species (such as isoprene or monoterpene), j is the vegetation type, BF is the leaf biomass factor (in g/m^2), EF is the emission factor ($\mu g/g$-leaf biomass/h), and F(S,T) is an environmental factor which accounts for solar radiation S and leaf temperature T.

Biomass Factors

Leaf biomass for forested areas and acreages for non-forested areas are derived from land use data in the Oak Ridge National Laboratory's Geoecology Data Base[10]. The land use data, some of it unfortunately dating back to the early 1970's, consist of county-level acreages for forest types, agricultural crops, and other areas such as urban, grassland, and water.

In the Geoecology Data Base, forested areas are classified by one of about 100 forest types. Lacking detailed information on forest biomass and emission factors, each forest type is simply grouped into either oak, other deciduous, or coniferous. Relationships suggested by Lamb[7] are used to partition the leaf biomass for each forest group into four emission categories: (1) high isoprene deciduous, (2) low isoprene deciduous, (3) no isoprene deciduous, and (4) coniferous. These biomass factors are listed in Table I.

TABLE I. Leaf biomass factors (g/m^2) for oak, other deciduous, and coniferous groups.

	Emission category			
Forest group	High isoprene deciduous	Low isoprene deciduous	Non-isoprene deciduous	Non-isoprene coniferous
Oak	185	60	60	70
Other deciduous	60	185	90	135
Coniferous	39	26	26	559

Biomass factors are not used for non-forested areas since the emission factors are expressed in terms of g/m^2. Non-forest vegetation types are assigned to one of twenty categories. Agricultural crops not having an explicit emission factor are categorized as a miscellaneous crop. Based on a limited review of satellite data, urban areas are assumed to contain 20% forests and 20% grassland. Forested regions in urban areas are divided equally among oak, other deciduous, and coniferous groups.

Seasonal adjustments of biomass are based on frost dates for each county. A simple step function is used in BEIS. For each month, deciduous vegetation (any non-coniferous vegetation class) within a county is assumed to have either full biomass or no biomass. For oxidant modeling, this is not a critical assumption because most high ozone episodes occur during the summer months.

Emission Factors

The emission factors in BEIS are largely based on Zimmerman's Tampa Bay Study[11], primarily because of the lack of standardized measurements from other biogenic emissions field programs. Emission factors for the three forest groups are listed in Table II. By multiplying these emission factors by the corresponding biomass factors in Table I, emission fluxes in terms of $\mu g/m^2/h$ can be compared for all land use types as shown in Table III.

TABLE II. Forest emission factors (μg/g/h) for each biomass emission category, standardized for full sunlight and 30°C.

Chemical species	Emission category: High isoprene deciduous	Low isoprene deciduous	Non-isoprene deciduous	Non-isoprene coniferous
Isoprene	14.69	6.60	0.0	0.0
α-pinene	0.13	0.05	0.07	1.13
Monoterpene	0.11	0.05	0.07	1.29
Unidentified	3.24	1.76	1.91	1.38

Emission fluxes in Table III are expressed in terms of total non-methane hydrocarbons and are broken down by isoprene, monoterpene, alpha-pinene, and unidentified. In most instances, the emission fluxes from forested areas are significantly higher than the fluxes for agricultural areas. An exception is corn which has an overall hydrocarbon emission flux of 3542 $\mu g/m^2/h$. Most of the emissions flux from corn is assigned to the unidentified category because the gas chromatography analysis did not identify specific hydrocarbon compounds. Rather than ignore the unidentified portion of the flux estimate, it is tentatively assumed that unidentified hydrocarbons can be treated as 50% terpene, 45% paraffin, and 5% nonreactive.

Sources of naturally-emitted nitrogen oxides include biomass burning, lightning, microbial activity in soils, and ammonia oxidation. Although these natural sources are reportedly much smaller than anthropogenic sources[12], concerns about air quality in rural areas--where anthropogenic emissions tend to be small--suggest the need to consider natural nitrogen oxide emissions. Lacking sufficiently detailed emission factors for other sources, only nitrogen oxide emissions from grasslands are considered in this version of BEIS. The equation used is noted by the following[13]:

$$Q = 0.74 \exp(0.079\ T_s)$$

where Q is the nitrogen flux (in ng of N $m^{-2}s^{-1}$), and T_s is the soil temperature (in °C) which is estimated from $T_s = 0.70\ T_a + 3.6$ where T_a is the ambient air temperature (°C). It is assumed that the nitrogen emitted into the air from grasslands is emitted in the form of NO.

