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A User's Manual for ADAM
(Air Force Dispersion Assessment Model)

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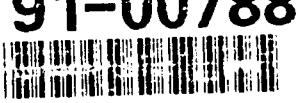
HANSCOM AIR FORCE BASE, MASSACHUSETTS 01731-5000



"This technical report has been reviewed and is approved for publication"

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Contract Manager

DONALD D. GRANTHAM, Chief
Atmospheric Structure Branch
Atmospheric Sciences Division

FOR THE COMMANDER

ROBERT A. McCLATCHEY, Director
Atmospheric Sciences Division

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13. ABSTRACT (Maximum 200 words)

The Air Force Dispersion Assessment Model (ADAM) program simulates the atmospheric dispersion of a several chemicals of interest to the U.S. Air Force. This manual provides detailed instructions for the installation, data input and execution of the ADAM program. The manual also provides information on the various features such as the graphical user interface, input/output file descriptions and reference to other readings on specific aspects of model calculations.

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TABLE OF CONTENTS

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1.0 INTRODUCTION TO ADAM

1.1 INTRODUCTION

The source and vapor dispersion models described in detail in Volumes I of this and the previous reports (Raj and Morris, 1987, 1990) have been incorporated into one easy to use computer program called ADAM (Air Force Dispersion Assessment Model). These models are coded in the computer program in FORTRAN, the graphics output is coded in FORTRAN graphics macros for screen graphics. The screen data input and retrieval panels are coded using the HIGHSCREENXL *Professional Series*™* package. The complete program is designed to run on the Air Force's Zenith microcomputer, (IBM-AT compatible) having an EGA graphics card or higher. The model run time for most chemicals is under five minutes; Hydrogen Fluoride runs may take longer. A general diagram of the ADAM program's logical flow is provided in Figure 1.1.

1.2 HARDWARE REQUIREMENTS

The hardware required to run this program is an IBM Compatible PC with at least 512 Kbytes of RAM (AT preferred), and a hard disk drive with at least 2.5 MB capacity. The screen graphic output can be printed with a graphics printer, such as the IBM Proprinter. The 8087 math chip is recommended to enhance the calculation speed. A mouse would add additional flexibility in the selection of options on the menus.

1.3 KEYSTROKE CONVENTIONS

In this manual, keystrokes are shown between brackets.

<ENTER> Means press the ENTER or RETURN key.

<F1> Means press the "F1" key.

<ESC> Means press the ESCAPE key.

<CTRL>-<C> Means press both the Control key and the "C" key simultaneously.

Command strings are shown surrounded by quotes as follows:

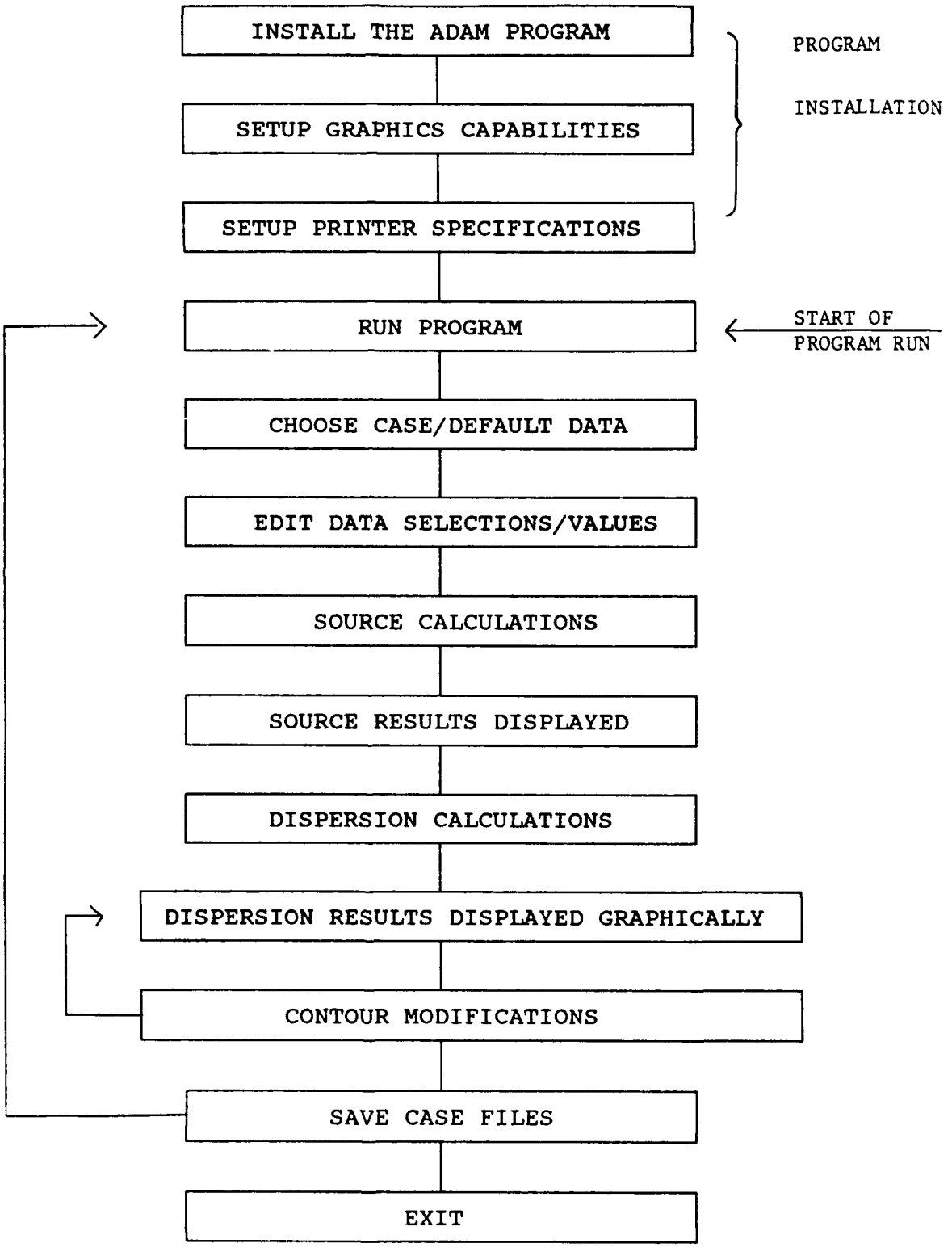
"CD ADAM" means type the line CD ADAM at the DOS prompt.

---

* HIGHSCREENXL *Professional Series* is a Trademark of Softway, Inc.

FIGURE 1-1

ADAM INSTALLATION/ARCHITECTURE



2.0 INSTALLATION OF ADAM

2.1 MAKING BACKUP DISKS

Before installing ADAM, you should make backup copies of the disks sent to you. This can be done using the "DISKCOPY" function of DOS. (The "COPY" command may also be used.) The copies should then be used to load ADAM onto your computer system. The original disks should be kept in a separate, safe location in case the copies are damaged. The disks provided are NOT copy protected.

Once the program is installed on your hard drive, the disks are not needed for running the program on a daily basis.

2.2 LOADING DISK CONTENTS ONTO HARD DRIVE

To install the ADAM program onto the Hard Drive (HD) in your computer, please perform the following steps are indicated:

1. Start your computer.

2. Place Disk 1 of the ADAM program disks into the appropriate floppy disk drive in your computer and close the drive door. The drive designator for this drive may be A: or B: (this depends on the number of floppy drives you have). For purposes of discussion, we will assume that the floppy drive you will use is A:. This drive will be designated the default floppy drive. Type A: and press <ENTER>.

3. You may now invoke the install batch file providing the disk letters for the source and destination disk drives. Type "INSTALL <source> <destination>" where <source> is the drive letter only of the source drive and <destination> is the destination drive letter only. The routine will now display Figure 2.1 with the drives indicated by you. <ENTER> to continue with the program installation.

4. The computer now creates an ADAM directory on your hard disk, makes other subdirectories (as required) and copies the program files from the floppy disks to the appropriate subdirectories.

5. When you are prompted to place other disks in the floppy drive, insert the disks in the proper sequence (disk 2, disk 3, etc.), close the drive door and press <ENTER>.

2.3 CONFIGURING THE DISPLAY MONITOR

Once the programs are copied onto your hard drive, you must inform ADAM of your monitor's dimensions and aspect ratio. This is accomplished by running a program called SETASP. SETASP is run automatically by the INSTALL program as soon as the ADAM files are copied (go to step 3 below).

```
Routine to copy all required ADAM files to the designated drive c:
from the source disk in drive a:

To abort the program installation press [CTRL]-[C]
Strike a key when ready . . .
```

Figure 2.1

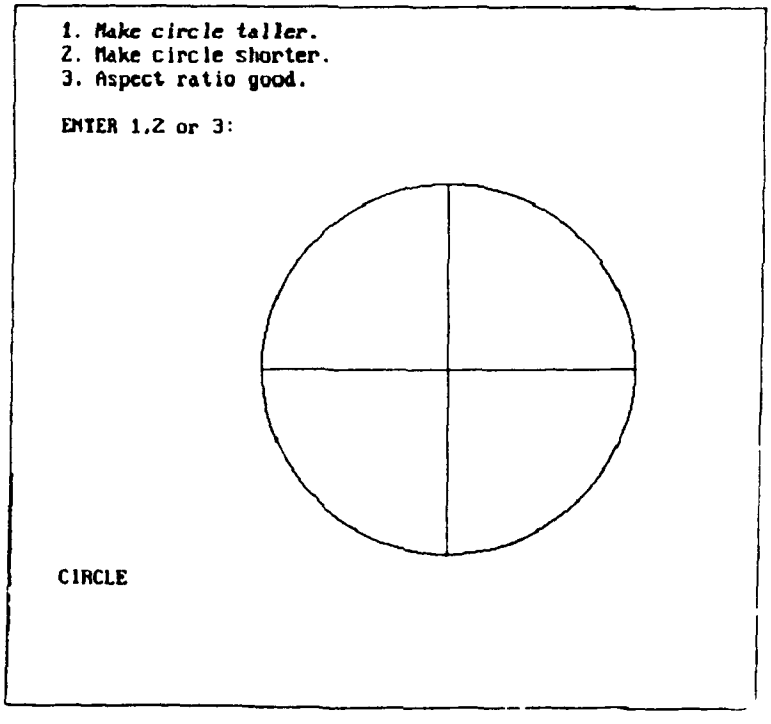


Figure 2.2

If you change your monitor, you must run the SETASP program by performing all of the steps below:

1. Type "CD ADAM" if you are in the root directory and <ENTER>. This will put you in the proper directory containing the ADAM program.

2. Type SETASP and <ENTER>.

3. The computer will display a screen with several options and an oval as indicated in Figure 2.2.

   You must modify the oval on the screen to resemble a circle by selecting one of the option numbers. Continue to make the oval taller or shorter by keying the appropriate number and <ENTER> until the oval best resembles a circle. Key "3" and press <ENTER> when you have achieved the best "circle".

4. A second screen with several option, and a line labeled 0 through 5 will be displayed as in Figure 2.3.

   You must modify the line on the screen to make a five-inch ruler by selecting one of the option numbers. Continue to make the line longer or shorter by keying the appropriate number and <ENTER> until the line best fits a five-inch ruler. At this point, key "3" and <ENTER>.

2.4 CONFIGURING THE PRINTER

Once the monitor configuration data has been determined, you must inform ADAM of the type of printer you have. This is accomplished by running a program called SETUP. SETUP is run automatically by the INSTALL program as soon as the SETASP routine has been run (go to step 3 below).

If you change your printer, you must run the SETUP program by performing the steps below.

1. Type "cd ADAM" if you are in the root directory and <ENTER>. This will put you in the proper directory containing the ADAM program.

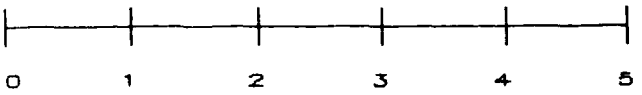
2. Type SETUP and press <ENTER>.

3. You will be asked if you have a Black & White or a Color printer, as shown in Figure 2.4. Press <B> for Black & White and <C> for Color. (Pressing <B> if you have a Color printer will cause the output to be only Black & White.)

4. You will be asked whether you have an impact or jet type printer, as shown in Figure 2.5. Press <I> or <J> to select the correct type. You will see a list of printers supported by ADAM.

