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# A Microcomputer Pollution Model for Civilian Airports and Air Force Bases USER'S GUIDE-ISSUE 2



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**Federal Aviation Administration**  
Office of Environment and Energy  
Washington, D.C. 20591



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August 1988

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FAA FAA-EE-88-3  
USAF ESL-TR-88-54

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1. Report No. (FAA) FAA-EE-3 (USAF) ESL-TR-54	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle A MICROCOMPUTER POLLUTION MODEL FOR CIVILIAN AIRPORTS AND AIR FORCE BASES -- USER'S GUIDE - ISSUE 2		5. Report Date AUGUST 1988	6. Performing Organization Code
7. Author(s) H. M. SEGAL	8. Performing Organization Report No. DOT/FAA		
9. Performing Organization Name and Address FEDERAL AVIATION ADMINISTRATION OFFICE OF ENVIRONMENT AND ENERGY 800 INDEPENDENCE AVENUE, SW. WASHINGTON, DC 20591	10. Work Unit No. (TRAIS)	11. Contract or Grant No.	
12. Sponsoring Agency Name and Address THE EDMS PROGRAM IS BEING JOINTLY FUNDED BY THE FAA (SEE ABOVE) AND THE USAF ENGINEERING SERVICES CENTER, TYNDALL AIR FORCE BASE, FLORIDA 32403	13. Type of Report and Period Covered USER'S GUIDE		
15. Supplementary Notes		14. Sponsoring Agency Code AEE-30(FAA);AFESC/RDWS(USAF)	
<p>16. Abstract</p> <p>This is one of three reports describing the Emissions and Dispersion Modeling System (EDMS). All reports have the same title--A MICROCOMPUTER MODEL FOR CIVILIAN AIRPORTS AND AIR FORCE BASES--but different subtitles. These subtitles are:</p> <p>(1) USER'S GUIDE - ISSUE 2 ..... (FAA-EE-88-3/ESL-TR-88-54)  (2) MODEL DESCRIPTION ..... (FAA-EE-88-4/ESL-TR-88-53)  (3) MODEL EVOLUTION AND APPLICATION ..... (FAA-EE-88-5/ESL-TR-88-55)</p> <p>Over the past 8 years, the Federal Aviation Administration (FAA) and the United States Air Force (USAF) have developed a number of user-friendly emissions and dispersion models for air quality assessment purposes. The major result of this effort is the Emissions and Dispersion Modeling System (EDMS) which was completed in 1985 and released to the general public. Since that time, major modifications have been made in the EDMS system to enhance its usability and incorporate an integral dispersion model into its code. As a result, the User's Guide is being reissued as--USER'S GUIDE--ISSUE 2--item (1) above.</p> <p>The approach of this guide is to provide "hands-on" instructions on how to use the model. The mechanism for doing this is an example problem which is introduced early in this document. Four short sections precede the example problem instructions. The first shows how the EDMS evolved from the earlier FAA and USAF mainframe models. The next three sections describe the hardware and software required to run the system and describe how to add, delete, or change standard input data. Section 5 provides the "hands-on" instructions to produce:</p> <p>(1) an emissions inventory of all sources at an airport/airbase; and  (2) an estimate of the concentrations produced by these sources at four airport locations. An inexperienced user should be able to process the example problem in less than 3 hours.</p>			
17. Key Words POLLUTION, AIR POLLUTION, DISPERSION MODEL, EMISSIONS MODEL, DATA BASE, MICROCOMPUTER		18. Distribution Statement THIS DOCUMENT IS AVAILABLE TO THE PUBLIC THROUGH THE NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VIRGINIA 22161	
19. Security Classif. (of this report) UNCLASSIFIED	20. Security Classif. (of this page) UNCLASSIFIED	21. No. of Pages	22. Price

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## 1 - INTRODUCTION

Almost any expansion of operations or facilities at airports or airbases requires some type of an environmental assessment. In the area of air quality, this assessment usually involves the use of two models--one to prepare an inventory of emissions and the other to calculate the concentrations caused by these emissions as they disperse downwind.

Models to perform these tasks were developed in the early 1970's by both the United States Air Force (USAF) and the Federal Aviation Administration (FAA). The USAF developed the Air Quality Assessment Model (AQAM) (Rote, et al., 1975), and the FAA developed the Airport Vicinity Air Pollution model (AVAP) (Wang, et al., 1973). However, these models are becoming obsolete--they are expensive to operate, tedious to enter data into, and require a fully-qualified scientist or engineer to use.

The introduction of modern microcomputers into the workplace has made it possible to simplify the modeling task considerably. However, a prime question to be asked before developing a new model is whether to develop a separate modeling system for each agency, as was done with the earlier AVAP and AQAM systems, or whether to combine FAA and USAF requirements into a single system.

Consultations between the FAA and the USAF indicated that it would be both feasible and cost effective to develop a single modeling system that both agencies could use. The system that resulted from these consultations is called the Emissions and Dispersion Modeling System (EDMS). It overcomes the limitations of the earlier models by incorporating the new "Simplex A" (Segal, 1981) and the Graphical Input Microcomputer Model (GIMM) (Segal, 1983) technology. The EDMS also employs a modern commercial data base (Condor, 1983) to enter, store, and preprocess information. These features permit a lay person to perform a modeling task that had previously been reserved for a scientist or engineer.

EDMS is a dispersion model with an emissions front end. It can process line, point, and area sources at an airport or airbase and can operate in a refined or screening mode.

The emissions portion of EDMS receives emissions information entered through its Condor data base (Condor, 1983) and converts this information into emission rates from which an emissions inventory can be prepared. The dispersion portion of EDMS adds meteorological inputs to this emissions information and produces a report of concentrations at specified airport locations.

Figure 1 shows the elements of the emissions model, and Figure 2 shows the manner in which the emissions and dispersion models interface.

The original EDMS, which was released in December 1985, did not contain an integral dispersion model in its code. This capability is now incorporated into EDMS. In doing so, special table lookup and numerical integration techniques were added to the original GIMM to enable it to function as a refined model. These techniques, along with the new dispersion model code are described in (Segal and Hamilton, 1988).

### Data Flow — Emissions Model

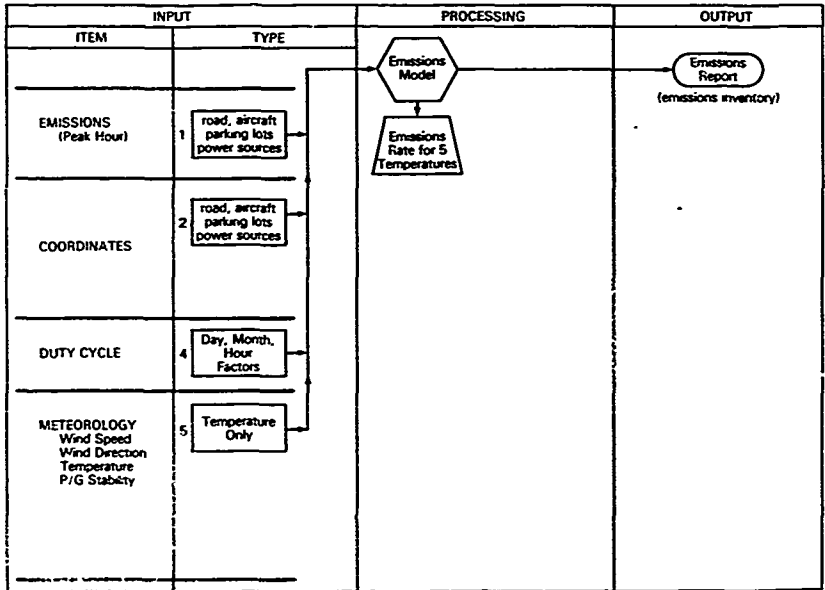
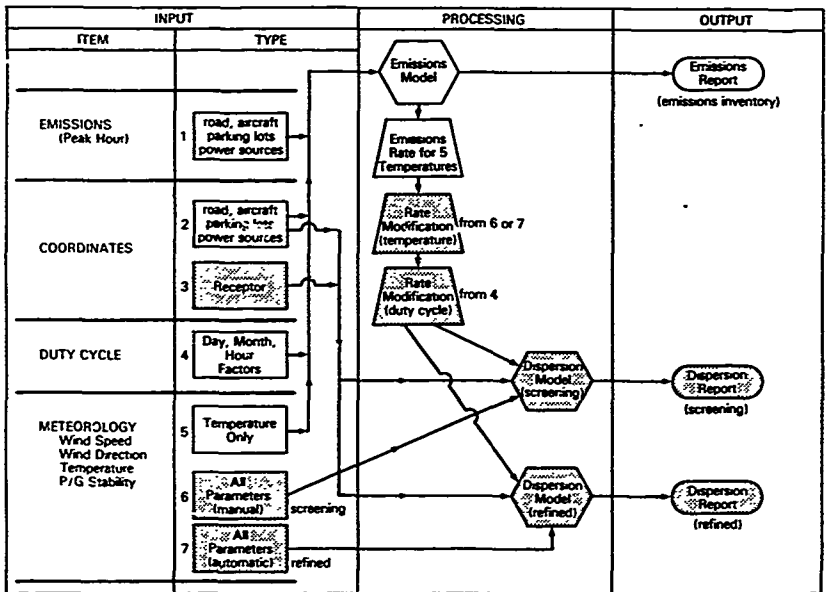


Figure 1

### Data Flow -- Emissions and Dispersion Model



NOTE: Shading represents dispersion model elements.