Table III. Emission fluxes for vegetation types used in BEIS. Fluxes are given for total non-methane hydrocarbons and percent contribution from individual chemical species, standardized to 30 °C and full sunlight.

Vegetation type	NMHC flux ($\mu g/m^2/h$)	Percent contribution isoprene	α-pinene	monoterpene	unidentified
Oak	4258	73	3	3	21
Corn	3542	0	10	10	80
Other decid.	3353	63	5	6	26
Coniferous	3106	24	21	23	32
Peanuts/Rice	510	20	25	25	30
Tobacco	294	0	10	10	80
Grass/Pasture	281	20	25	25	30
Hay/Scrub/Range	189	20	25	25	30
Potato	48	0	25	25	50
Sorghum	39	20	25	25	30
Alfalfa	38	50	10	10	30
Barley/Corn/Oats Rye/Misc.	38	20	25	25	30
Wheat	30	50	10	10	30
Soybeans	22	100	0	0	0
Water	0	0	0	0	0

Environmental Factors

Laboratory studies have shown that biogenic emissions from most plant species react strongly to changes in temperature and isoprene emissions are sunlight dependent[14-16]. BEIS includes adjustments to temperature and sunlight using relationships derived by Tingey. It also attempts to simulate the vertical variation of leaf temperature and sunlight within a forest canopy.

In BEIS, we have incorporated Tingey's adjustment factor for isoprene emissions[15] that is given by the following:

$$F(S,T) = \left(10^{\left[\frac{a}{1 + \exp(-b(T-c))} - d\right]}\right)/e$$

where a, b, c, d, and e are empirical coefficients which vary as a

function of solar intensity (S) as noted in Table IV. The leaf temperature T is expressed in °C. The above relationship is quite sensitive to temperature and sunlight. For example, only a 2 °C change of temperature during conditions of bright sunlight and 30 °C can result in a 50% change in the isoprene emission rate. At night, isoprene is usually not emitted and is assumed to be zero in BEIS.

TABLE IV. Empirical coefficients used in the environmental factor for adjusting the isoprene emission rate.

Light intensity ($\mu E\ m^{-2} s^{-1}$)	Empirical coefficients a	b	c	d	e
800	1.200	0.400	28.30	0.796	1.00
400	0.916	0.239	29.93	0.462	1.95
200	0.615	0.696	32.79	0.077	4.75
100	0.437	0.312	31.75	0.160	10.73

Existing laboratory data for non-isoprene emitting plants[14,16] have thus far identified only temperature as an important variable. The environmental adjustment factor used in BEIS is given by

$$F(T) = \exp(a [T - 30])$$

where values for a are given in Table V.

TABLE V. Empirical coefficients used for adjusting the emission rate for non-isoprene compounds.

Compound	Empirical coefficient a
Alpha-pinene	0.067
Monoterpene	0.0739
Unidentified	0.0739

A major refinement for BEIS was to include a canopy model for estimating profiles of leaf temperature and sunlight within forest canopies. The model was adapted from research initially performed at Washington State University[17]. Sunlight is assumed to decrease exponentially through hypothetical forest canopies with the rate of attenuation depending on the assumed biomass distribution. Both visible and total radiation are calculated for eight levels in the canopy. The visible portion of the solar spectrum is assumed to decrease more quickly than the total spectrum, because

leaves are more effective at absorbing visible light than other portions of the spectrum[18]. The calculated total solar radiation is used to compute the leaf temperature at each level using a radiational balance equation described by Gates and Papian[19]. The estimated leaf temperatures and visible radiation values are then used with the Tingey adjustment factors which were discussed above.

Adjustments for temperature are also important for estimates of nitrogen oxides emission rates from grasslands. The adjustment factor for nitrogen oxides is noted explicitly in the emission factor equation.