1. Make 5" line longer.
2. Make 5" line shorter.
3. Line length good.

ENTER 1,2 or 3:



5 INCH LINE

Figure 2.3

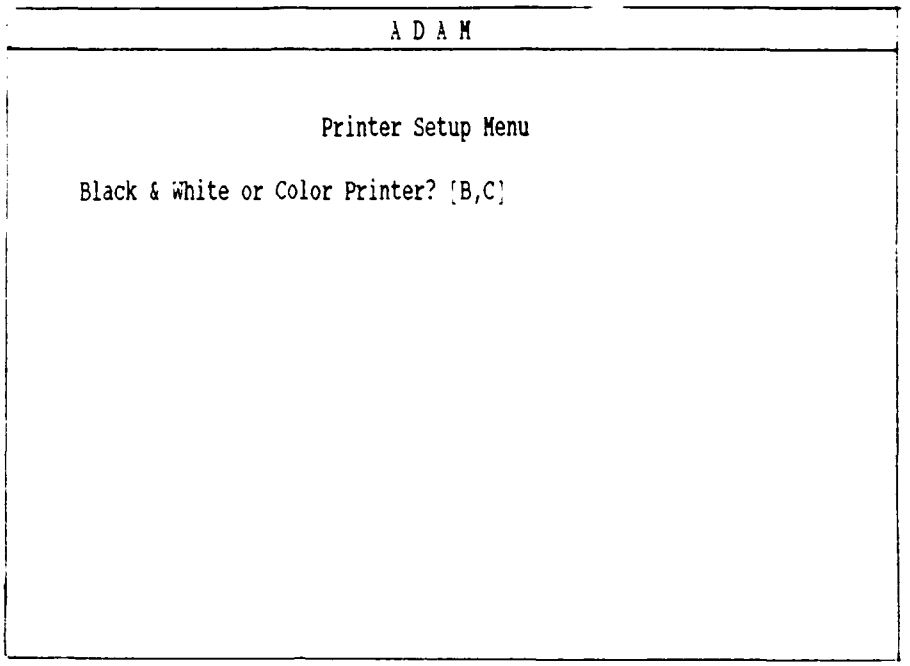


Figure 2.4

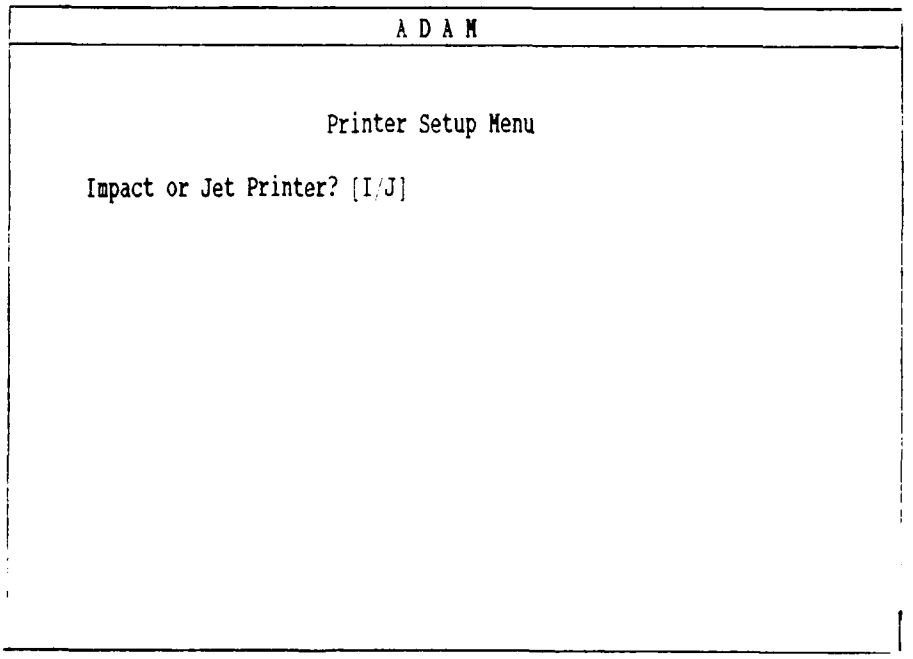


Figure 2.5

5. You must now select the manufacturer's name from the list provided. Figure 2.6 shows the laser printer list screen. (Appendix A has a complete list of supported printers.) Type the number corresponding to the correct name. To see additional pages of names (if any), press <ENTER>.

6. If multiple printer models are available from the manufacturer, you will be asked to type the number corresponding to the one you have (as shown in Figure 2.7).

7. ADAM assumes that the printer you will be using to print graphics images (contours, maps, plumes, etc.) is attached to port LPT1. If this is not true, please call TMS for instructions on setting up the printer program.

Once ADAM is installed, you may run it by going to the ADAM directory (enter the command "cd\" if you are in the root directory) and type "ADAM". All features of ADAM will function at this time.

2.5 ABOUT PANELS AND DATA INPUT

Data is input to the model through the use of a number of data input panels.

Figure 2.8 shows a typical ADAM panel. Panels consist of parameter descriptions on an associated field (shown by xxx) and a unit identifier associated with each of the descriptions. The values input into the fields for the parameters must be in the units specified next to each of the fields. Each panel allows the user to view and modify data for one category of information.

Notice that a prompt at the bottom right corner of the panel ("ESC TO CONTINUE") will occur in most panels, the use of this prompt is described in Section 2.6 below.

2.6 PANEL AND FIELD EDITING

The program uses both a combination of <ENTER> and <ESC> key press sequences to validate the data as well as ARROW (↑ ↓) keys to validate the data and to move through menus and data fields. Some general rules for using ADAM's parameter editing panels follow:

1. Two distinct forms of **VALIDATION** exist in the parameter editor. Although not every panel utilizes both types of validation, it is essential that the user be aware of both and of their usage.

    a) SCREEN VALIDATION - Typically activated by the ESCAPE key (<ESC>), screen validation recovers the parameter values in the panel and signals the program to continue on to the next screen/process (not all screens will require this step).

```
                                A D A M

                          Printer Setup Menu

      Impact or Jet Printer? [I/J]

      Ink/Laser Jet Makes Supported :

         0: Apple                      5: IBM
         1: CIE                        6: Okidata
         2: Canon                      7: Olivetti
         3: Epson                      8: Postscript
         4: Hewlett-Packard            9: Printek

Select : 0 -  9, or [Return] for more choices:
```

Figure 2.6

```
                                A D A M

                          Printer Setup Menu

      Impact or Jet Printer? [I/J]

      Ink/Laser Jet Makes Supported :

         0: Apple                      5: IBM
         1: CIE                        6: Okidata
         2: Canon                      7: Olivetti
         3: Epson                      8: Postscript
         4: Hewlett-Packard            9: Printek

  Select : 0 -  9, or [Return] for more choices: 4

  Model(s) Supported :
1 :LaserJet                            5 :QuietJet
2 :LaserJet+                           6 :PaintJet
3 :Series II                           7 :DeskJet
4 :ThinkJet
           Select Model 1-7 :
```

Figure 2.7

b) FIELD VALIDATION - All screens require the data fields which have been modified to be validated by striking <ENTER>[2]*. The program will then check and either accept or reject the input data for the field. Note that acceptable ranges of input data are displayed at the bottom of the screen during input of data into the fields.

NOTE: You must perform field validation before screen validation for the program to recognize and accept the newest data values (i.e., do not enter a new value and immediately escape the panel without first validating the field). The default (original) data for the last changed field will be used if it has not been properly field validated.

2. To select a menu item, highlight the option of interest using the ARROW keys (↑ ↓) and press <ENTER>. If a mouse is used, you may simply point to the item of interest and press the mouse button.

3. Some screens have an EDIT/CONTINUE menu displayed after screen validation is performed to allow the user to revise the data before continuing. The EDIT selection will bring the user back into the panel to change data/selections; the CONTINUE selection signals the program to continue on to the next process.

4. Movement between fields may be achieved through use of the ARROW keys (↑ ↓), or if a mouse is being used, the user may click directly on the field he/she wishes to change.

NOTE: Some panels may be opened so that they overlay previous screens leaving the previous data visible. Only the currently active data in the new window may be edited.

---

[2] Validation will occur when the editing cursor is moved off of the modified field by either pressing <ENTER> or by using the ARROW (↑ ↓) keys to move to the next/previous field, or, if a mouse is available, by clicking the mouse on another field.

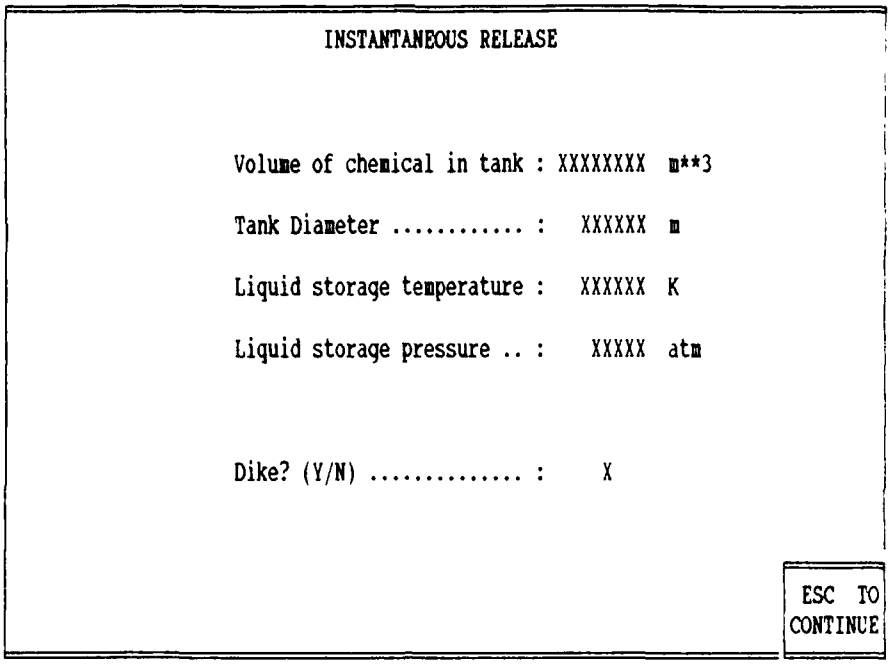

INSTANTANEOUS RELEASE
Volume of chemical in tank : XXXXXXXX m**3
Tank Diameter ..... : XXXXXX m
Liquid storage temperature : XXXXXX K
Liquid storage pressure .. : XXXXX atm
Dike? (Y/N) ..... : X
ESC TO CONTINUE

Figure 2.8

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3.0 EXECUTING ADAM

The ADAM program has been written to facilitate evaluation of a number of vapor dispersion scenarios with minimal effort. This is done through the use of data and case files and the data edit menu. Input data for test cases are stored in files. The input data are easily changed to execute different release/spill situations or chemicals through file selection and use of the ADAM parameter editing system.

3.1 PROGRAM PRELIMINARIES

After program has been installed and the SETUP and SETASP routines have been run (as described in Chapter 2), the ADAM program will be ready for execution.

1. In the directory where the ADAM program resides, type "ADAM" and press <ENTER>.

2. ADAM will initialize the program and display the title panel (Figure 3.1). Press <ENTER> to continue.

3. The Program Information panel (shown in Figure 3.2) displays summary information on the ADAM program and will be displayed next. Press <ENTER> to continue on to the database selection screen.

   NOTE: The title panel and the program information panel do not appear during the repeated runs of ADAM during the same session.

3.2 DATABASE SELECTION

The data for executing an ADAM run can be:

i) read from the default data file (DEFIN.DAT) that has been supplied with the ADAM code (see Appendix B);

ii) read from a data set stored as a CASE FILE from a previous run;

iii) modified by the user after loading the data from either of the two selections above.

After pressing <ENTER> on the Program Information panel shown, a panel similar to that in either Figure 3.3 or Figure 3.4 will be displayed. This is the Input Data Information panel.

The panel in Figure 3.3 will be displayed as the Input Data Information panel if this is the first run of ADAM after installation, or if no case files from a previous run exist.

The panel in Figure 3.4 is displayed as the Input Data Information panel if ADAM has been run previously and the input data in a run has been stored as a "CASE FILE".