Figure 2



## 2 - APPROACH

This guide is intended to provide "hands-on" instructions on the use of the EDMS model. The mechanism for doing this is an example problem which is introduced early in this document. Only two sections precede the example problem instructions. The first acquaints the user with the hardware and software required to run the example problem. The second describes how to load the model diskettes into the computer and start it up. The example problem is then run by following a sequence of 111 steps. The user can check his results with those printed in Appendix B.

Yearly revisions to the User's Guide are planned. The user is therefore encouraged to communicate any corrections, additions, or simplifications to the system that he feels will enhance its effectiveness. Telephone contacts are Howard Segal, AEE-30, (202) 267-3494, for the FAA, and Captain Michael Moss, AFESC/RDVS, (904) 283-4234, for the USAF. Mailing addresses for both agencies are listed on the Technical Report Documentation Page (first page) of this report.

### 3 - HARDWARE AND SOFTWARE REQUIREMENTS

#### 3.1 HARDWARE

The following is required:

- 1) One IBM-PC/XT or equivalent computer. One 5 1/4" floppy disk drive. One hard disk drive with 8 megabytes of unused space. At least 256 kilobytes of internal memory.

While this model will also operate on a Zenith - 248 computer, its compatibility with other "AT" type computers has not been verified.

- 2) One printer compatible with the above.

The following are optional items:

- 1) At least 256 kilobytes of additional internal memory
- 2) A color graphics monitor
- 3) An Intel 8087 math coprocessor. This chip will significantly speed up system loading and data processing.
- 4) A graphics tablet digitizer (to facilitate coordinate entry)

#### 3.2 SOFTWARE

The EDMS requires the following software:

- 1) MS-DOS version 2.0 or higher
- 2) 8 diskettes containing the EDMS code

To order diskettes, contact: Federal Aviation Administration  
800 Independence Avenue, SW. (AEE-30)  
Washington, D.C. 20591  
Attn: Howard M. Segal  
Telephone: (202) 267-3494

#### 4 - SYSTEM CHARACTERISTICS

##### 4.1 SYSTEM START-UP AND LOAD

The computer start-up procedure is described in steps 1 through 4 of the Example Problem Instruction section, Section 5.3. The EDMS is loaded into the computer as follows:

- A. Insert EDMS disk #1 into the A: disk drive (there are 8 diskettes).
- B. Type "A:" then (↵) which is the keyboard symbol for carriage return.
- C. Type "INSTALL" then (↵) to start the load program.
- D. The contents of disk #1 will be copied into the hard disk.
- E. After disk #1 has been loaded, a prompt for disk #2 will appear on the screen. Remove disk #1 and insert disk #2 and press (↵).
- F. Repeat step E until all 8 diskettes have been loaded. Time to load the diskettes is about one hour.

##### 4.2 ENTERING AND PROCESSING LONG TERM METEOROLOGICAL DATA

One National Climatic Center (NCC) weather file, the one for observations made at Stapleton International Airport in 1982, has already been loaded into the EDMS model. A weather file for any other NCC station can be entered by typing the following commands after the user has obtained the appropriate data diskettes from the NCC:

- ```
> type "CD\EDMS1" ENTER
    Insert the first diskette
> type "COPY A:-----*.DAT" ENTER
    where "-----" is the NCC station number
    Insert the second diskette
> type "COPY A:-----*.DAT" ENTER
> type "WEATHER" ENTER
> type "EDMS1" ENTER
```

#### 4.3 DATA FILES

Data entered into the aircraft (AIR2), motor vehicle (MVEM) and other emission rate (standards) files have been entered for instructional purposes only. When performing an actual environmental assessment, it is the user's responsibility to ensure that these data are current and reflect the information desired. The user can check the data already loaded into the EDMS data files by accessing the appropriate source menu display and exercising the Standards option in that menu. The user can also check (or change) the loaded emission rate data by entering Condor directly. The procedure for doing this is described in Table A-1 of Appendix A.

#### 4.4 CHANGING OR ADDING MOTOR VEHICLE EMISSION INFORMATION

Both high and low altitude emission rates for automobiles have been entered into the emission rate (standards) files for 1988, 1990, 1995, and 2000 fleet mixes in accordance with information listed in (EPA 1985). The motor vehicle data file (MVEM) default is for a 1988 motor vehicle fleet mix operating at a high altitude. If you wish to check the emission rate file presently coupled to the EDMS model or to process your scenario for other years (1990, 1995, or 2000) and/or other operational altitudes (high or low), refer to Appendix A for special instructions.

#### 4.5 DATA INPUT AND CHANGE

The computer may take some time to respond to keyboard commands. The user should make sure that the red light near the disk drive is not lighted and that a screen is displayed before issuing the next keyboard command. The word ENTER in the text means that the carriage return key (↵) should be pressed. Text entries must be in upper case since the data base distinguishes between upper and lower case characters. Quotes around numbers, characters, or words are for identification only. They are not to be typed in.

A menu item can be entered quickly by typing the desired menu item as soon as it appears on the screen. The user does not have to wait for a complete menu display. A "C)" character on the screen means that the user has been ejected from the EDMS system--usually because of an input error. To reenter the system, type "HELP MAIN".

Data can be entered in two ways: through the "R" (revise) command displayed at the bottom of the data entry screens or by the "add new data" item displayed on the source, temporal, facility and receptor menus. The revision method is demonstrated only once--in steps 9 through 16. The "add new data" method is demonstrated many times--in the entry of all other data.

Data entry errors can be corrected on any screen with the "revise" command.

## 5 - EXAMPLE PROBLEM

### 5.1 INTRODUCTION

A simple source-receptor scenario has been prepared to lead the user through the steps for calculating an emissions inventory and for calculating pollutant concentrations at various airport locations. The problem is designed for an inexperienced layperson.

The source-receptor geometry for Washington National Airport is shown in Figure 3. There are 19 emission sources, six of which (letters B through G) were selected for the example problem.

### 5.2 GIVEN INFORMATION

Information to be entered into the example problem is listed below. Detailed instructions for entering these data are listed in Section 5.3.

#### 5.2.1 Source Information

##### 5.2.1.1 Hourly Changes in Source Activity

Power plants and other sources can have an hourly "duty cycle" varying from 100 percent-on to 100 percent-off. This duty cycle is established when the user enters factors of from "0" (100 percent-off) to "1" (100 percent-on) into the 43 fields of the temporal screen. These fields are broken down as follows: 24-hour fields--one for each hour of the day; 7-day fields--one for each day of the week; and 12-month fields--one for each month of the year. Through triple nesting these 43 entries permit the calculation of emission values for all 8760 hours of the year.

##### 5.2.1.2 Source Scenario

The source-receptor geometry for Washington National Airport is shown in Figure 3. This geometry includes 19 sources, six of which are used in the Example Problem. These six sources consist of:

- One power plant (source G)
- One runway (source C)
- One takeoff queue (source B)
- Two roadways (sources D and E)
- One parking lot (source F)

# Source—Receptor Geometry at Wash. National Airport

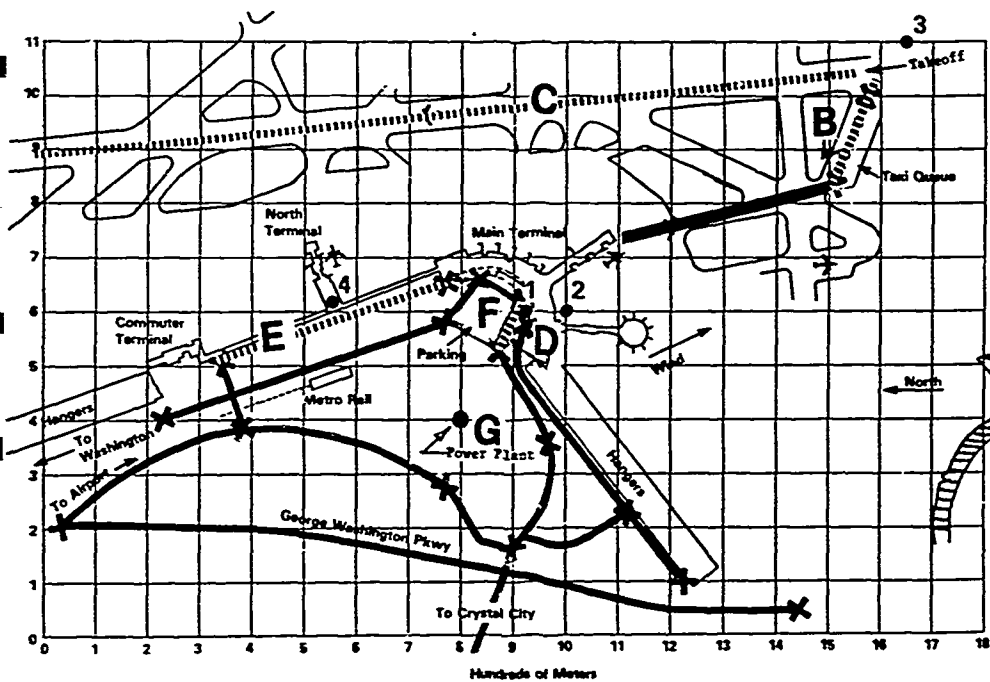


Figure 3

5.2.1.3 Source Related Inputs

Table 1 lists the source related inputs.