Computer Aspects

Early versions of BEIS were written in SAS[20]. Because of the large computational requirements of the canopy model, most of the code was translated into FORTRAN. The basic flow of the system is illustrated in Figure 1. Land use data and frost dates are provided in the form of SAS data sets from the Oak Ridge National Laboratory Geoecology Data Base[10]. A SAS procedure converts the county land use data into the appropriate model grids. Frost dates are likewise converted and are stored as monthly gridded flags which serve as an on/off switch for deciduous vegetation. Biomass factors are stored as SAS data sets and are used to compute full-growth biomass in each grid cell. These calculations are only performed once and are stored for subsequent regional model executions.

Typically, a regional air pollution model application involves a simulation for about a two week period. To provide biogenic emissions, BEIS first computes the biomass for the corresponding period using the monthly adjustment flags. A SAS procedure outputs ASCII data files of gridded canopy and non-canopy biomass which are subsequently read by FORTRAN routines. The next step is to compute standardized emission fluxes at each grid cell. Standardized means that emission fluxes are computed for 30 ^{o}C and full sunlight conditions. This calculation is performed once per model simulation. The computer intensive portion of BEIS involves hourly corrections for sunlight and temperature. For non-canopy vegetation, Tingey adjustment factors are computed using surface temperature and solar radiation provided by either ROM or RADM. For canopy vegetation, surface temperature, wind speed, relative humidity, and solar radiation are fed into the canopy model which computes profiles of leaf temperature and sunlight. These profiles are used to compute Tingey adjustment factors as a function of height using the assumed biomass distribution. The adjustment factors are then multiplied by the standardized emission fluxes, and the non-canopy and canopy emission rates are merged. Emission rates are finally converted into the appropriate chemical species. For example, the ROM uses the following conversions[21]:

- 1 mol isoprene is treated as 1 mol ISOP
- 1 mol monoterpene or alpha-pinene is treated as 0.5 mol OLE, 6 mol PAR, and 1.5 mol ALD2

- 1 mol unidentified (or unknown) is treated as 0.5 mol OLE, 8.5 mol PAR, and 0.5 mol NONR

where ISOP, OLE, PAR, ALD2, and NONR are surrogate species used in the Carbon Bond 4 mechanism and refer respectively to isoprene, olefin, paraffin, higher aldehydes, and nonreactives.

Estimates of nitrogen oxide emissions require the grassland area in a grid cell (available from the Geoecology Data Base) and the surface temperature (provided by the meteorological processor of the regional air pollution model). Emissions are generated for each grid cell in units of moles of NO.

Differences Between BESS and BEIS

BEIS is similar in many ways to the system it replaces, BESS. However, several factors prompted the development of BEIS: (1) In BESS, emission rates were computed for individual tree species, meaning that broad assumptions were required for tree species not having an emission factor. Because of the large variability in existing factors and until more complete emission factors become available, we decided to use factors in BEIS that could be generalized for broad categories of forest vegetation. (2) In BESS, forest leaf biomass was computed from measurements of diameter-breast-height (d.b.h.) compiled by the U.S. Forest Service. Measurements of d.b.h. simply do not exist for many forested areas of the U.S., particularly for non-productive timberland. Therefore, the more general biomass conversion shown in Table I is used in BEIS. (3) The methodology for BESS was developed specifically for regional oxidant modeling, and a similar methodology was developed for acid precipitation assessment. To achieve consistency between the two modeling efforts, features of both methodologies have been combined into BEIS. Major differences between BESS and BEIS are summarized in Table VI.

RESULTS

Biogenic and anthropogenic emissions in the Northeastern United States have been estimated for July 12-18, 1980. The modeling domain consists of 2520 (60 x 42) grid cells, each having a horizontal resolution of about 19 km on a side.