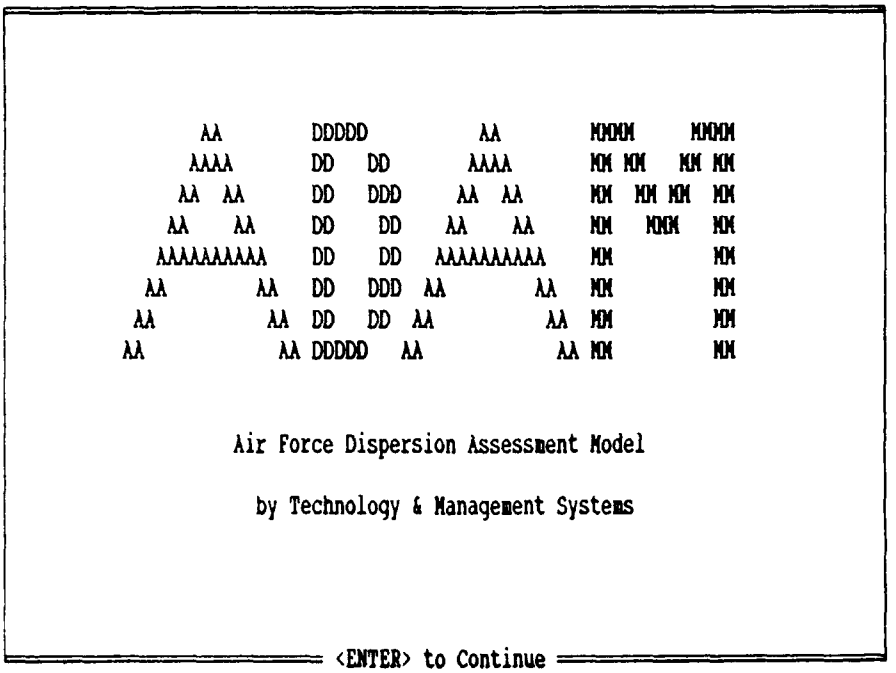


Figure 3.1

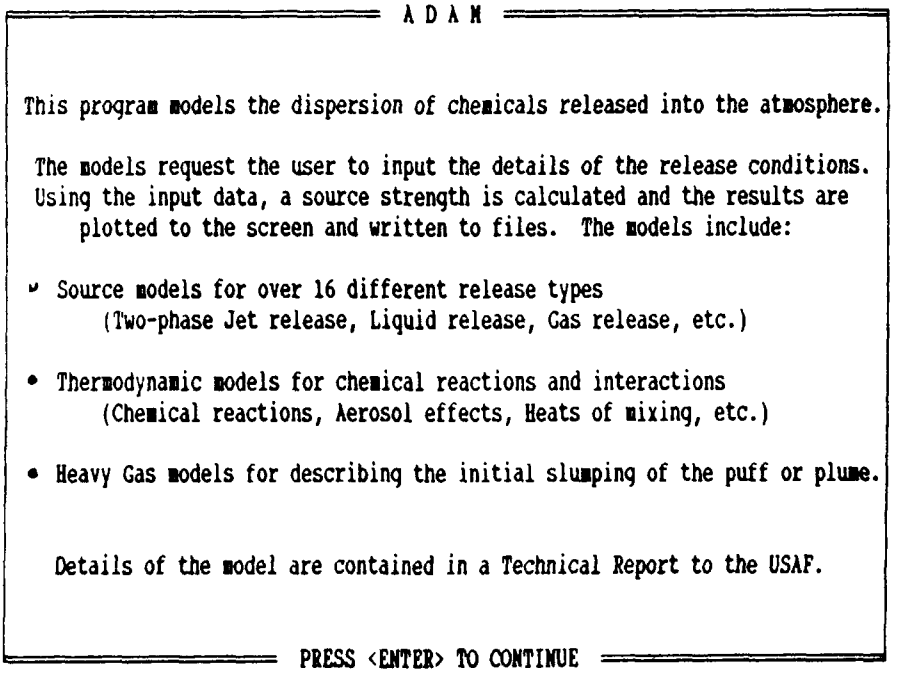


Figure 3.2

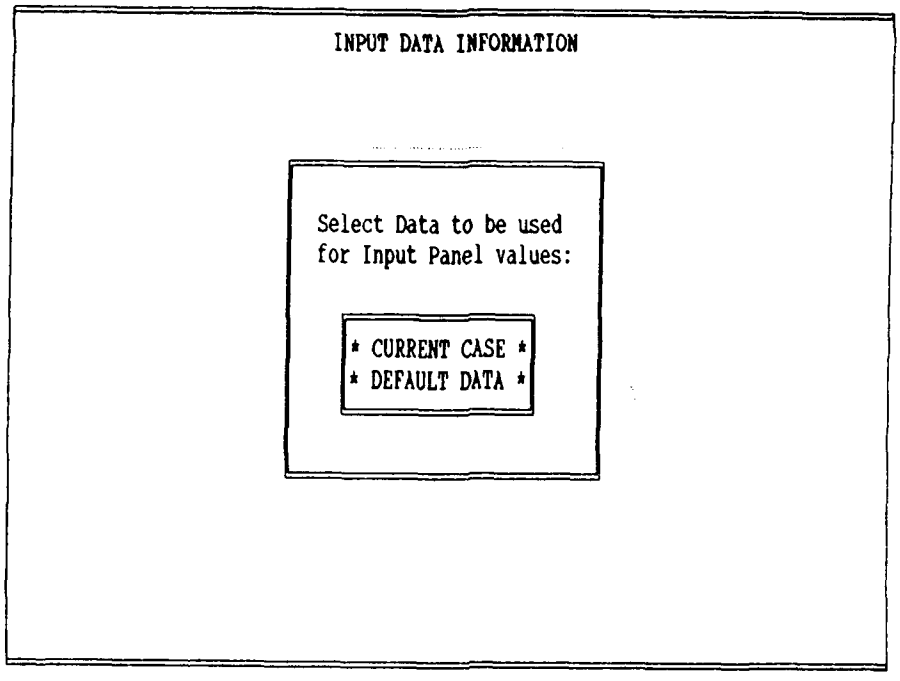


Figure 3.3

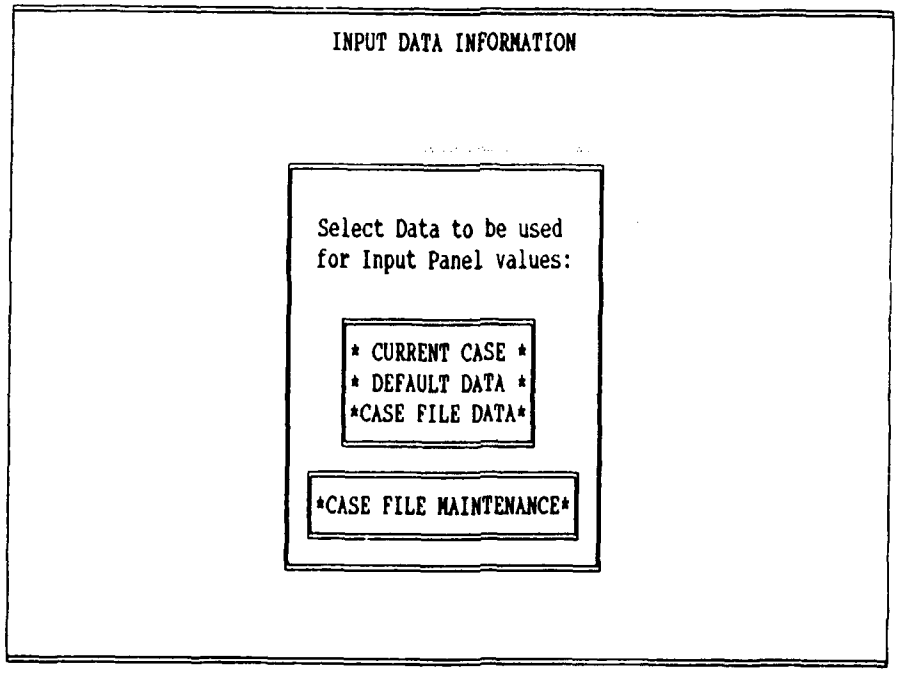


Figure 3.4

You may select the particular type of database by moving the cursor up or down in the menu through use of the arrow keys and keying <ENTER> when the desired database is highlighted. The details of each of the selections on this panel are as follows:

1) **Current Case:** This selection uses the temporary data file OUTIN.DAT which is created each time ADAM runs. Use of this data in the ADAM run, if unmodified, will result in a run duplicate to the latest ADAM run. If no previous run data exist when this selection is chosen, a message is displayed and the default data are used.

2) **Default Data:** This selection uses the default data file DEFIN.DAT (see Appendix B for a listing of the data in this file).

3) **Case File Data:** This selection allows the user to select a file created from a previous run as the input data. A Case Filenames window (Figure 3.5) is opened upon selecting this option. This window lists the names of all previously stored case files. The user now selects the case file to be used through the use of the ARROW (↑ ↓) keys. Keying <ESC> will abandon the selection window and return the processing to the Input Data Information panel. Note that the window can be scrolled up or down using the <PGUP> (Page Up) or <PGDN> (Page Down) keys.

4) **Case File Maintenance:** This selection allows the user to delete case files. A Select Case File for Deletion window (Figure 3.6) is opened which allows the user to select a case file to delete. Use the ARROW (↑ ↓) keys to highlight the case of interest and press <ENTER> to select it. Once selected, the case file names and their corresponding plot files are removed from CASE.DAT but are not actually removed from the system until the editing section is complete and the program either returns to DOS or continues onto the dispersion calculations. Note, ADAM will not recognize files other than those listed in the CASE.DAT file. Keying <ESC> will abort the deletion process and return the processing to the Input Data Information Menu. The case storage system will allow up to 40 cases.

NOTE: WHEN DELETING CASE FILES, BE SURE OF FILES YOU ARE REMOVING BEFORE STRIKING <ENTER>!

3.3 DATA MODIFICATIONS

After you have selected the data to be used, the ADAM Main Menu panel (Figure 3.7) will be displayed. The two principal options are to (i) execute a run without any further data modification or (ii) modify the data values in one or more of the different information categories before continuing on to execute a run.

The details of each of the selections on this panel are as follows:

1) **Edit All data:** All of the data editing sections discussed below (Section 2) are presented sequentially here for the user to modify and view the data. If only specific data categories are to be changed, choose the appropriate section from the listing below.