Table 1

SOURCE RELATED INPUTS

| Source      | Coordinates (M) |            |            |            | Emission Data                      | Duty Cycle |                                                                                                                                                                         |
|-------------|-----------------|------------|------------|------------|------------------------------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | x1              | y1         | x2         | y2         |                                    | File Name  | % Activity (Temporal Factor)                                                                                                                                            |
| Power Plant | 800             | 400        |            |            | 4 m tons/hr bitumenous coal        | POWER      | 100% activity for all days, months & hours                                                                                                                              |
| Runway      | 1550            | 1050       | 0000       | 900        | 10 - 737's<br>12 - 727's           | SCENARIO   | 0800 - 90% activity<br>0900 - 60% activity<br>2000 - 80% activity<br>2100 - 90% activity<br>Aug - 60% activity<br>Sept - 70% activity<br><br>all other activity is 100% |
| Queue       | 1580            | 1000       | 1500       | 820        | 10 - 737's<br>12 - 727's           | SCENARIO   | sane as "runway"                                                                                                                                                        |
| Roadway E   | 320             | 500        | 770        | 660        | 340 veh/hr<br>15 mi/hr<br>20% cold | SCENARIO   | sane as "runway"                                                                                                                                                        |
| Roadway D   | 880             | 530        | 910        | 610        | 1500 veh/hr<br>5 mi/hr<br>20% cold | SCENARIO   | sane as "runway"                                                                                                                                                        |
| Parking Lot | 880<br>830      | 530<br>660 | 910<br>780 | 610<br>580 | 150 veh/hr<br>5 mi/hr<br>80% cold  | SCENARIO   | sane as "runway"                                                                                                                                                        |

### 5.2.2 Receptor Information

The following coordinates were used in this scenario:

| Receptor Name             | "X" Location (M) | "Y" Location (M) |
|---------------------------|------------------|------------------|
| #1 Main Terminal          | 920              | 600              |
| #2 South of Main Terminal | 1000             | 600              |
| #3 Runway - North End     | 1650             | 1100             |
| #4 North Terminal         | 550              | 610              |

### 5.2.3 Meteorological Information

The model can accept two types of meteorological data; one for the refined model calculations, and the other for the screening model calculations. Data for the refined calculations are selected from hourly weather observational data files released by the National Climatic Center (NCC) in diskette form. To facilitate example problem processing, the NCC diskettes for one NCC weather station have already been entered into the model. The user has only to identify the range of hours he wishes to process in order to initiate the batched dispersion calculations. The times between 0800 and 0900 on August 11th (1982) were selected for input into the example problem.

To reduce the amount of time the user spends in running the screening model only one hour of meteorological data has been selected for user input. The values selected are listed below.

| Parameter                        | Hourly averaged values |
|----------------------------------|------------------------|
| Wind speed (meters/second)       | 1                      |
| Wind direction (degrees)         | 235                    |
| Air temperature (degrees F.)     | 70                     |
| Pasquill/Gifford stability (2-5) | 2                      |

Note: Stability classes 2 - 5 correspond to Pasquill Gifford stability classes B - F.



### 5.3 EXAMPLE PROBLEM INSTRUCTIONS

Menu flow to each screen is shown in Figure 4. This flow chart should prove helpful if the user gets lost while exercising the example problem.

Provisions for graphics tablet use have not as yet been included in the revised computer code. Therefore, this User's Guide provides instruction for TABLET OFF operation only.

Start with instruction #1 to run the example problem.

#### PREPARE FOR DATA ENTRY:

|   | ACTION                                                                                         | PURPOSE                                         |
|---|------------------------------------------------------------------------------------------------|-------------------------------------------------|
| 1 | turn on computer, monitor and printer                                                          | activate system                                 |
| 2 | press "ALT", "DEL", and "CTRL" keys simultaneously<br>press "CAPS LOCK" Key                    | boot system; preempt upper case character entry |
| 3 | press ENTER a sufficient number of times to make the "C" or "A" character appear on the screen | make prompt character appear                    |
| 4 | type "C:" ENTER                                                                                | make sure the system is in the "C" drive        |
| 5 | type "CD EDMS1" ENTER                                                                          | address the EDMS system                         |
| 6 | type "EDMSTOFF" ENTER                                                                          | operate system without the graphics tablet      |



ENTER FACILITY DATA

- |    |                                                                                                                                                           |                                                                      |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| 7  | type "2" ENTER                                                                                                                                            | start to input data                                                  |
| 8  | type "1" ENTER                                                                                                                                            | select main input menu                                               |
| 9  | type "1" ENTER                                                                                                                                            | display airport facility screen (item 1)                             |
| 10 | type "R" -- NOTE: the character "R" was selected from the option line at the bottom of the screen                                                         | activate revise mode prior to entering data                          |
| 11 | press ENTER six times                                                                                                                                     | move cursor to latitude field                                        |
| 12 | type "3851N" ENTER                                                                                                                                        | enter latitude                                                       |
| 13 | type "7702W" ENTER                                                                                                                                        | enter longitude                                                      |
| 14 | press ENTER thirteen times - NOTE: after pausing through the last field (DEC 58) the select line at the bottom of the screen changes to the "OPTION" mode | move cursor through the remaining fields without changing any values |
| 15 | type "P" then E"                                                                                                                                          | print and save data                                                  |
| 16 | press ENTER                                                                                                                                               | return to main input menu                                            |

ENTER TEMPORAL DATA (MENU ITEM 2)

- 17 type "2" ENTER                   select "TEMPORAL" item
- 18 type "1" ENTER                   select "add new data" option
- 19 type "POWER" ENTER               enter file name
- 20 type ENTER 43 times              enter default of "1.0" into all fields  
to show 100% activity at all times
- 21 type "P" then "E"                print and save temporal file "POWER"
- 22 type "1" ENTER                   display blank screen for second file
- 23 type "SCENARIO" ENTER            enter file name (SCENARIO)
- 24 press ENTER 28 times             enter defaults values (100%)
- 25 type .9 ENTER; type .8 ENTER     enter appropriate temporal factors  
type .6 ENTER; type .6 ENTER     from Table 2 into the next six  
type .9 ENTER; type .7 ENTER     fields

TABLE 2

| TEMPORAL ACTIVITY |        |      |        |          |            |          |        |
|-------------------|--------|------|--------|----------|------------|----------|--------|
| Object Number 1   |        |      |        | 1 SRC.CD | 0 TEMPORAL | SCENARIO |        |
| Hour              | Factor | Hour | Factor | Day      | Factor     | Month    | Factor |
| 0100              | H1 1   | 1300 | H13 1  | M        | D1 1       | JAN      | M1 1   |
| 0200              | H2 1   | 1400 | H14 1  | T        | D2 1       | FEB      | M2 1   |
| 0300              | H3 1   | 1500 | H15 1  | W        | D3 1       | MAR      | M3 1   |
| 0400              | H4 1   | 1600 | H16 1  | Th       | D4 1       | APR      | M4 1   |
| 0500              | H5 1   | 1700 | H17 1  | F        | D5 1       | MAY      | M5 1   |
| 0600              | H6 1   | 1800 | H18 1  | Sa       | D6 1       | JUN      | M6 1   |
| 0700              | H7 1   | 1900 | H19 1  | Su       | D7 1       | JUL      | M7 1   |
| 0800              | H8 .9  | 2000 | H20 .8 |          |            | AUG      | M8 .6  |
| 0900              | H9 .6  | 2100 | H21 .9 |          |            | SEP      | M9 .7  |
| 1000              | H10 1  | 2200 | H22 1  |          |            | OCT      | M10 1  |
| 1100              | H11 1  | 2300 | H23 1  |          |            | NOV      | M11 1  |
| 1200              | H12 1  | 2400 | H24 1  |          |            | DEC      | M12 1  |

- 26 press ENTER successively to     exit screen  
exit
- 27 type "P" then "E"                print then save
- 28 type "10" ENTER                  return to previous menu

ENTER SOURCE DATA - POWER PLANTS

|    |                                                                           |                                                           |
|----|---------------------------------------------------------------------------|-----------------------------------------------------------|
| 29 | type "3" ENTER                                                            | select "source input"                                     |
| 30 | type "2" ENTER                                                            | select "power input"                                      |
| 31 | type "1" ENTER                                                            | select "power plant"                                      |
| 32 | type "1" ENTER                                                            | select "bituminous"                                       |
| 33 | type "1" ENTER                                                            | display blank screen                                      |
| 34 | type "POWER" ENTER                                                        | enter the relational name of the<br>temporal file (POWER) |
| 35 | type "PUGET POWER #1" ENTER                                               | enter the name of the power plant                         |
| 36 | type "800" ENTER<br>type "400" ENTER                                      | enter plant coordinates (meters<br>from origin)           |
| 37 | press ENTER seven times                                                   | enter defaults                                            |
| 38 | type "4" ENTER                                                            | enter amount of fuel burned                               |
| 39 | press ENTER a sufficient<br>number of times to pass<br>through all fields | enter remaining defaults                                  |
| 40 | type "P" then "E"                                                         | print and save data                                       |
| 41 | type "10" ENTER<br>type "10" ENTER<br>type "10" ENTER                     | return to source menu                                     |

ENTER SOURCE DATA - AIRCRAFT OPERATIONS

- 42 type "4" ENTER                   select new source (aircraft)
- 43 type "1" ENTER                   prepare to input aircraft type and runway information
- 44 type "1" ENTER                   display input screen
- 45 enter appropriate runway, runway queueing, and aircraft operations data from Table 3 by moving cursor through the fields (enter name or value then move cursor to next field by pressing the ENTER key).