Table VII compares these estimates for the entire domain. Nitrogen oxide emissions from grasslands are three orders of magnitude smaller than anthropogenic emissions. However, biogenic and anthropogenic estimates of non-methane hydrocarbon (NMHC) emissions are of the same order of magnitude, ranging from 40.4 to 48.2 million moles carbon per hour. Emissions from BEIS and BESS are slightly higher than the anthropogenic estimates taken from the 1980 NAPAP inventory[22], and estimates from BESS are slightly higher (11%) than BEIS. Although the total amount of NMHC is similar for all three estimates, the species composition varies somewhat. About 50% of the NMHC for each estimate is assumed to be emitted as paraffins (PAR). For the

anthropogenic estimates, the remainder of the NMHC emissions is distributed fairly evenly among the carbon bond surrogate species ETH, OLE, FORM, ALD2, TOL, XYL, AND NONR. For BESS and BEIS, approximately 25% of the emissions are attributed to isoprene (ISOP). BEIS splits the remainder of NMHC into olefins (OLE), higher aldehydes (ALD2), and non-reactives (NONR). For BESS, the remainder (6.4×10^6 moles C/h) is assigned as olefins. Differences in speciation between BEIS and BESS can be attributed partly to different versions of the Carbon Bond chemical mechanism (4.0 vs 4.2) and partly to how the unidentified compounds are speciated.

TABLE VI. Major differences between BESS and BEIS.

Category	BESS	BEIS
Tree leaf biomass	U.S. Forest Service tree count data	Geoecology Database forest area
Forest emission factors	Individual tree species	Three broad groups
Canopy effects	None	Canopy model
Urban vegetation	30% grass	20% grass, 20% trees
Chemical species	9 broad classes	Isoprene, α-pinene, monoterpene, and unidentified
Unidentified speciation	25% monoterpene, 75% nonreactive	50% terpene, 45% paraffin, 5% nonreactive
NO_x emissions	None	Grasslands

Hourly variations of NMHC emissions are shown in Figures 2-4 for anthropogenic, BEIS, and BESS, respectively. The diurnal variation in emissions is clearly evident in all figures. Anthropogenic emissions tend to peak during the early morning, and biogenic emissions peak in the early afternoon. The large diurnal changes in biogenic emissions are due solely to changes in temperature and sunlight. Daily peak biogenic emissions also vary considerably, differing by as much as 50% during this six day simulation. Day-to-day variations in anthropogenic emissions are due mainly to weekend/weekday differences, and it should be noted that the first two days of the simulation occur on a weekend. There are some notable differences between BEIS and BESS. Primarily because of the attentuation of sunlight by the canopy model, BEIS tends to have a more pronounced peak in the afternoon than BESS. Isoprene is a significant component for both processors, consisting of as much as 50% of the biogenic portion as seen for hour 13 of Julian day 80198 (July 16, 1980).

Spatial patterns of NMHC emissions for this hour are shown in Figures 5-7. Anthropogenic emissions in Figure 5 are highly concentrated near the major urban areas but are low in the rural areas. The high emissions along the Northeast Corridor are clearly evident, and it should be noted that the emissions flux for a grid cell near New York City is seven times higher than any other biogenic emissions flux. Biogenic emissions for BEIS and BESS in Figures 6 and 7 are fairly well distributed and show much less variability than the anthropogenic emissions. Emission fluxes for both processors are highest in the forested areas near the Appalachian Mountains. The pattern in BESS is "noisier" than BEIS, and this can be attributed to BESS's use of emission rates for individual tree species and U.S. Forest Service tree measurement data. Biogenic emission fluxes in urban areas are higher with BEIS than BESS, since BEIS assumes more vegetation in urban areas. Overall, the NMHC emission patterns of BEIS and BESS compare quite closely.

TABLE VII. Hourly average emission rates estimated for July 12-18, 1980 over the NEROS modeling domainand are broken out according to the carbon bond species (e.g., PAR, ISOP, etc.). NMHC emission rates are expressed in terms of moles C. Anthropogenic emissions are based on the 1980 NAPAP inventory.

Chemical species	Emission rate (10^3 moles/hour)		
	Anthropogenic	BEIS	BESS
NO_x	12,708	15	-
NMHC	40,405	43,420	48,199
PAR	25,698	22,266	28,996
ISOP	-	14,661	12,753
OLE	1,358	2,876	6,450
ALD2	2,052	2,615	-
NONR	2,262	1,002	-
TOL	3,871	-	-
ETH	2,247	-	-
XYL	2,227	-	-
FORM	690	-	-

SUMMARY

A methodology for estimating gridded hourly hydrocarbon emissions from biogenic sources has been developed for regional-scale air pollution models. By considering nitrogen oxide emissions from grasslands, we have also taken a first step towards including nitrogen oxides into a natural emissions inventory. A comparison of biogenic and anthropogenic NMHC emissions demonstrates that biogenic emissions are significant, exceeding 50% of the

total carbon mass. Estimates using two different methodologies, BESS and BEIS, compare closely for overall carbon mass but differ somewhat for chemical speciation, diurnal variations, and spatial distribution.