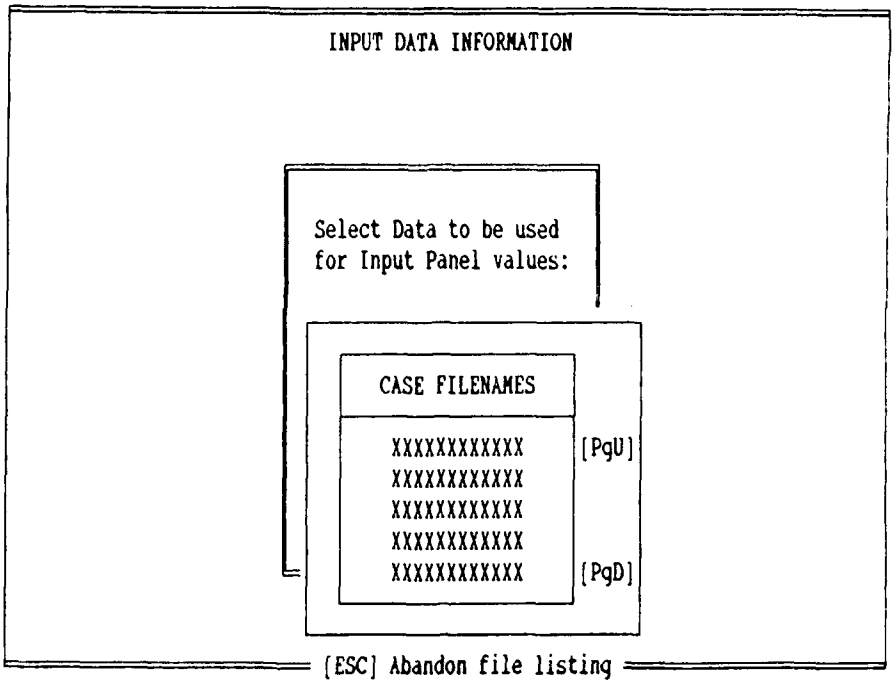


Figure 3.5

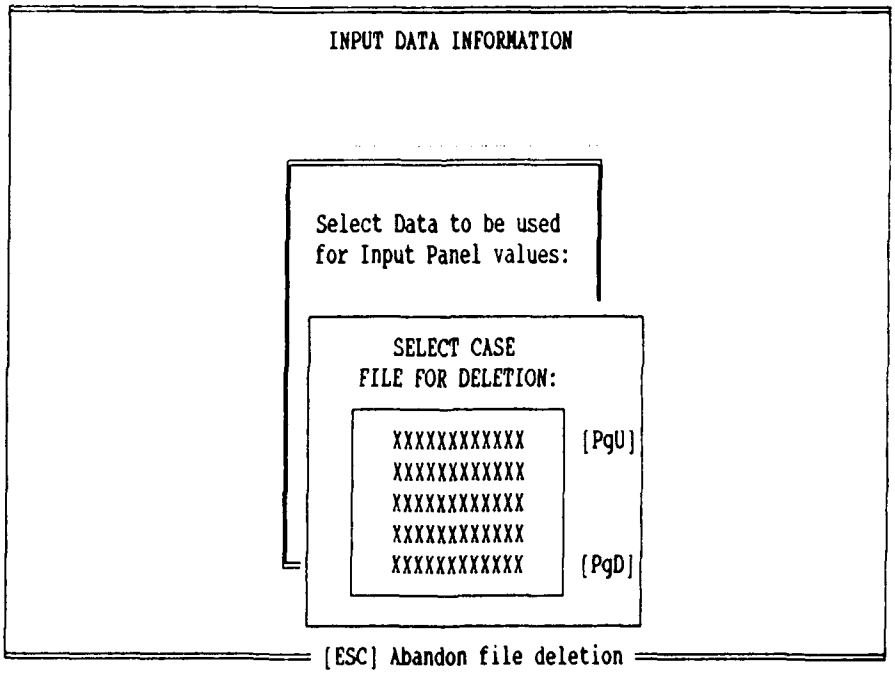


Figure 3.6

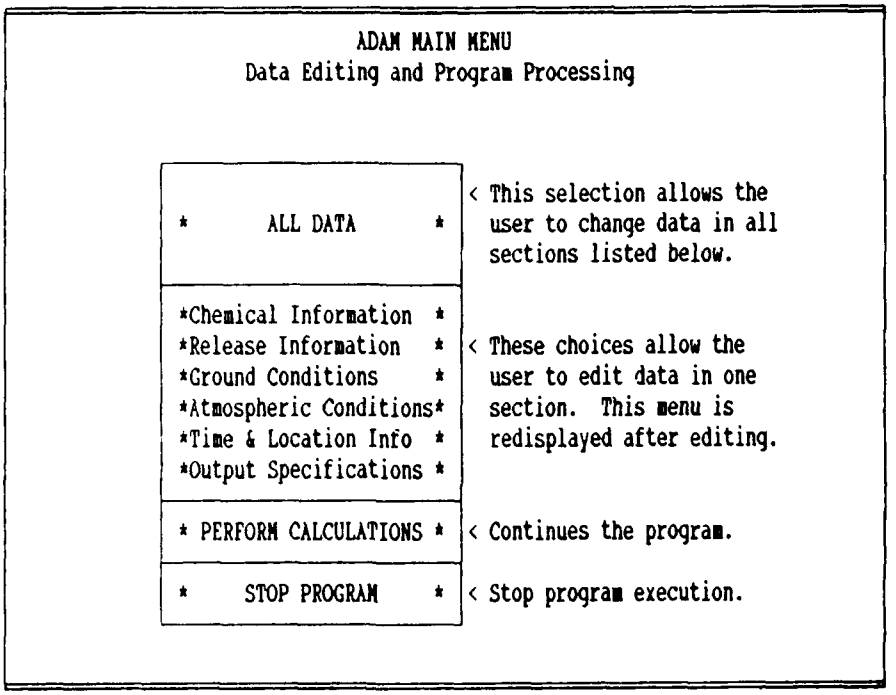

ADAM MAIN MENU
Data Editing and Program Processing
* ALL DATA *
< This selection allows the user to change data in all sections listed below.
*Chemical Information *
*Release Information *
*Ground Conditions *
Atmospheric Conditions
*Time & Location Info *
*Output Specifications *
< These choices allow the user to edit data in one section. This menu is redisplayed after editing.
* PERFORM CALCULATIONS *
< Continues the program.
* STOP PROGRAM *
< Stop program execution.

Figure 3.7

2) **Specific categories of data which may be edited:**

a) **Chemical information:** This selection allows the modification of the run title and the chemical released. After this option is selected, the Release Information screen (Figure 3.8) will be displayed. Type your run title and press <ENTER>. A chemical will be highlighted in the Chemical Release menu. Select the chemical of interest by using the ARROW (↑ ↓) keys, and press <ENTER>. The editing system will now automatically return to the ADAM Main Menu panel.

b) **Release information:** This selection allows the modification of the type of release and the source specifications. After this option has been selected, the Type of Release panel (Figure 3.9) is displayed. Highlight the appropriate release type by using the ARROW (↑ ↓) keys and press <ENTER> to select it.

If you have selected the "INSTANTANEOUS" release type, the Instantaneous Release panel will be displayed (Figure 3.10). Select the cause of the instantaneous release. **NOTE:** the instantaneous release cause selection will only affect calculations performed for Fluorine (FXX) releases.

Following your selection of the release type (and cause), the Perform Source Calculations? panel will be displayed (Figure 3.11) to allow you to override the source calculations.

Your response to the Perform Source Calculations question determines the type of information you must supply in the following panels:

i) A Y(es) response will result in the user supplying release condition information similar to that shown in Figure 3.12, under the instantaneous release case or as in Figures 3.13(a,b,c) for the continuous release case.

ii) A N(o) response will cause the program to assume that the user is to provide all of the source information required to continue on directly to the dispersion calculations, thus overriding the source calculations. The user in this case is asked to provide information such as that displayed in Figures 3.13(d,e).

c) **Ground conditions:** This selection allows the modifications of the ground temperature and surface roughness parameters as shown in Figure 3.14.

d) **Atmospheric conditions:** This selection allows the modifications of the atmospheric information. After this option is selected, the Atmospheric Conditions panel (Figure 3.15a) is displayed for user modification of values. Press <ESC> to continue after modifying parameter values.