TABLE 3

| RUNWAYS AND RUNWAY QUEUEING AREAS |                 |                               |      |      |  |
|-----------------------------------|-----------------|-------------------------------|------|------|--|
| Runway number R                   | Object number I | 3 SRC.CD 61 TEMPORAL SCENARIO |      |      |  |
| Name DATA32                       | 1               | MAIN                          |      |      |  |
| Location of runway:               | Point 1 X1      | 1550                          | Y1   | 1050 |  |
|                                   | Point 2 X2      | 0                             | Y2   | 900  |  |
| Aircraft AIRCFT                   | Z3Z-1Z          |                               |      |      |  |
| Hourly takeoffs LTO               | 10              |                               |      |      |  |
| Ground support % GSEACT           | 100             |                               |      |      |  |
| Runway queueing areas:            |                 |                               |      |      |  |
| Location of queue # 1:            | Point 1 Q1X1    | 1580                          | Q1Y1 | 1000 |  |
|                                   | Point 2 Q1X2    | 1500                          | Q1Y2 | 820  |  |
| Location of queue # 2:            | Point 1 Q2X1    | 0                             | Q2Y1 | 0    |  |
|                                   | Point 2 Q2X2    | 0                             | Q2Y2 | 0    |  |
| Which queue is being used? 1 or 2 | QUENUM 1        |                               |      |      |  |
| Hourly touch and go:              | HT60 0          |                               |      |      |  |

- 46 type "P" then "E"                   print and save data

ENTER SOURCE DATA - AIRCRAFT OPERATIONS

- 47 type "1" ENTER                    display input screen
- 48 input data from Table 4

TABLE 4

| RUNWAYS AND RUNWAY QUEUEING AREAS |                 |                               |      |             |  |
|-----------------------------------|-----------------|-------------------------------|------|-------------|--|
| Runway number R                   | Object number 1 | 4 SRC.CD 61 TEMPORAL SCENARIO |      |             |  |
| Name        DATA32                | 1<br>MAIN       |                               |      |             |  |
| Location of runway:               | Point 1 X1      | <u>1550</u>                   | Y1   | <u>1050</u> |  |
|                                   | Point 2 X2      | <u>0</u>                      | Y2   | <u>900</u>  |  |
| Aircraft AIRCFT                   | <u>Z22-17</u>   |                               |      |             |  |
| Hourly takeoffs LTO               | <u>12</u>       |                               |      |             |  |
| Ground support % GSEACT           | <u>100</u>      |                               |      |             |  |
| Runway queueing areas:            |                 |                               |      |             |  |
| Location of queue # 1:            | Point 1 Q1X1    | <u>1580</u>                   | Q1Y1 | <u>1000</u> |  |
|                                   | Point 2 Q1X2    | <u>1500</u>                   | Q1Y2 | <u>800</u>  |  |
| Location of queue # 2:            | Point 1 Q2X1    | <u>0</u>                      | Q2Y1 | <u>0</u>    |  |
|                                   | Point 2 Q2X2    | <u>0</u>                      | Q2Y2 | <u>0</u>    |  |
| Which queue is being used? 1 or 2 | QUENUM          | <u>1</u>                      |      |             |  |
| Hourly touch and go:              | HTGO            | <u>0</u>                      |      |             |  |

- 49 type "P" then "E"                    print and save data
- 50 type "10" ENTER                    return to source menu
- type "10" ENTER

ENTER SOURCE DATA -- AUTO ROADWAYS

- 51 type "5" ENTER                   select motor vehicle source
- 52 type "1" ENTER                   select roadway mode
- 53 type "1" ENTER                   display data screen for roadway #1
- 54 input data from Table 5

TABLE 5

| R O A D W A Y S     |                       |     |           |
|---------------------|-----------------------|-----|-----------|
| Object number 1     |                       | 5   | SRC.CD 71 |
| Temporal name       | TEMPORAL SCENARIO     |     |           |
| Roadway name        | DATA32 NORTH TERMINAL |     |           |
| Vehicles/hour       | CAUT                  | 340 |           |
| Speed (mph)         | CVAS                  | 15  |           |
| Cold starts (%)     | CCLD                  | 20  |           |
| End points of road: |                       |     |           |
| Point 1             | X1                    | 320 | Y1 500    |
| Point 2             | X2                    | 220 | Y2 660    |

- 55 type "P" then "E"                   print and save data



ENTER\_SOURCE\_DATA - AUTO\_ROADWAYS

- 56 type "1" ENTER                    display data screen for roadway  
57 input data from Table 6            input data for roadway #2

TABLE 6

| R O A D W A Y S     |               |               |      |           |      |
|---------------------|---------------|---------------|------|-----------|------|
|                     | Object number | 1             | 6    | SRC.CD 71 |      |
| Temporal name       | TEMPORAL      | SCENARIO      |      |           |      |
| Roadway name        | DATA32        | MAIN_TERMINAL |      |           |      |
| Vehicles/hour       | CAUT          | 1500.         |      |           |      |
| Speed               | CVAS          | 5.            |      |           |      |
| Cold starts (%)     | CCLD          | 20.           |      |           |      |
| End points of road: | Point 1       | X1            | 880. | Y1        | 530. |
|                     | Point 2       | X2            | 910. | Y2        | 610. |

- 58 type "P" then "E"                print and save data  
59 type "10" ENTER                    return to motor vehicle screen

ENTER SOURCE DATA - AUTO PARKING

- 60 type "3" ENTER select parking lot option  
61 type "1" ENTER display parking lot screen  
62 input data from Table 7

TABLE 7

| VEHICLE PARKING FACILITIES                  |                   |                   |           |
|---------------------------------------------|-------------------|-------------------|-----------|
|                                             | Object number     | I 7               | SRC.CO 75 |
| Temporal name                               | TEMPORAL SCENARIO |                   |           |
| Roadway name                                | DATA32            | MAIN TERMINAL LOT |           |
| Average distance from gate to parking space | AVED              | 300               | (feet)    |
| Vehicles entering/hour                      | VINP              | 150               |           |
| Vehicles existing/hour                      | VOUT              | 150               |           |
| Speed (mph)                                 | CVAS              | 5                 |           |
| Cold starts on exit (%)                     | CCLD              | 80                |           |
| Coordinates of corners:                     | X1                | 870               | Y1 530    |
|                                             | X2                | 919               | Y2 620    |
|                                             | X3                | 828               | Y3 660    |
|                                             | X4                | 780               | Y4 580    |

- 63 type "P" then "E" print and save data  
64 type "10" ENTER return to motor vehicle  
65 type "10" ENTER return to source-receptor menu

ENTER RECEPTORS

- 66 type "6" ENTER                   prepare to enter receptor coordinates
- 67 type "1" ENTER                   display receptor screen
- 68 move cursor through fields to   enter name and coordinates of  
enter relevant data from       first receptor  
Table 8

TABLE 8

| RECEPTOR NO. 1    |                      |          |                     |
|-------------------|----------------------|----------|---------------------|
| R E C E P T O R S |                      |          |                     |
|                   | Object number I      | B SRC.CD | 0 TEMPORAL SCENARIO |
| Receptor number   | J                    |          | 1                   |
| Name              | DATA32 MAIN TERMINAL |          |                     |
| Location          | X        220         | Y        | 600                 |

- 69 type "P" then "E"               print and sav. coordinates of 1st  
receptor
- 70 repeat steps 67 thru 69 three more times using the data listed below  
in order to enter coordinates of receptors 2, 3, and 4,

| Receptor number | Receptor name          | X    | Y    |
|-----------------|------------------------|------|------|
| 2               | SOUTH OF MAIN TERMINAL | 1000 | 600  |
| 3               | RUNWAY - NORTH END     | 1650 | 1100 |
| 4               | NORTH TERMINAL         | 550  | 610  |

- 71 type "11" ENTER               return to main menu

All emissions and receptor data are now entered. The remaining tasks are to:

1. select the sources to run in the emissions model;
2. check to ensure that all data has been entered correctly;
3. run emissions model and print results;
4. run dispersion model in the screening mode -- print results;
5. run dispersion model in the refined mode -- print results
6. save all example problem data on a separate diskette
7. erase all data from hard disk to prepare system to accept new scenario

SELECT EMISSIONS MODEL RUN CRITERION

- |    |                                                                                  |                                  |
|----|----------------------------------------------------------------------------------|----------------------------------|
| 72 | type "3" ENTER                                                                   | initiate emissions model run     |
| 73 | type "1" ENTER                                                                   | select source criterion          |
| 74 | type "1" ENTER                                                                   | select source category criterion |
| 75 | type "R"                                                                         | set data entry at "REVISE"       |
| 76 | enter number 1 into the first field and press ENTER to pass the remaining fields | select "process all sources"     |
| 77 | type "P" then "E" then ENTER                                                     | print and save selection screen  |
| 78 | type "11" ENTER                                                                  | return to main menu              |

CHECK DATA ENTERED INTO SCREENS

- |    |                                                       |                               |
|----|-------------------------------------------------------|-------------------------------|
| 79 | type "2" ENTER                                        | initiate emission data check  |
| 80 | type "2" ENTER - this task will take about 15 minutes | select emissions check option |

NOTE: If you have made no errors in entering data, the main menu will be displayed and the printer will not print out any errors. When this happens, proceed to step 81 (run emissions model). If errors have been printed out they must be corrected. First identify the flow path to the screen requiring correction. Refer to Fig. 4. Then using the knowledge you have already gained, select the menu screen just prior to the screen you wish to change. Type "2" ENTER and make the appropriate changes. Reenter the step sequence at step 79.