Although natural nitrogen oxide emissions from grasslands are small when compared to anthropogenic estimates, additional sources (such as lightning, agricultural lands, and biomass burning) need to be considered. Reliable emission factors for these sources, however, were not available for this version of BEIS.

Because the magnitude of biogenic NMHC emissions is quite large and the uncertainty in estimating these emissions is about a factor of three[7], we strongly recommend that additional research be undertaken. Areas needing improvement include the development of additional emission factors with the speciation of unidentified hydrocarbon compounds, a better understanding of environmental influences, and an update of land use patterns.

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DISCLAIMER

Although the research described in this article has been supported by the United States Environmental Protection Agency, it has not been subjected to Agency review and therefore does not necessarily reflect the views of the Agency and no official endorsement should be inferred. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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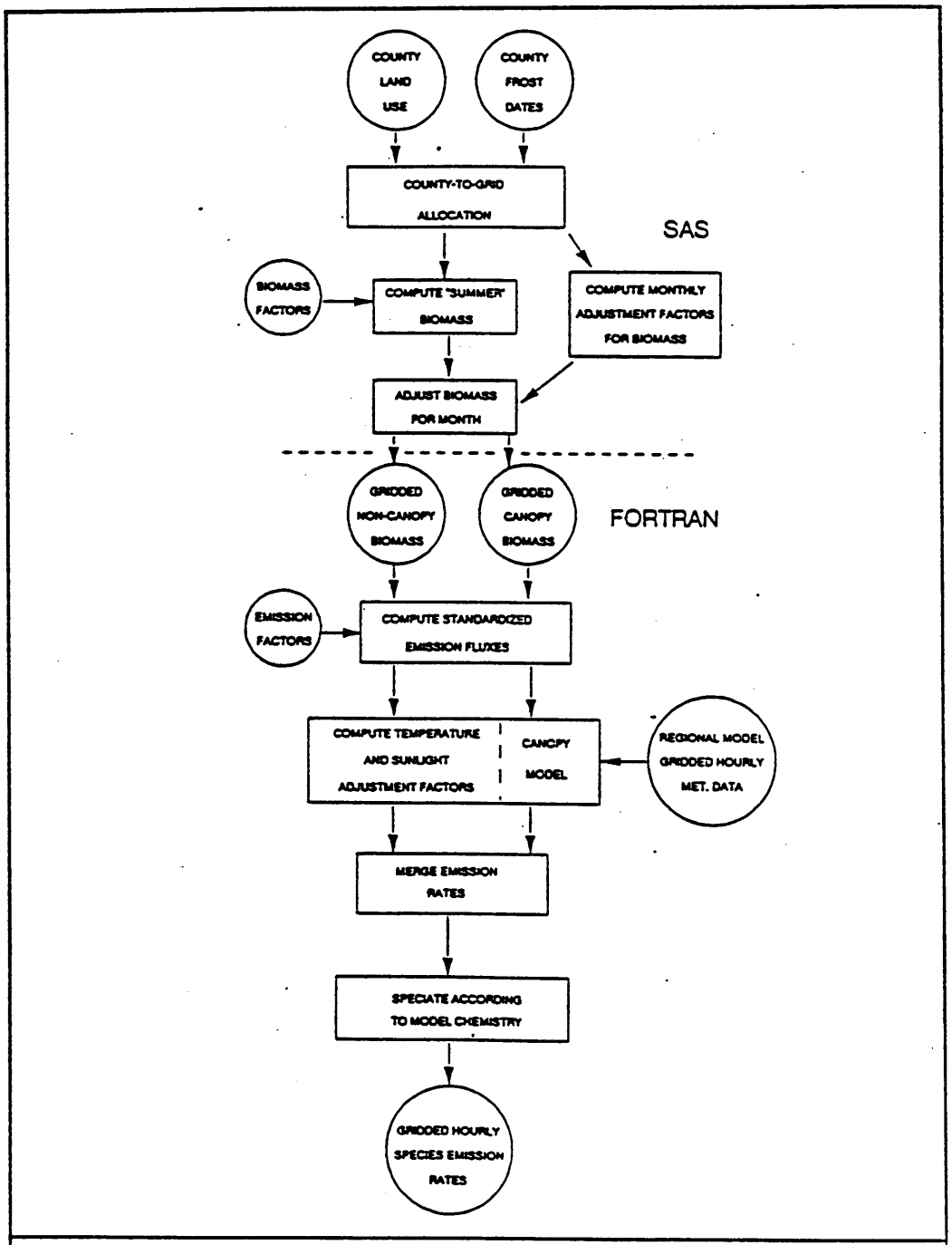