The next panels will collect parameters needed for calculating the atmospheric

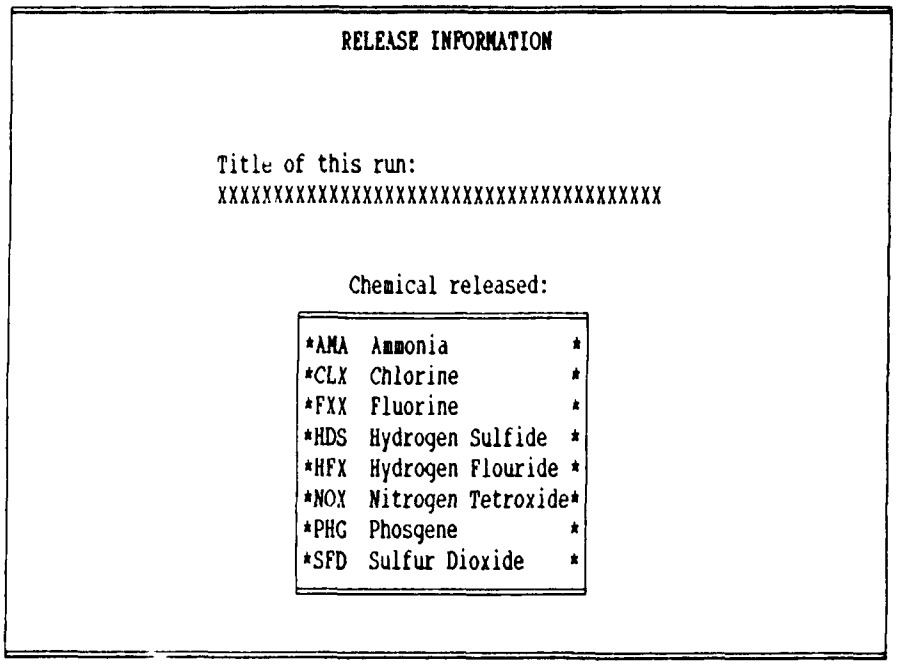


Figure 3.8

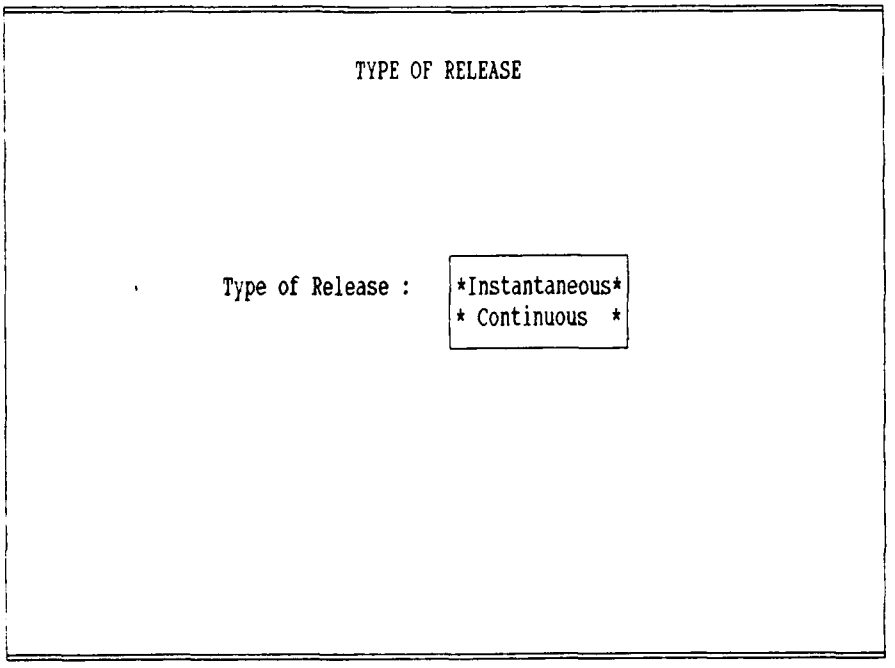


Figure 3.9

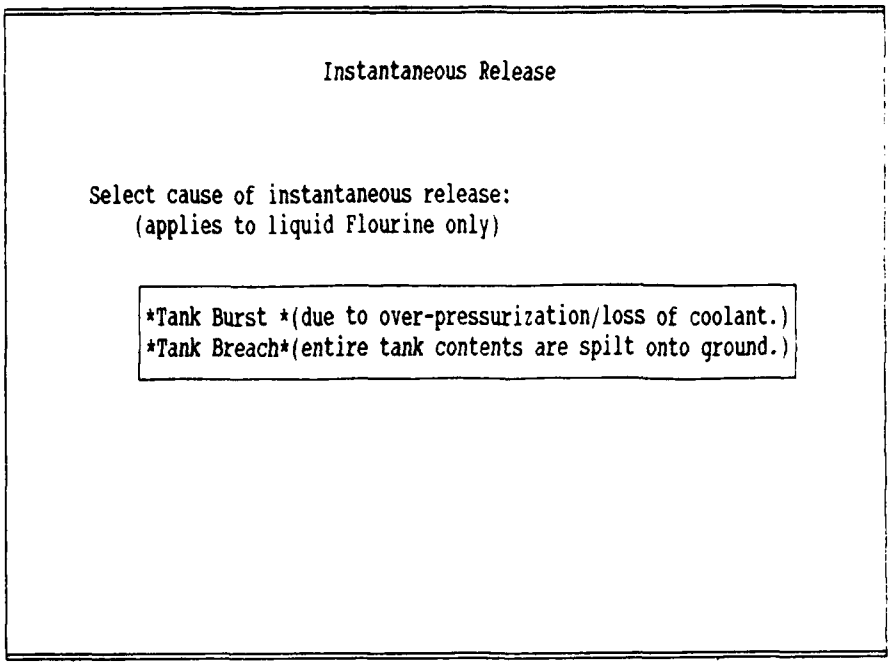


Figure 3.10

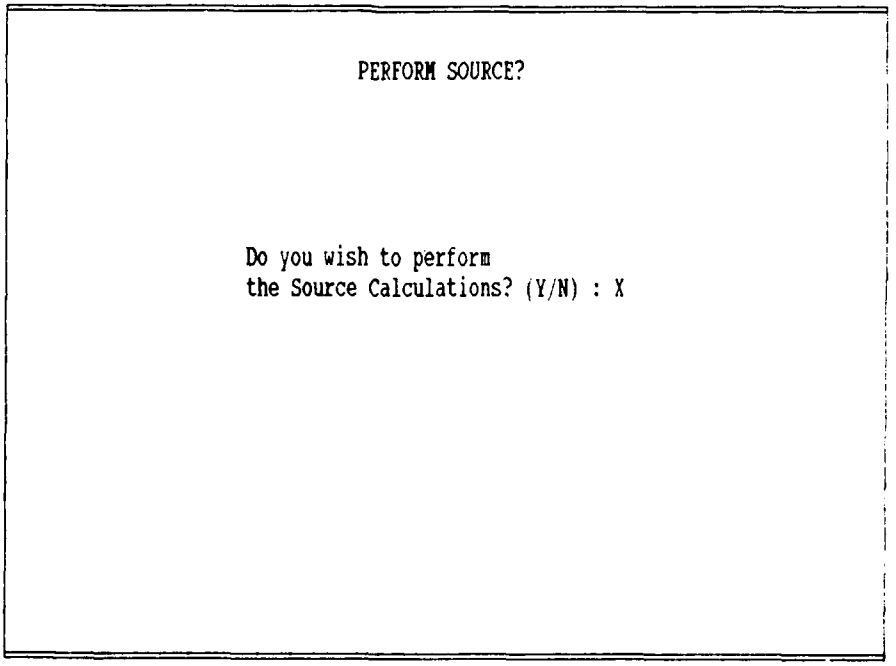


Figure 3.11

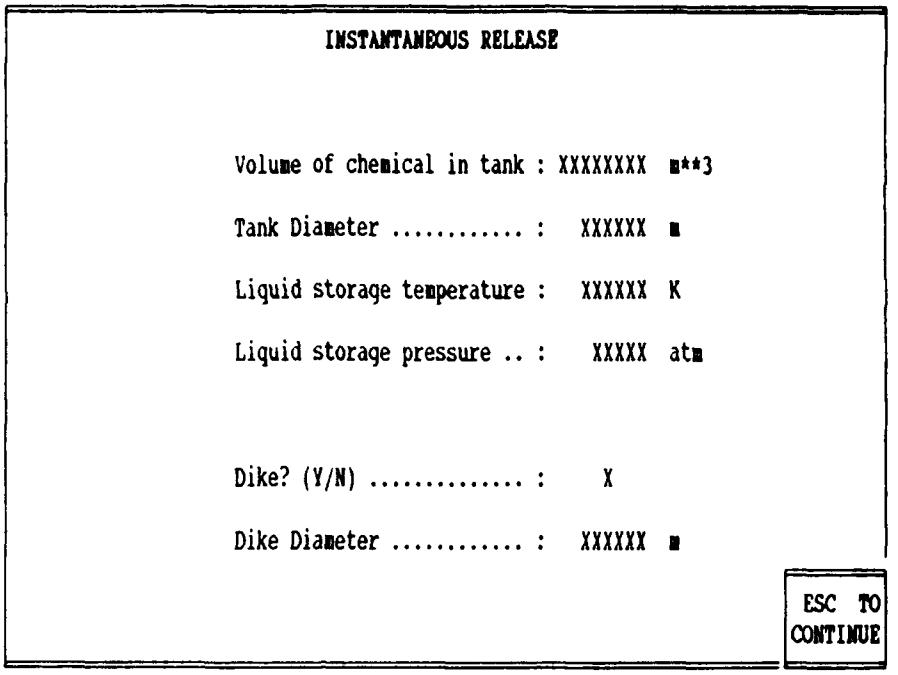


Figure 3.12

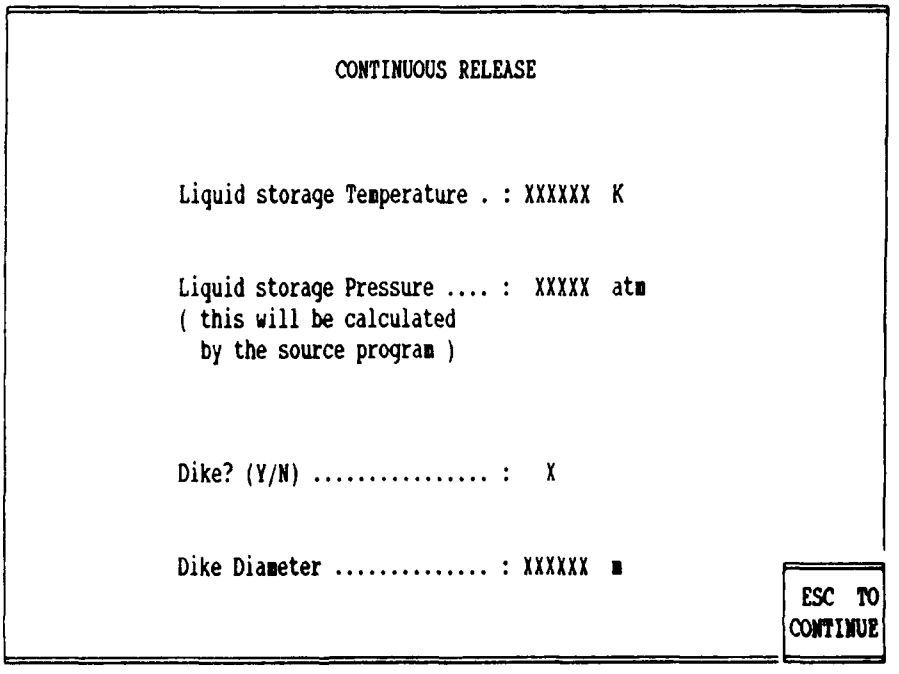


Figure 3.13a

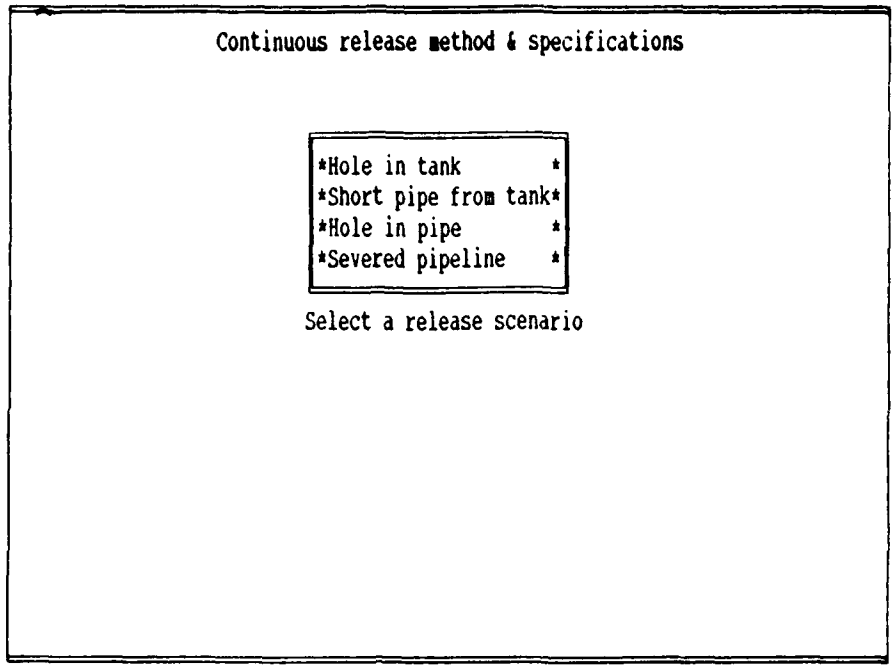


Figure 3.13b

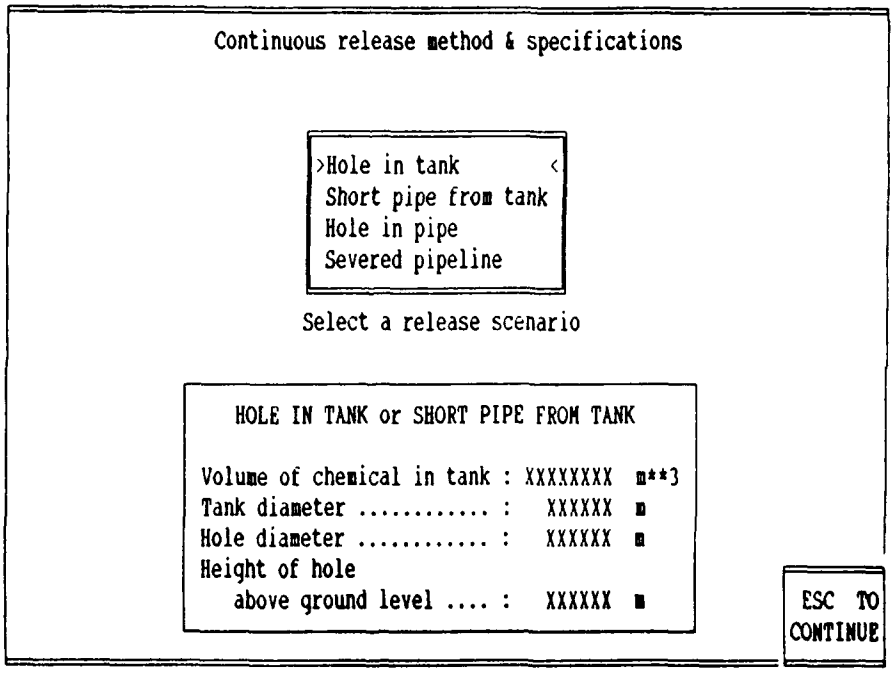


Figure 3.13c

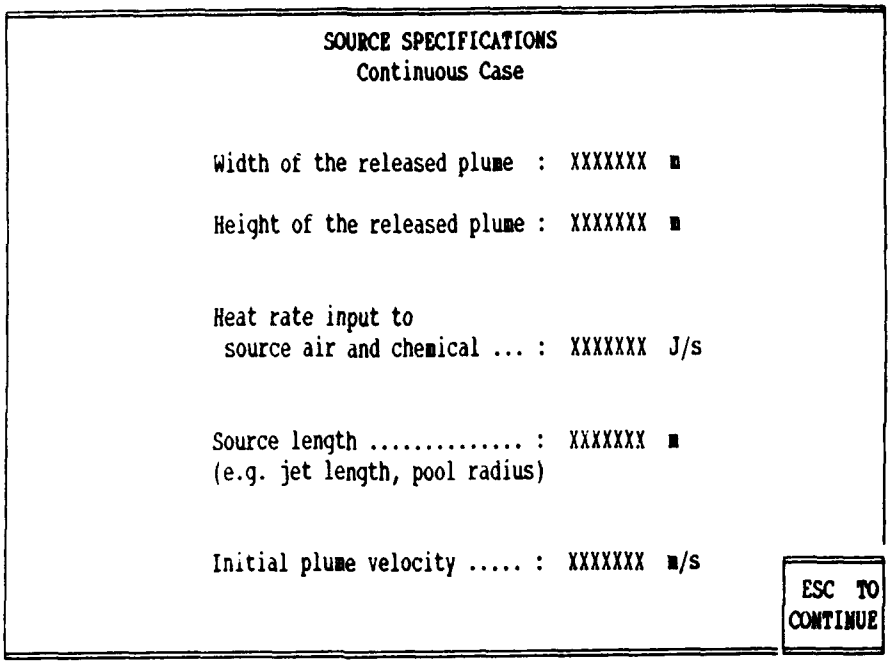


Figure 3.13d

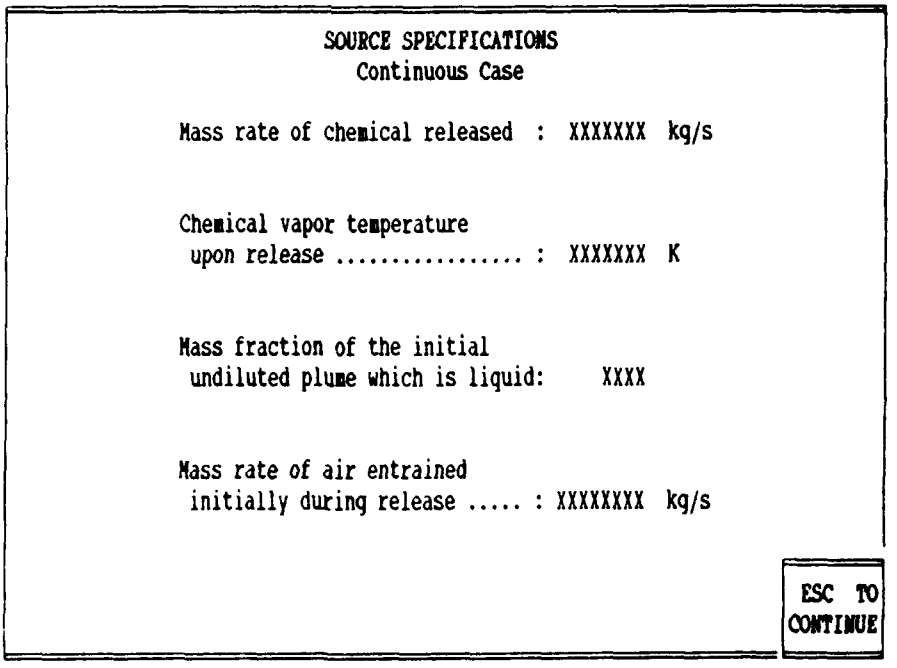


Figure 3.13e

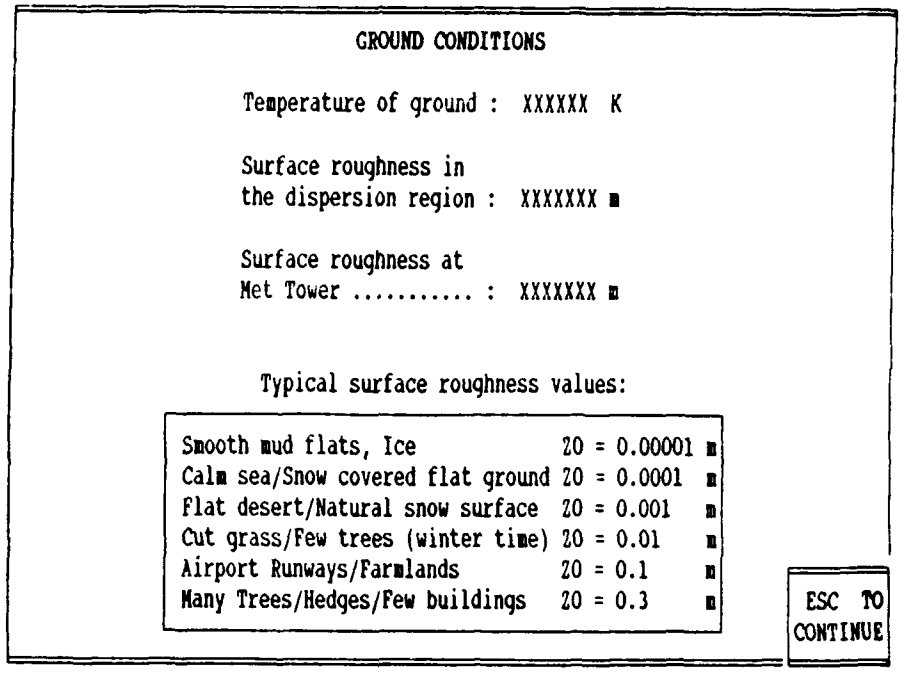


Figure 3.14

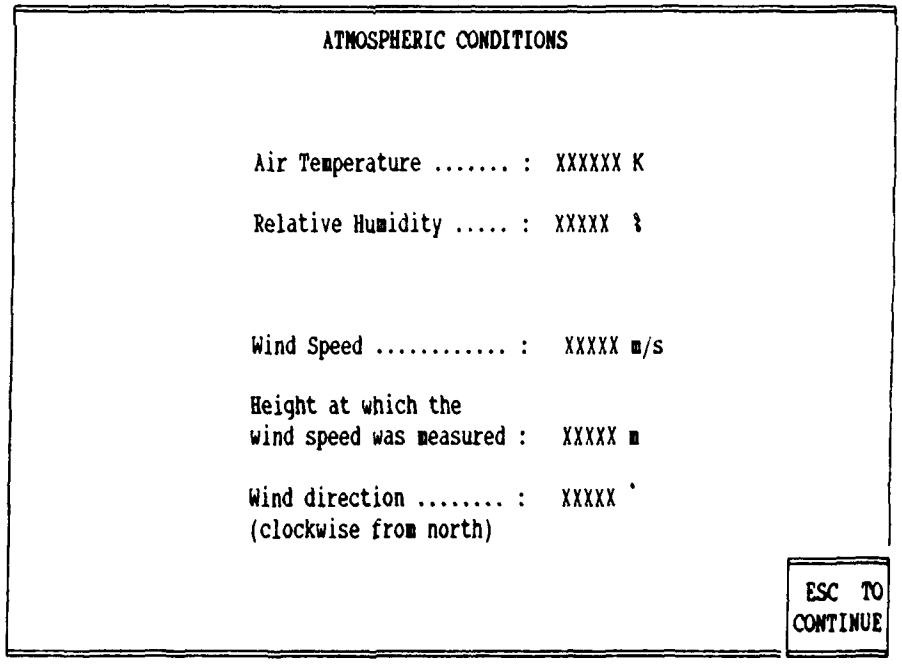


Figure 3.15a

stability. There are three ways of providing values for this calculation:

i) Enter the Atmospheric Stability directly.

ii) Enter the wind direction standard deviation ($\sigma\Theta$) and the wind direction averaging time.

iii) Provide values for parameters describing the atmosphere and have the program calculate the stability.

These options are exercised as follows:

i) a) Answer Y(es) to the Override Atmospheric calculations (Figure 3.15b) question.
   b) Enter values into the Atmospheric Conditions panel (Figure 3.15c)

ii) a) Answer N(o) to the Override Atmospheric calculations (Figure 3.15b) question.
   b) Answer Y(es) to the Provide Values question under the Atmospheric Conditions panel (Figure 3.15d).
   c) Enter values in the Atmospheric Conditions panel (Figure 3.15e).

iii) a) Answer N(o) to the Override Atmospheric calculations (Figure 3.15b) question.
   b) Answer N(o) to the Provide Values question under the Atmospheric Conditions panel question (Figure 3.15d).
   c) Enter values in the Atmospheric Conditions panel (Figure 3.15f).

e) **Time and location info:** This selection allows the modification of both the release and current time and the location of the spill. After this option is selected, the Time and Location Information panel is displayed (Figure 3.16). Once the parameter values have been modified, pressing <ESC> to return the program to the ADAM Main Menu.

NOTE: Time and date values are read from the input data file selected in Section 3.2, however, if "DEFAULT DATA" was selected as the input data, the time and date parameters displayed in this section will reflect the system time (system time - 10 minutes for release time) and system date.

f) **Output specifications:** Select this to modify the output contour parameters. Once selected, an output specifications panel similar to Figure 3.17 is displayed for you to modify values. Press <ESC> to return to the ADAM Main Menu.