RUN EMISSIONS MODEL AND PRINT RESULTS

- |    |                                                    |                                                                                  |
|----|----------------------------------------------------|----------------------------------------------------------------------------------|
| 81 | type "4" ENTER<br>type "3" ENTER<br>type "2" ENTER | run emissions model                                                              |
| 82 | type "3" ENTER                                     | print out results of emission model run (check results with those in Appendix B) |
| 83 | type "4" ENTER                                     | return to main menu                                                              |

RUN DISPERSION MODEL IN SCREENING MODE -- PRINT RESULTS

- 84 type "4" ENTER select process dispersion menu
- 85 type "1" ENTER run GIMM (wait while files are processed,  
when prompted proceed with next step)
- 86 type "S" ENTER select screening mode
- 87 type "1989" ENTER enter year
- 88 type "AUG" ENTER enter month
- 89 type "1" ENTER enter day of month
- 90 type "16" ENTER enter hour of day
- 91 type "70" ENTER enter temperature in deg F
- 92 type "1" ENTER enter wind speed
- 93 type "225" ENTER enter wind direction
- 94 type "2" ENTER enter P/G class
- 95 type "Y" ENTER initiates dispersion calculation  
and report printout for 1 of 4 sources  
(Check results with those in Appendix B)

Note: After printout has stopped and the interactive display  
"PROCESS ANOTHER HOUR ?" appears, proceed with step 96

- 96 type "N" ENTER proceed to next source - "parking lots"
- 97 repeat steps 96 through 96 three more times to run all sources
- 98 type "10" ENTER return to main menu  
type "6" ENTER return to DOS

RUN DISPERSION MODEL IN REFINED MODE -- PRINT RESULTS

- 99 type "REFINED" ENTER access the weather file
- 100 type "8, 11, 08" code for Aug, 11 - 0800 hours
- 101 type "8, 11, 09" code for Aug, 11 - 0900 hours
- 102 type "R" ENTER start refined run for 1st source
- 103 after printing stops-  
type "R" ENTER -- repeat 3x complete processing of all 4 sources  
(check results with those in Appendix B)
- 104 type "EDMS" return to main system

SAVE AND ERASE DATA

- |     |                                                 |                                                                                                |
|-----|-------------------------------------------------|------------------------------------------------------------------------------------------------|
| 105 | type "5" ENTER                                  | select save menu option                                                                        |
| 106 | insert formatted diskette<br>into the "A" drive | prepare to save data on diskette                                                               |
| 107 | type "1" ENTER<br>type "Y" ENTER                | initiate save data option                                                                      |
| 108 | type "2" ENTER<br>type "Y" ENTER                | erase saved scenario from hard disk<br>This action clears the hard disk to<br>accept new data. |
| 110 | type "4" ENTER                                  | return to main menu                                                                            |
| 111 | type "6" ENTER                                  | leave the EDMS program and<br>return to DOS                                                    |

REFERENCES

Condor 1983; Condor 3 Database Management System - User's Guide; Condor Computer Corporation; P.O. Box 8318; Ann Arbor, MI.; 1983

EPA 1983; Compilation of Air Pollution Emission Factors - AP-42 Supplements 8 through 14; Environmental Protection Agency; Research Triangle Park, N.C.; June 1982 - May 1983

EPA 1985; Compilation of Air Pollutant Emission Factors - Volume II: Mobile Sources; Environmental Protection Agency; Ann Arbor, MI; September 1985

Rote D. M. and Wangan L. E. ; A Generalized Air Quality Assessment Model for Air Force Operations; Air Force Weapons Laboratory, Kirkland Air Force Base, New Mexico; USAF Report #AFWL -TR -74 -304, Feb. 1975

Segal H. M.; A Simplified Atmospheric Dispersion Model for Airport Use (User's Guide); Federal Aviation Administration,; Washington, D. C.; Report FAA-EE-81-8; July 1981

Segal H. M.; Microcomputer Graphics in Atmospheric Dispersion Modeling; Journal of the Air Pollution Control Association; 23:6; June 1983

Segal H. M. and Hamilton P. L.; A Microcomputer Pollution Model For Civilian Airports and Air Force Bases -- Model Description ; Federal Aviation Administration; Washington, D. C. 20591; Report # FAA-EE-88-4 / ESL-TR-88-41 August 1988

Wang I. T., Conley D. M., Rote D. M.; Airport Vicinity Air Pollution Model User's Guide; Argonne National Laboratory, Argonne, Ill.; 1973

APPENDIX A  
PROCEDURES FOR CHANGING DATA FILES



### 1. SYSTEM CONSIDERATIONS

The "C)" prompt implies that the user is in the Disk Operating System (DOS) and the "C>>" implies that the user is in the Condor data base. When screens or menus appear you are in the Condor application program, EDMS. From DOS you can enter the EDMS model itself or else enter the Condor data base independent of the EDMS model. All commands should be entered in upper case. The commands for moving between DOS, Condor, and the EDMS program are shown in Table A-1.

Table A-1

COMMANDS FOR MOVING BETWEEN DOS, CONDOR, AND EDMS

| FROM \ TO                      | DOS<br>C)                        | CONDOR<br>C>>          | EDMS PROGRAM<br>"No Prompt"                                                                              |
|--------------------------------|----------------------------------|------------------------|----------------------------------------------------------------------------------------------------------|
| DOS<br>C)                      | ****                             | C>><br>C>> "SYSTEM"    | 1. enter any menu and select #11 (return to main menu)<br>2. from main menu, select return to DOS option |
| CONDOR<br>C>>                  | C)<br>C) "CD\EDMS1"<br>C) "EDMS" | ****                   | no menu option is available to return the user to Condor other than going through DOS                    |
| EDMS<br>PROGRAM<br>"No Prompt" | C)<br>C) "CD\EDMS1"<br>C) "EDMS" | C>><br>C>> "HELP MAIN" | ****                                                                                                     |

### 2. NAMES OF STANDARDS FILES

AIR2 - Aircraft  
 MVEM - Motor Vehicles  
 INEF - Incinerators  
 PPEF - Heating/power plants  
 TFEM - Training Fires  
 TNEF - Petroleum products (tank farms)  
 FUEL - Fuel Standards

### 3. SPECIAL NOTATIONS

Aircraft data files list eight Geomodes, each of which has a different TIME IN MODE (TIM). (A Geomode is an aircraft mode of operation such as taxi, takeoff etc.) The relationship of EDMS Geomodes to analogous EPA TIMES IN MODE are listed in Table A-2.

Table A-2

EDMS MODES ASSIGNED TO CIVIL AIRCRAFT

| EDMS MODES           | EPA MODES       | EPA TIMES IN MODE (MIN) |                |          |
|----------------------|-----------------|-------------------------|----------------|----------|
|                      |                 | TURBO FAN*<br>TURBO JET | TURBO*<br>PROP | PISTON** |
| 1 - RUNWAY ACTIVITY  | TAKEOFF         | 0.7                     | 0.5            | 0.3      |
| 2 - RUNWAY QUEUE     | ***RUNWAY QUEUE | 12.0                    | 12.0           | 4.0      |
| 3 - TOUCH AND GO     |                 |                         |                |          |
| 4 - TAXIWAY CYCLE    | ***TAXI OUT     | 7.0                     | 7.0            | 8.0      |
|                      | ***TAXI IN      | 7.0                     | 7.0            | 4.0      |
| 5 - AIRCRAFT PARKING |                 |                         |                |          |
| 6 - ENGINE TESTING   |                 |                         |                |          |
| 7 - CLIMB            | CLIMB           | 2.2                     | 2.5            | 6.0      |
| 8 APPROACH           | APPROACH        | 4.0                     | 4.5            | 6.0      |

\* Page 58473, Federal Register, December 30, 1982 (Final Engine Emission Standards)

\*\* Page 19101, Federal Register, July 17, 1973 (Initial Engine Emission Standards)

\*\*\*26 minute EPA taxi-idle time in mode breakdown (estimated)

#### 4. EXAMPLE CALCULATIONS TO UPDATE STANDARDS FILES

##### 4.1 Example Problem - Aircraft

A number of example problems have been constructed to trace the steps for adding or updating emission rate data or changing times in mode (TIM) for aircraft.