FIGURE 1. Flow chart for the Biogenic Emissions Inventory System.

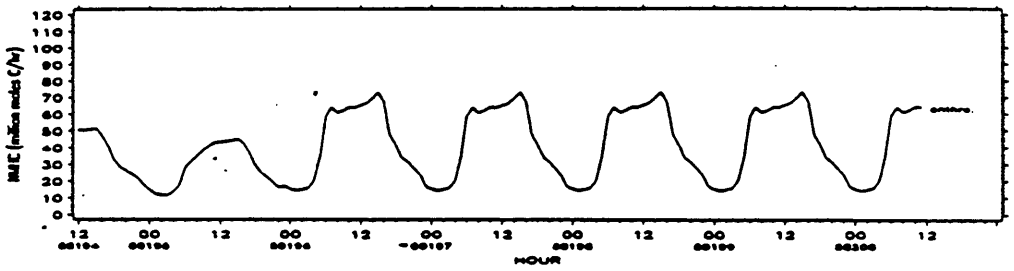

FIGURE 2. Hourly NMHC emissions from the NAPAP 1980 inventory.

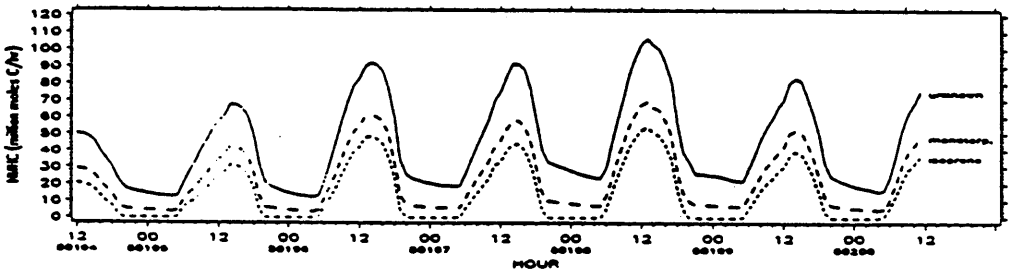

FIGURE 3. Hourly NMHC emissions from BEIS.

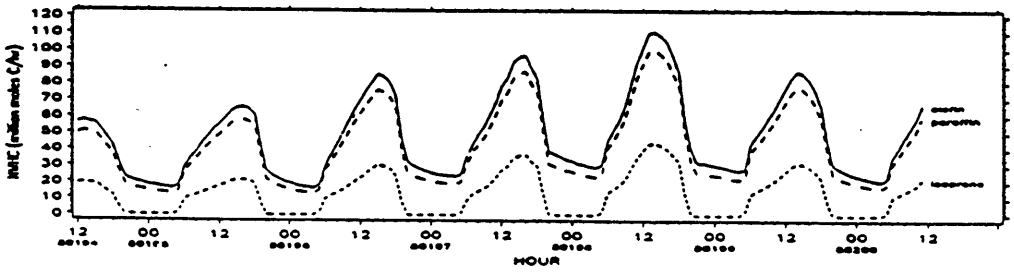

FIGURE 4. Hourly NMHC emissions from BESS.