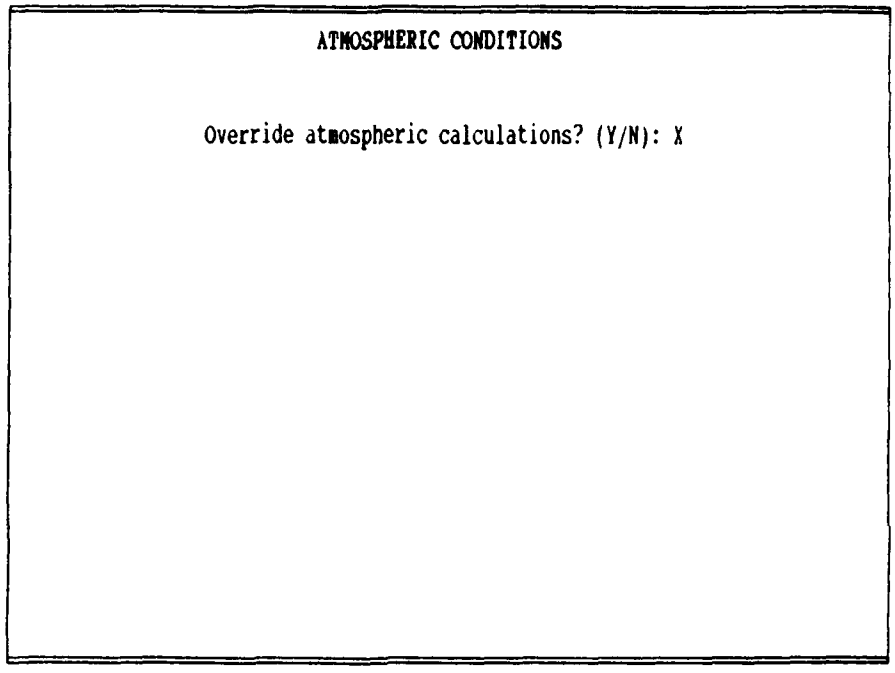


Figure 3.15b

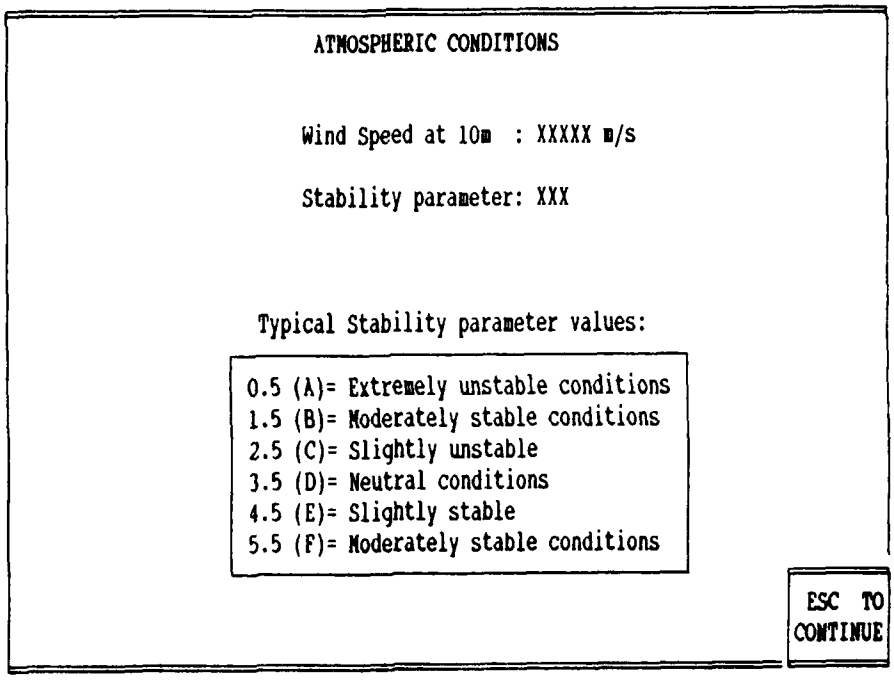


Figure 3.15c

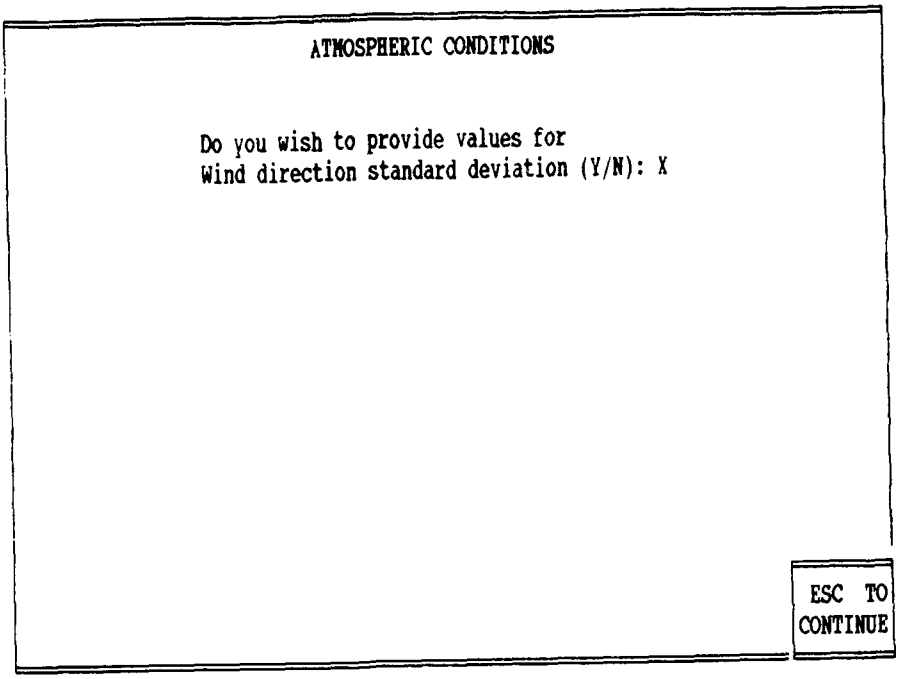


Figure 3.15d

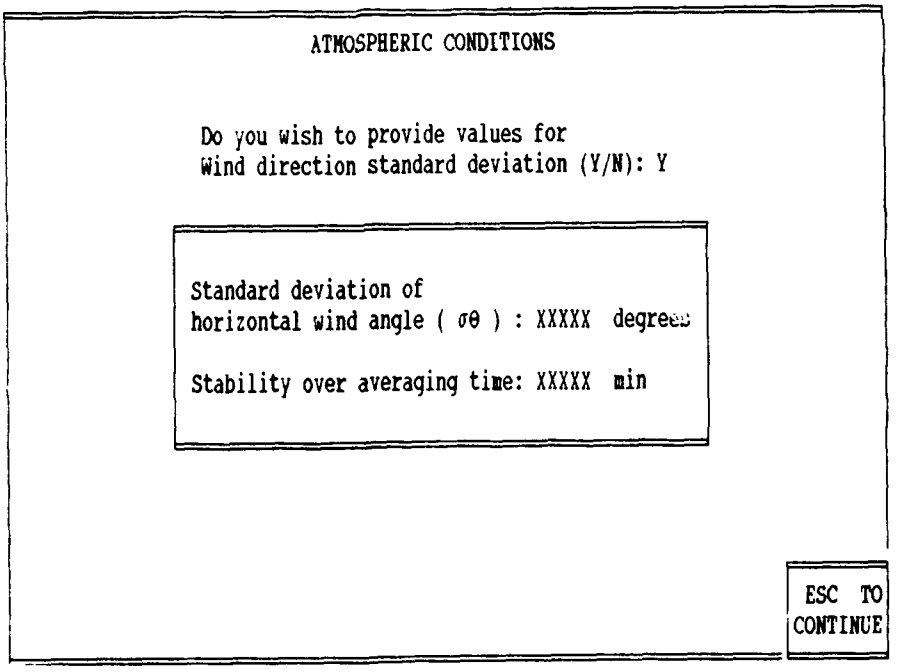


Figure 3.15e

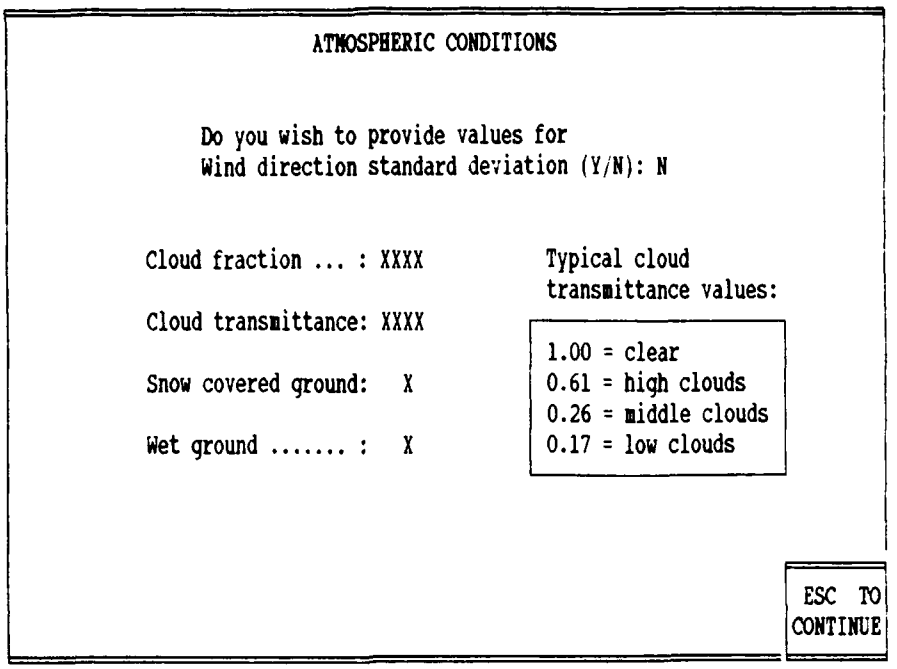


Figure 3.15f

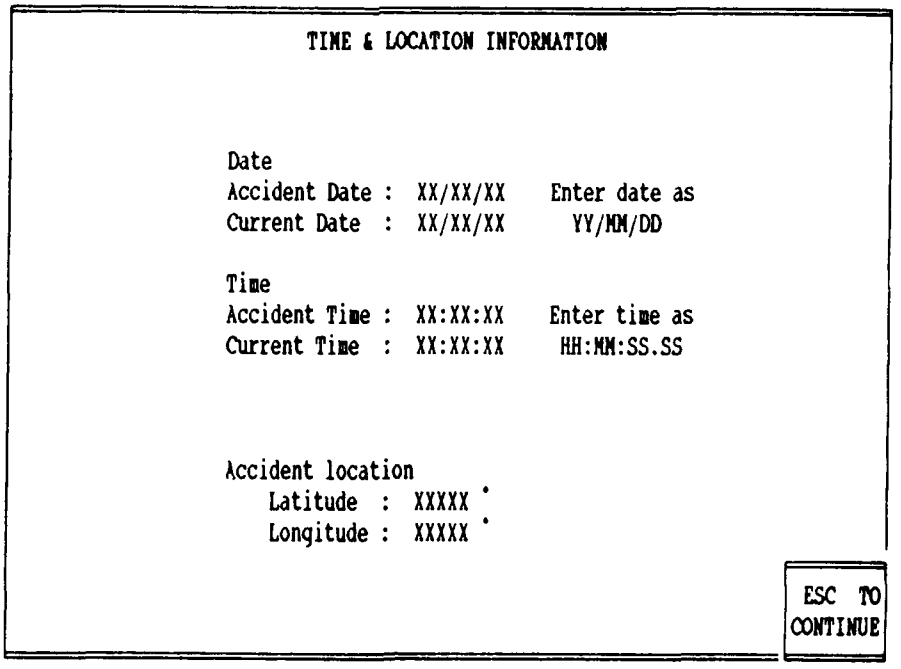


Figure 3.16

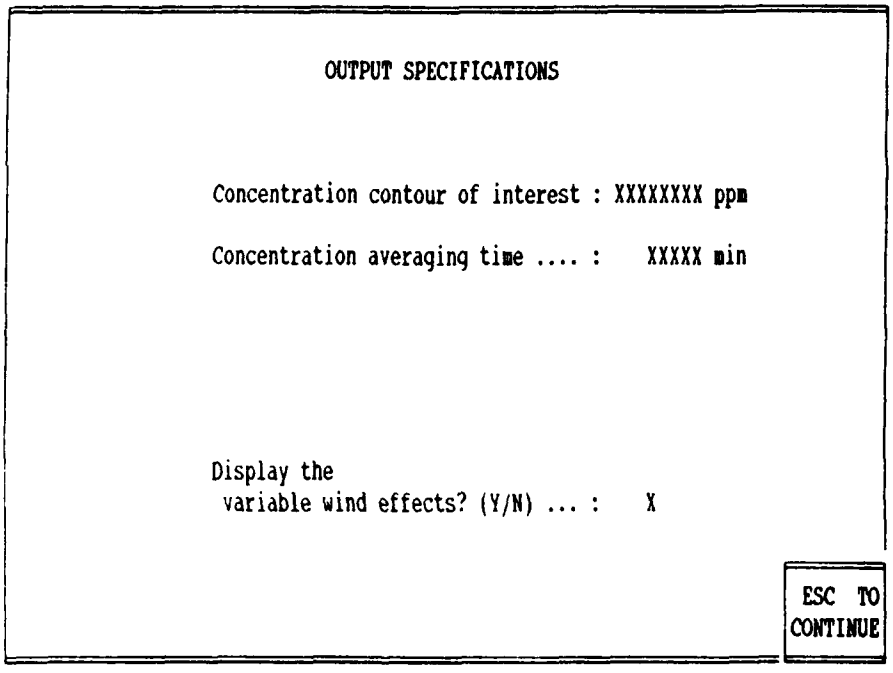

OUTPUT SPECIFICATIONS
Concentration contour of interest : XXXXXXXX ppm
Concentration averaging time .... : XXXXX min
Display the
variable wind effects? (Y/N) ... : X
ESC TO
CONTINUE

Figure 3.17

NOTE: Display the variable wind effects: Respond with Y(es) or N(o) to indicate whether the effects of a continuously changing wind direction is to be accounted for on the output contour. If the answer is Y(es) then the user has to provide the wind direction data file called WINDIR.DAT before the ADAM program is executed. For further information on the structure of WINDIR.DAT file and other details see Appendix C.

3) **Perform calculations:** This selection performs the source and dispersion calculations.

NOTE: The user may select to override the source calculations as described in Section 3.3-2b above.

4) **Stop program:** Halts program, brings user to DOS, changes are not saved.

3.4 SOURCE CALCULATIONS

After the data has been modified by the user and "PERFORM CALCULATIONS" has been selected from the ADAM Main Menu, the program will perform the Source Calculations.

A. A menu may be presented to the user containing both the saturation pressure of the chemical and the user's input pressure (Figure 3.18). A selection of one of the two values is required to continue on with the Source Calculations. The selected pressure will be used in the calculations and saved in the output file (OUTIN.DAT).

B. After various status messages are displayed at the bottom of the screen, ADAM will present the Source Calculations Results panel (Figure 3.19). The user may select to continue on with the Dispersion Calculations or he/she may select EDIT from the menu and change the displayed values before continuing on with the Dispersion Calculations.

3.5 DISPERSION CALCULATIONS

The program will automatically begin the Dispersion Calculations once the user has selected "CONTINUE" for Step 3.4B above. The status of the calculations is shown in the lower left corner of the screen, similar to that shown in Figure 3.20.

Once the calculations are complete, the results are written to files and displayed both graphically and in text on the screen (Figure 3.21). The user may print this screen on a graphics printer by pressing <SHIFT>-<PrtScn>, or continue by pressing <ENTER>. The user is then presented with the PROCESSING CHOICE menu (Figure 3.22).

Selections on this menu are:

A. **REPLOT RESULTS:** This selection allows the user to make changes to the dispersion time, dose and concentration limits and wind meander effects before replotting the data. A second menu is presented to the user for this purpose (Figure 3.23).