##### 4.1.1 Entering New Data

Problem: To enter emission rates for a 707-3D aircraft during takeoff

| a. Given Information:    | Emission Rates (gm/sec): |
|--------------------------|--------------------------|
| Source Code (SRC.CD): 66 | CO: 4.06                 |
| Aircraft type: 707-3D    | HC: 2.26                 |
| Geomode: 1               | NO <sub>x</sub> : 57.34  |
| Fuel: 13                 | SO <sub>x</sub> : 4.52   |
| Number of Engines: 4     | Part: 3.70               |
| Time in Mode: 0.7 min    |                          |
| Takeoff Speed: 42 m/s    |                          |

To prepare for data entry, enter Condor as per Table 1, and type:

C> "ENTER AIRZ"

A blank screen will appear on the monitor. This screen, along with the data values you are to enter, is reproduced below.

| A I R C R A F T   E M I S S I O N S   F A C T O R S |              |                      |                               | SRC.CD 66 |
|-----------------------------------------------------|--------------|----------------------|-------------------------------|-----------|
| Aircraft                                            | AIRCFT       | <u>707-3D</u>        | Geomode 1 - Takeoff           |           |
| Geographic mode                                     | GEOMODE      | <u>1</u>             | Geomode 2 - Runway Queue      |           |
| Fuel                                                | FUEL.CD      | <u>13</u>            | Geomode 3 - Touch & Go        |           |
| Number of engines                                   | ENG.NUM      | <u>4</u>             | Geomode 4 - Taxi in/out       |           |
| Time in mode                                        | TIMEMOD      | <u>0.7</u> minutes   | Geomode 5 - Aircraft Parking  |           |
| Takeoff speed                                       | TOSPEED      | <u>42</u> meters/sec | Geomode 6 - Engine Testing    |           |
| Emission rates in Kg/hr                             |              |                      | Geomode 7 - Aircraft Climb    |           |
|                                                     |              |                      | Geomode 8 - Aircraft Approach |           |
| CO                                                  | <u>4.06</u>  |                      |                               |           |
| HC                                                  | <u>2.26</u>  |                      |                               |           |
| NO <sub>x</sub>                                     | <u>57.34</u> |                      |                               |           |
| SO <sub>x</sub>                                     | <u>4.52</u>  |                      |                               |           |
| Part                                                | <u>3.70</u>  |                      |                               |           |

Enter the values underlined above into the blank screen appearing on the monitor. Type "E", a carriage return and "RUN STANDARDS" when finished. If you wish to add data for additional Geomodes, type "C" (for Continue).

#### 4.1.2 Updating Existing Data

Problem: To update HC emission rates for a DC-9-50 aircraft in Geomode 1. Change field value from 0.227 kg/hr (already entered) to 0.22699 kg/hr.

To prepare for updating, type:

C>> "UPDATE AIR2"

After the search condition prompt appears, type: "ALL"

After typing "ALL" a screen will appear with field values entered for a 737 aircraft in Geomode 1. Press the "N" character 8 times to scroll through the data base and reach the DC-9-50 aircraft in Geomode 1.

The screen you are to update will appear on the monitor, as shown below.

| A I R C R A F T   E M I S S I O N S   F A C T O R S |         |                                                                                |                               | SRC.CD 66 |
|-----------------------------------------------------|---------|--------------------------------------------------------------------------------|-------------------------------|-----------|
| Aircraft                                            | AIRCFT  | DC-9-50                                                                        | Geomode 1 - Takeoff           |           |
| Geographic mode                                     | GEOMODE | 1                                                                              | Geomode 2 - Runway Queue      |           |
| Fuel                                                | FUEL.CD | 13                                                                             | Geomode 3 - Touch & Go        |           |
| Number of engines                                   | ENG.NUM | 2                                                                              | Geomode 4 - Taxi in/out       |           |
| Time in mode                                        | TIMEMOD | .70 minutes                                                                    | Geomode 5 - Aircraft Parking  |           |
| Takeoff speed                                       | TOSPEED | 42.00 meters/sec (it has meaning only for geomode #1, it is ignored otherwise) | Geomode 6 - Engine Testing    |           |
| Emission rates in kg/hr                             |         |                                                                                | Geomode 7 - Aircraft Climb    |           |
|                                                     |         |                                                                                | Geomode 8 - Aircraft Approach |           |
| CO                                                  |         | 3.170000                                                                       |                               |           |
| HC                                                  |         | .277000                                                                        |                               |           |
| NOx                                                 |         | 91.900000                                                                      |                               |           |
| SOx                                                 |         | 4.530000                                                                       |                               |           |
| Part                                                |         | 1.700000                                                                       |                               |           |

To prepare for data revision, type "R"

Move the cursor to the underlined "HC" field on the lower left hand portion of the displayed screen and change the .227 value listed to .22699. After moving the cursor through the remaining fields, type "E" followed by a carriage return and "RUN STANDARD". This command is necessary to update the emission rate (standard) file to reflect the change made on the screen.

Note: If you wish to change data for the next geomode, inject a "C" command prior to the "E" command, type "R" and iterate the above procedure until you have reached the last geomode you wish to change. At this point select the "E" option followed by a carriage return to stop updating.

#### 4.1.3 Changing Times In Mode

Problem: Change the runway queue time in mode (TIM) from 12 minutes to 5 minutes for all aircraft.

You must first save the 12 minute TIM data for possible future use. The DOS command to do this is:

C) "COPY AIRZ.DAT AIRZ12.DAT"

You can then proceed to revise the 12-minute TIM screen, which has been saved, to reflect 5-minute TIM values. To do this reenter Condor (see Table 1) and issue the command:

C) "UPDATE AIRZ"

When the search condition appears type: "WHERE GEOMODE IS 2"

After the first AIRZ screen appears, move to the "TIMEMOD" field and change the value from 12 to 5 minutes. Move the cursor through the last field of this screen, exercise the "C" for continue option and change all aircraft TIM's from 12 to 5 minutes. After the last aircraft screen has been modified return to Condor and type:

C) "RUN STANDARDS"

Note: At some future date, if you wish to reuse the 12-minute TIM data it can be restored to the EDMS model by typing the following DOS command:

C) "COPY AIRZ12.DAT AIRZ.DAT"

And from Condor type:

C) "RUN STANDARDS"

Note - Emission rates for the following aircraft have been loaded into the the AIRZ standards file:

| Aircraft       | Engine    | Names Recognized by EDMS |
|----------------|-----------|--------------------------|
| B737-200       | JT8D-17   | 737-17                   |
| DC-9-50        | JT8D-17   | DC-9-50                  |
| B727-200       | JT8D-17   | 727-17                   |
| B747-200B      | JT9D-70   | 747-70                   |
| B747-200B      | RB211-524 | 747-524                  |
| L1011-200      | RB211-524 | L1011                    |
| DC-10-30       | CF6-50C   | DC-10-30                 |
| DH6            | PT6A-27   | DH6-27                   |
| B99            | PT6A-27   | B99-27                   |
| C-150          | Q-200     | C-150                    |
| SKYMASTER      | TS10-360C | SKYMASTER                |
| NAVAJO         | T10-540   | NAVAJO                   |
| CV580          | 501D22A   | CV580                    |
| GENERIC SINGLE | Q-209     | GEN-SING                 |
| GENERIC TWIN   | TS10-360C | GEN-TWIN                 |

## 4.2 Example Problem - Motor Vehicles

### 4.2.1 General

Motor vehicle emissions data are stored in eight Mobile 3 data files, any one of which can be copied into the MVEM file. These eight files were extracted from the table lookup listing of (EPA, 1985) and were for the years 1988, 1990, 1995, and 2000 for either high (HI) or low (LO) altitude operation.

The format for these specially designated Mobile 3 files is "MVEMxxnn" where "xx" designates "HI" or "LO" altitude and "nn" designates the last two digits of the fleet mix year (88, 90, 95, 00). The designations of the 8 MVEM files are as follows:

MVEMHI88.DAT  
MVEMHI90.DAT  
MVEMHI95.DAT  
MVEMHI00.DAT

MVEMLO88.DAT  
MVEMLO90.DAT  
MVEMLO95.DAT  
MVEMLO00.DAT

Any one of the eight Mobile 3 data files in the EDMS directory can be copied into the EDMS program by executing the following DOS command:

C) \*COPY MVEMxxnn.DAT MVEM.DAT\*

Then enter Condor and type:

C) \*RUN STANDARDS\*

### 3.2.2 File Change Example

Problem: Enter Mobile 3 data into the MVEM file for a low altitude fleet mix for the year 1995. To accomplish this task, enter DOS and type:

C) \*COPY MVEMLO95.DAT MVEM.DAT\* --- Now access Condor and type:

C) \*RUN STANDARDS\*

To ensure that the 1995 data have been loaded into the model, return to Condor and type "UPDATE MVEM" followed by "ALL". Check to make sure that the emission rates listed on the screen correspond with those from (EPA 1985) which you have just entered. Note that the emission units on the screen should be grams/mile not grams/second.