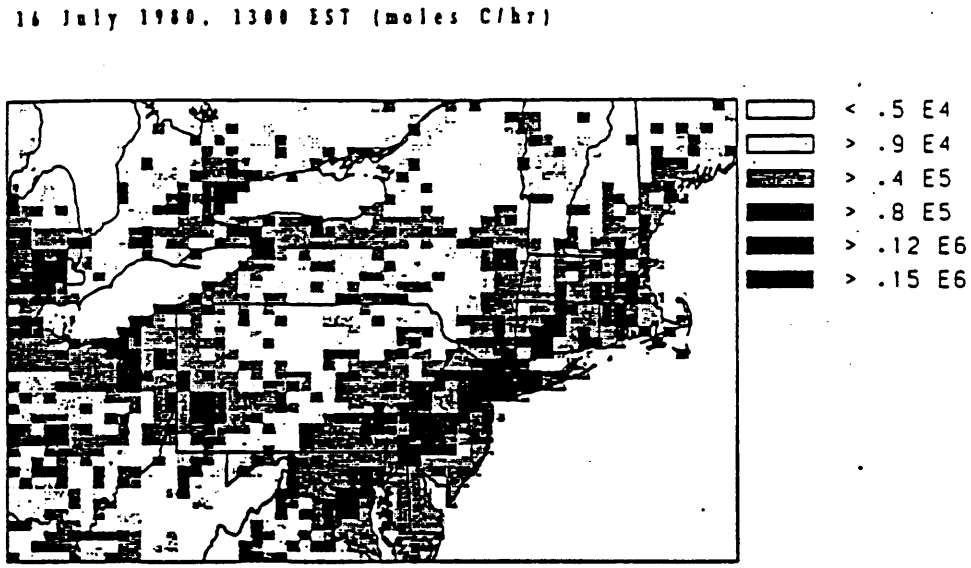

FIGURE 5. Anthropogenic emissions of NMHC estimated for 16 July 1980 (1300 EST).

FIGURE 6. Biogenic emissions of NMHC estimated from BEIS for July 16, 1980 (1300 EST).

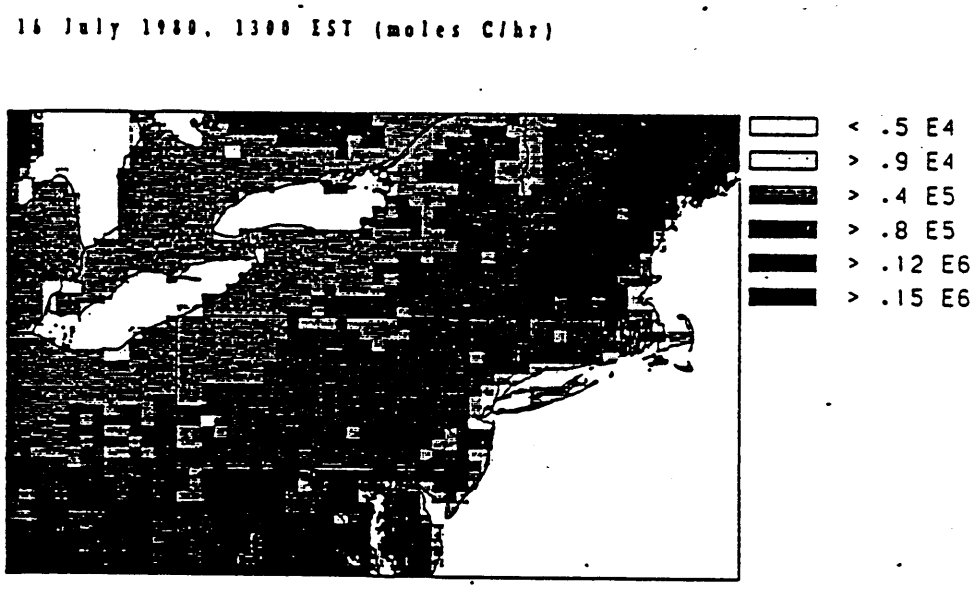

FIGURE 7. Biogenic emissions of NMHC estimated from BESS for July 16, 1980 (1300 EST).

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(Please read Instructions on the reverse before completing)

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16. ABSTRACT

This document serves as a manual for the Emissions Preprocessing System (EPS) which produces low-level gridded, speciated and time variable anthropogenic and natural emission inputs for the Urban Airshed Model. The EPS also produces inputs to the point source preprocessor.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
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