To facilitate the running of the example problem, one of the eight files listed above has already been loaded into the EDMD. This file contains data for a 1988 fleet mix -- high altitude operation. In doing an actual air quality assessment you will probably want to consider other fleet mix years and other altitudes of operation. When exercising the file change procedure noted above the new file overwrites the existing file.

APPENDIX B  
PRINTOUT OF EXAMPLE PROBLEM RESULTS

a

## OVERVIEW

A note in the example problem states the the results from the emission and dispersion model calculations can be be checked against a master by referring to Appendix B.

In this appendix, the first page of the emissions inventory report and all pages of the screening and refined reports are printed out to permit this checkout of results.



- B3 -

Detailed emission report.

E D M S E M I S S I O N S R E P O R T

DATE: 01/01/80

SITE: WASHINGTON NATIONAL AIRPORT

STATE: DC

Note:- All values are in grams.

Detailed emission reports:  
 SITE: WASHINGTON NATIONAL AIRPORT  
 Note:- All values are in grams.

SOURCE TYPE: BITUMINOUS COAL POWER PLANT  
 SITE NAME: PUGET POWER #1  
 ID NUMBER: 2  
 TEMPORAL: POWER

|           | CARBON<br>MONOXIDE | HYDROCARBONS | NITROGEN<br>OXIDES | SULPHUR<br>OXIDES | PARTICULATES |
|-----------|--------------------|--------------|--------------------|-------------------|--------------|
| JANUARY   | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| FEBRUARY  | 8.136E+05          | 1.492E+05    | 2.034E+07          | 1.058E+08         | 2.115E+08    |
| MARCH     | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| APRIL     | 8.640E+05          | 1.584E+05    | 2.160E+07          | 1.123E+08         | 2.246E+08    |
| MAY       | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| JUNE      | 8.640E+05          | 1.584E+05    | 2.160E+07          | 1.123E+08         | 2.246E+08    |
| JULY      | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| AUGUST    | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| SEPTEMBER | 8.640E+05          | 1.584E+05    | 2.160E+07          | 1.123E+08         | 2.246E+08    |
| OCTOBER   | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| NOVEMBER  | 8.640E+05          | 1.584E+05    | 2.160E+07          | 1.123E+08         | 2.246E+08    |
| DECEMBER  | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| TOTAL     | 1.052E+07          | 1.928E+06    | 2.630E+08          | 1.367E+09         | 2.735E+09    |

Total of all power/heating plants and incinerators.

|           | CARBON<br>MONOXIDE | HYDROCARBONS | NITROGEN<br>OXIDES | SULPHUR<br>OXIDES | PARTICULATES |
|-----------|--------------------|--------------|--------------------|-------------------|--------------|
| JANUARY   | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| FEBRUARY  | 8.136E+05          | 1.492E+05    | 2.034E+07          | 1.058E+08         | 2.115E+08    |
| MARCH     | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| APRIL     | 8.640E+05          | 1.584E+05    | 2.160E+07          | 1.123E+08         | 2.246E+08    |
| MAY       | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| JUNE      | 8.640E+05          | 1.584E+05    | 2.160E+07          | 1.123E+08         | 2.246E+08    |
| JULY      | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| AUGUST    | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| SEPTEMBER | 8.640E+05          | 1.584E+05    | 2.160E+07          | 1.123E+08         | 2.246E+08    |
| OCTOBER   | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| NOVEMBER  | 8.640E+05          | 1.584E+05    | 2.160E+07          | 1.123E+08         | 2.246E+08    |
| DECEMBER  | 8.928E+05          | 1.637E+05    | 2.232E+07          | 1.161E+08         | 2.321E+08    |
| TOTAL     | 1.052E+07          | 1.928E+06    | 2.630E+08          | 1.367E+09         | 2.735E+09    |

| EMISSION REPORT (POINT)                       |                       |     |                  |   |         |                |          |                 |          |          |          |          |          |
|-----------------------------------------------|-----------------------|-----|------------------|---|---------|----------------|----------|-----------------|----------|----------|----------|----------|----------|
| AUG-11-82 ( 000 HR.)                          |                       |     |                  |   |         |                |          |                 |          |          |          |          |          |
| INPUTS                                        |                       |     |                  |   | OUTPUTS |                |          |                 |          |          |          |          |          |
| COORDINATES OF POINT SOURCE'S ORIGIN (0,0)(M) | INITIAL PARAMETERS(M) |     |                  |   | (AP-42) | EMISSION RATES |          |                 |          |          |          |          |          |
| REC:                                          | S16                   | S16 | PLUME (TONS/TEMP |   |         | GIV/SEC        |          |                 |          |          |          |          |          |
| 0                                             | X1                    | Y1  | Z                | Y | HT.     | (F)            | CO       | HC              | NOX      | SOX      | PART     |          |          |
| 1                                             | 800                   | 400 |                  |   |         | 0              | 56       | PLUCET POWER 01 | 3.33E-01 | 6.17E-02 | 0.33E+00 | 4.33E+01 | 0.67E+01 |
| TOTAL                                         |                       |     |                  |   |         |                | 3.33E-01 | 6.17E-02        | 0.33E+00 | 4.33E+01 | 0.67E+01 |          |          |

| DISPERSION REPORT |    |      |      |     |          |                                |        |   |          |          |          |          |          |
|-------------------|----|------|------|-----|----------|--------------------------------|--------|---|----------|----------|----------|----------|----------|
| INPUTS            |    |      |      |     |          |                                | OUTPUT |   |          |          |          |          |          |
| DATE              | HR | W/S  | WD   | W/P | RECEPTOR | CONCENTRATION G/M <sup>3</sup> |        |   |          |          |          |          |          |
|                   |    | IN/S | DES  | A/F |          | NO.                            | X      | Y | CO       | HC       | NOX      | SOX      | PART     |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 1        | 920                            | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 2        | 1000                           | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 3        | 1650                           | 1100   |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 4        | 550                            | 610    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 1        | 920                            | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 2        | 1000                           | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 3        | 1650                           | 1100   |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 4        | 550                            | 610    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 1        | 920                            | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 2        | 1000                           | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 3        | 1650                           | 1100   |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 4        | 550                            | 610    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 1        | 920                            | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 2        | 1000                           | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 3        | 1650                           | 1100   |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 4        | 550                            | 610    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 1        | 920                            | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 2        | 1000                           | 400    |   | 1.45E-07 | 2.68E-08 | 3.42E-06 | 1.08E-05 | 3.77E-05 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 3        | 1650                           | 1100   |   | 3.67E-06 | 5.47E-07 | 7.47E-05 | 3.99E-04 | 7.90E-04 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 4        | 550                            | 610    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 1        | 920                            | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 2        | 1000                           | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 3        | 1650                           | 1100   |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 4        | 550                            | 610    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 1        | 920                            | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 2        | 1000                           | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 3        | 1650                           | 1100   |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 4        | 550                            | 610    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 1        | 920                            | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 2        | 1000                           | 400    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 3        | 1650                           | 1100   |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 4        | 550                            | 610    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

} power plant

} incinerator

} fuel tank

} training fire

| EMISSION REPORT (PARKING LOTS) |     |     |     |     |     |     |                                            |     |      |     |                |     |     |          |          |          |          |          |          |
|--------------------------------|-----|-----|-----|-----|-----|-----|--------------------------------------------|-----|------|-----|----------------|-----|-----|----------|----------|----------|----------|----------|----------|
| AUG-11-82 ( 800 HR.)           |     |     |     |     |     |     |                                            |     |      |     |                |     |     |          |          |          |          |          |          |
| INPUTS                         |     |     |     |     |     |     | OUTPUTS                                    |     |      |     |                |     |     |          |          |          |          |          |          |
| COORDINATES OF SOURCES (M)     |     |     |     |     |     |     | MOBILE 3                                   |     |      |     | EMISSION RATES |     |     |          |          |          |          |          |          |
| ORIGIN AT (0, 0)               |     |     |     |     |     |     |                                            |     |      |     |                |     |     |          |          |          |          |          |          |
| LOT:                           |     |     |     |     |     |     | SIG   PLANE   CARS/   MIN/   TEMP/   YEAR: |     |      |     | BV/SEC         |     |     |          |          |          |          |          |          |
| 0                              | X1  | Y1  | X2  | Y2  | X3  | Y3  | X4                                         | Y4  | Z    | HT. | HR             | CAR | (F) | CO       | HC       | NOX      | SOX      | PART     |          |
| 1                              | 870 | 530 | 919 | 620 | 928 | 660 | 780                                        | 580 | 11.5 |     | 150            | 0   | 56  | 0        | 7.14E-01 | 5.82E-02 | 7.42E-03 | 6.83E-05 | 6.83E-05 |
| TOTAL                          |     |     |     |     |     |     |                                            |     |      |     |                |     |     | 7.14E-01 | 5.82E-02 | 7.42E-03 | 6.83E-05 | 6.83E-05 |          |

| DISPERSION REPORT |    |      |      |      |          |                                 |        |          |          |          |          |          |      |
|-------------------|----|------|------|------|----------|---------------------------------|--------|----------|----------|----------|----------|----------|------|
| INPUTS            |    |      |      |      |          |                                 | OUTPUT |          |          |          |          |          |      |
| DATE              | HR | W/S  | WD   | IP/6 | RECEPTOR | CONCENTRATION BV/M <sup>3</sup> |        |          |          |          |          |          |      |
|                   |    |      |      |      |          | NO.                             | X      | Y        | CO       | HC       | NOX      | SOX      | PART |
| AUG-11-82         | 8  | 10   | 1346 | 4    | 1        | 920                             | 600    | 6.42E-04 | 5.22E-05 | 6.64E-06 | 6.13E-08 | 6.13E-08 |      |
| AUG-11-82         | 8  | 10   | 1346 | 4    | 2        | 1000                            | 600    | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |      |
| AUG-11-82         | 8  | 10   | 1346 | 4    | 3        | 1650                            | 1100   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |      |
| AUG-11-82         | 8  | 10   | 1346 | 4    | 4        | 550                             | 610    | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |      |
| AUG-11-82         | 9  | 12.0 | 1236 | 3    | 1        | 920                             | 600    | 9.48E-04 | 7.71E-05 | 1.04E-05 | 9.61E-08 | 9.61E-08 |      |
| AUG-11-82         | 9  | 12.0 | 1236 | 3    | 2        | 1000                            | 600    | 1.49E-05 | 1.21E-06 | 1.63E-07 | 1.51E-09 | 1.51E-09 |      |
| AUG-11-82         | 9  | 12.0 | 1236 | 3    | 3        | 1650                            | 1100   | 1.75E-05 | 1.42E-06 | 1.91E-07 | 1.77E-09 | 1.77E-09 |      |
| AUG-11-82         | 9  | 12.0 | 1236 | 3    | 4        | 550                             | 610    | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |      |

| EMISSION REPORT (AIRCRAFT)                      |      |      |      |      |    |                          |       |     |         |               |          |                |          |          |          |
|-------------------------------------------------|------|------|------|------|----|--------------------------|-------|-----|---------|---------------|----------|----------------|----------|----------|----------|
| AUG-11-82 ( 000 NM.)                            |      |      |      |      |    |                          |       |     |         |               |          |                |          |          |          |
| INPUTS                                          |      |      |      |      |    | OUTPUTS                  |       |     |         |               |          |                |          |          |          |
| COORDINATES OF SOURCES (M):<br>ORIGIN AT (0, 0) |      |      |      |      |    | INITIAL<br>PARAMETERS(M) |       |     | (AP-42) |               |          | EMISSION RATES |          |          |          |
| REC:                                            |      |      |      |      |    | SIG                      | PLANE | SIG | ACFT    | AIRCRAFT TYPE |          |                | GM/SEC   |          |          |
| B                                               | X1   | Y1   | X2   | Y2   | Y  | HT.                      | Z     | HR  |         | CO            | HC       | NOX            | SOX      | PART     |          |
| 1:                                              | 1550 | 1050 | 0    | 900  | 15 | 16                       |       | 10: | takeoff | 737-17        | 2.00E-01 | 1.47E-02       | 6.00E+00 | 3.00E-01 | 1.10E-01 |
| 1:                                              | 1500 | 1000 | 1550 | 1050 | 15 | 16                       |       | 10: | queue   | 737-17        | 2.00E+01 | 5.17E+00       | 2.00E+00 | 5.83E-01 | 1.83E-01 |
| 2:                                              | 1550 | 1050 | 0    | 900  | 15 | 16                       |       | 12: | takeoff | 727-17        | 3.67E-01 | 2.67E-02       | 1.07E+01 | 5.33E-01 | 2.00E-01 |
| 2:                                              | 1500 | 1000 | 1550 | 1050 | 15 | 16                       |       | 12: | queue   | 727-17        | 3.50E+01 | 9.17E+00       | 3.50E+00 | 1.03E+00 | 3.17E-01 |
| TOTAL :                                         |      |      |      |      |    |                          |       |     |         |               | 5.56E+01 | 1.44E+01       | 2.22E+01 | 2.45E+00 | 8.10E-01 |

| DISPERSION REPORT |    |      |      |     |          |                                 |      |          |          |          |          |          |
|-------------------|----|------|------|-----|----------|---------------------------------|------|----------|----------|----------|----------|----------|
| INPUTS            |    |      |      |     |          | OUTPUT                          |      |          |          |          |          |          |
| DATE              | HR | W/S  | WD   | P/G | RECEPTOR | CONCENTRATION GM/M <sup>3</sup> |      |          |          |          |          |          |
|                   |    | W/S  | DEB  | A=1 |          | CO                              | HC   | NOX      | SOX      | PART     |          |          |
|                   |    |      |      |     | NO.      | X                               | Y    |          |          |          |          |          |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 1        | 920                             | 600  | 1.46E-05 | 1.07E-06 | 4.30E-04 | 2.15E-05 | 7.99E-06 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 2        | 1000                            | 600  | 1.53E-05 | 1.12E-06 | 4.50E-04 | 2.20E-05 | 8.37E-06 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 3        | 1650                            | 1100 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 4        | 550                             | 610  | 1.28E-05 | 9.34E-07 | 3.77E-04 | 1.80E-05 | 7.01E-06 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 1        | 920                             | 600  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 2        | 1000                            | 600  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 3        | 1650                            | 1100 | 1.87E-02 | 4.87E-03 | 3.16E-03 | 6.10E-04 | 1.94E-04 |
| AUG-11-82         | 9  | 12.0 | 1236 | 3   | 4        | 550                             | 610  | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

| EMISSION REPORT (ROADWAYS)  |     |     |     |     |      |      |                |      |       |     |          |          |          |          |          |          |
|-----------------------------|-----|-----|-----|-----|------|------|----------------|------|-------|-----|----------|----------|----------|----------|----------|----------|
| AUG-11-82( 800 HR.)         |     |     |     |     |      |      |                |      |       |     |          |          |          |          |          |          |
| INPUTS                      |     |     |     |     |      |      | OUTPUTS        |      |       |     |          |          |          |          |          |          |
| COORDINATES OF SOURCES (M): |     |     |     |     |      |      | EMISSION RATES |      |       |     |          |          |          |          |          |          |
| ORIGIN AT (0, 0)            |     |     |     |     |      |      | PARAMETERS(M)  |      |       |     |          |          |          |          |          |          |
| ROAD:                       |     |     |     |     |      |      | GH/SEC         |      |       |     |          |          |          |          |          |          |
| NO                          | X1  | Y1  | X2  | Y2  | Z    | Y    | HT.            | HR   | START | (F) | CO       | HC       | NOX      | SOX      | PART     |          |
| 1                           | 320 | 500 | 770 | 660 | 3.04 | 6.09 | 1              | 340  | 15    | 20  | 561982   | 1.85E+00 | 1.74E-01 | 7.51E-02 | 5.17E-05 | 3.33E-04 |
| 2                           | 880 | 530 | 910 | 610 | 3.19 | 6.38 | 1              | 1500 | 5     | 20  | 561982   | 3.55E+00 | 2.97E-01 | 6.55E-02 | 4.80E-05 | 2.67E-04 |
| TOTAL :                     |     |     |     |     |      |      |                |      |       |     | 5.41E+00 | 4.71E-01 | 1.41E-01 | 9.17E-05 | 6.80E-04 |          |

| DISPERSION REPORT |    |      |      |     |          |                                 |        |   |          |          |          |          |          |  |  |
|-------------------|----|------|------|-----|----------|---------------------------------|--------|---|----------|----------|----------|----------|----------|--|--|
| INPUTS            |    |      |      |     |          |                                 | OUTPUT |   |          |          |          |          |          |  |  |
| DATE              | HR | W/S  | WD   | P/6 | RECEPTOR | CONCENTRATION GH/M <sup>3</sup> |        |   |          |          |          |          |          |  |  |
|                   |    | IN/S | DEG  | A=1 |          | NO.                             | X      | Y | CO       | HC       | NOX      | SOX      | PART     |  |  |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 1        | 920                             | 600    |   | 1.65E-03 | 1.36E-04 | 3.05E-05 | 1.86E-08 | 1.24E-07 |  |  |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 2        | 1000                            | 600    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |  |  |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 3        | 1650                            | 1100   |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |  |  |
| AUG-11-82         | 8  | 10   | 1346 | 4   | 4        | 550                             | 610    |   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |  |  |
| AUG-11-82         | 9  | 12.0 | 236  | 3   | 1        | 920                             | 600    |   | 6.34E-03 | 5.33E-04 | 1.21E-04 | 7.43E-08 | 4.95E-07 |  |  |
| AUG-11-82         | 9  | 12.0 | 236  | 3   | 2        | 1000                            | 600    |   | 5.13E-04 | 4.31E-05 | 9.75E-06 | 6.01E-09 | 4.81E-08 |  |  |
| AUG-11-82         | 9  | 12.0 | 236  | 3   | 3        | 1650                            | 1100   |   | 4.35E-05 | 3.74E-06 | 9.89E-07 | 6.33E-10 | 4.18E-09 |  |  |
| AUG-11-82         | 9  | 12.0 | 236  | 3   | 4        | 550                             | 610    |   | 3.36E-04 | 3.20E-05 | 1.40E-05 | 9.76E-09 | 6.30E-08 |  |  |