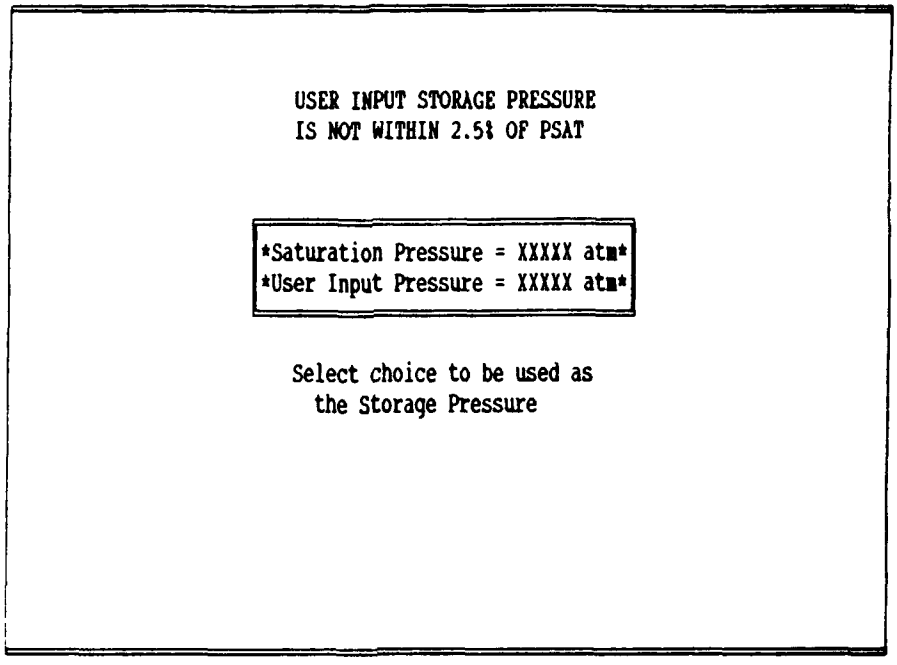


Figure 3.18

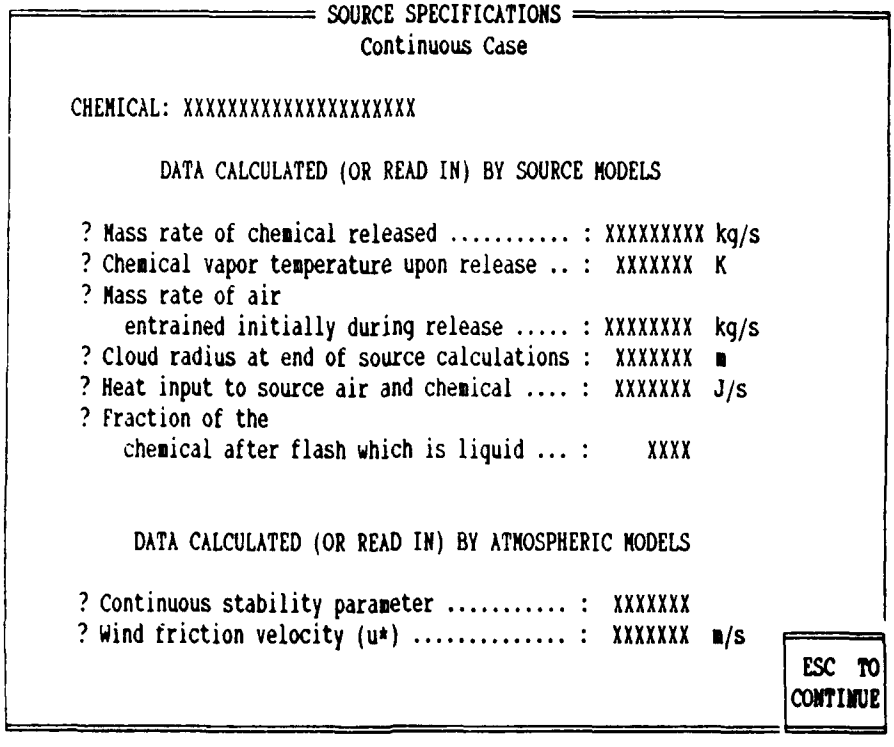
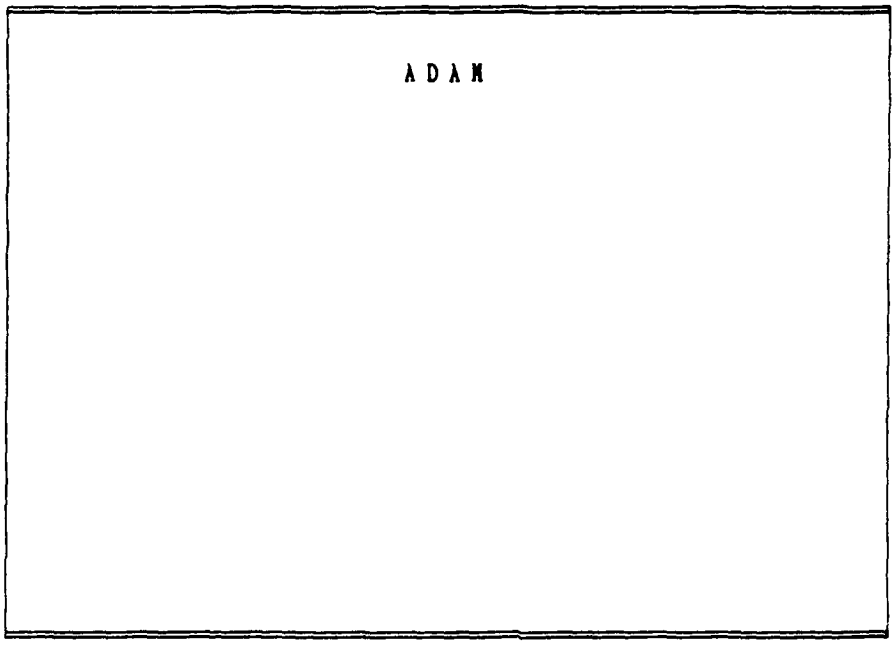


Figure 3.19



PERFORMING DISPERSION CALCULATIONS

Figure: 3.20

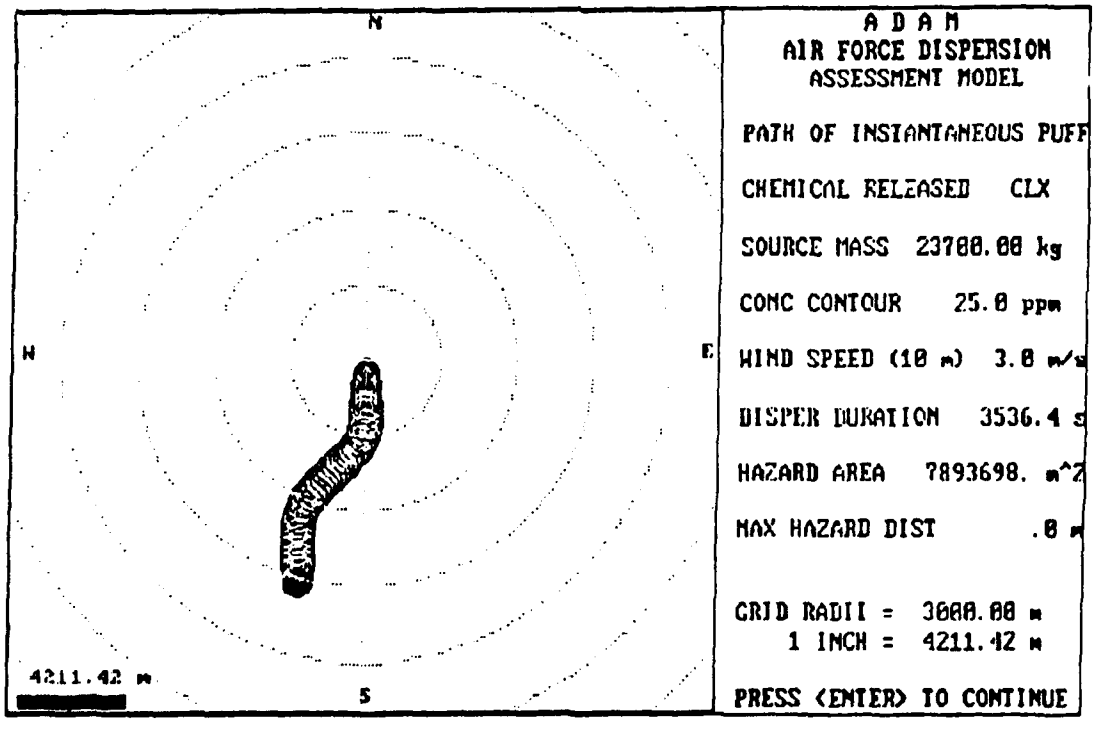


Figure: 3.21

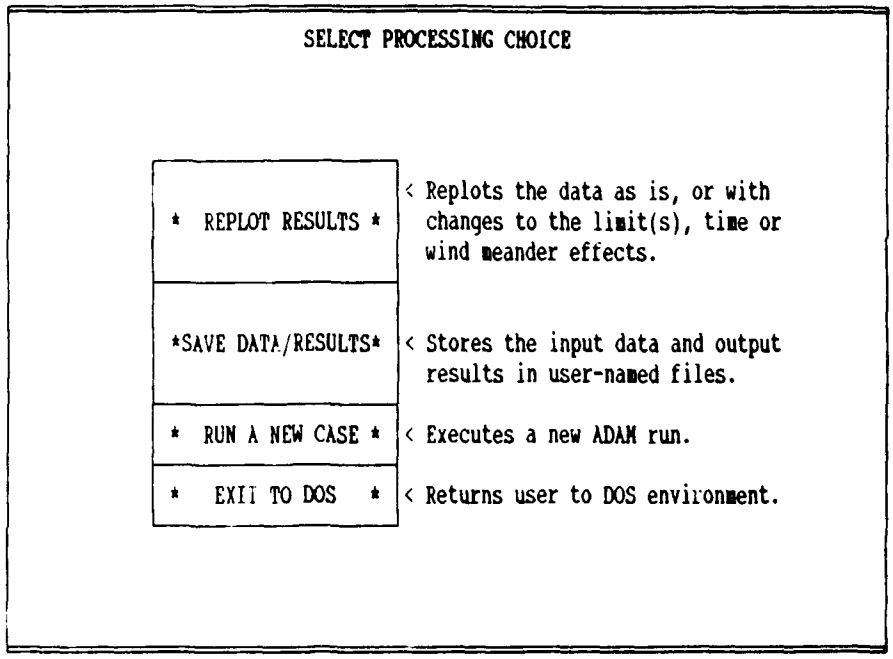


Figure 3.22

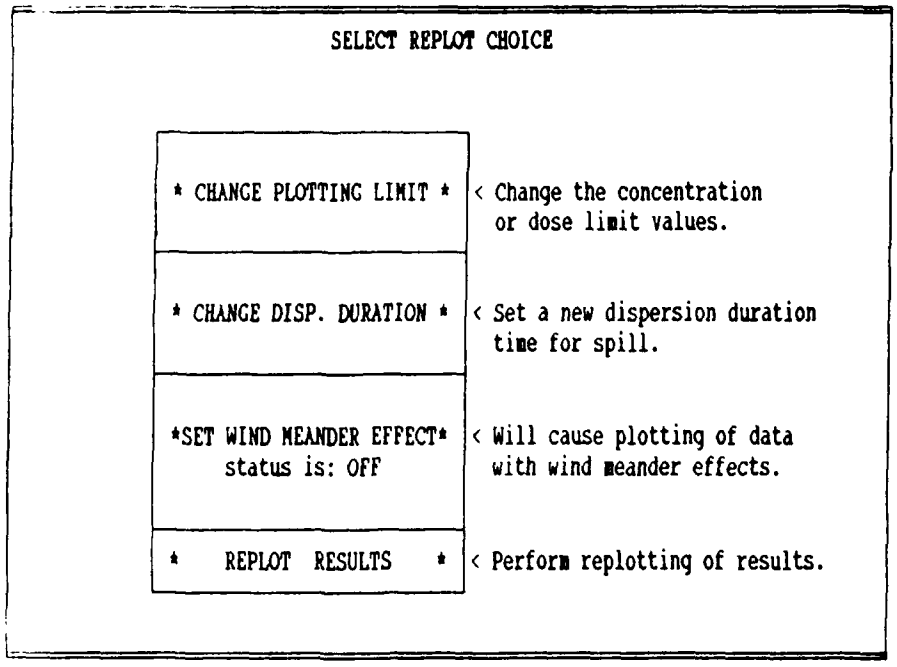


Figure 3.23

1) **Change Plotting Limit:** This selection allows the user to set new concentration/dose limits. The user may be presented with a small menu as in Figure 3.24a to select which limit he/she wishes to modify. After selection of the limit to be set, a window such as that in Figure 3.24b or 3.24c will be displayed for user modification of the limit. [Note: For concentration/dose values below the previously input minimum value a "new" case has to be run with a revised minmum concentration/dose. Only those contours with concentration/dose values above the minimum can be displayed in the replot].

2) **Change Dispersion Duration:** This selection will present the user with the Change Time Since Spill screen (Figure 3.25). The preset values are for reference purposes only.

3) **Set Wind Meander Effect:** This selection toggles the wind meander effects on and off. The file WINDIR.DAT must be modified prior to a run using a text editor, as discussed below.

Wind Direction Data File: The program can simulate the effects of variable wind direction occurring during a spill if the wind direction data are available. A data file is included on the diskette (WINDIR.DAT) which is a sample wind direction data file (see Appendix C). The user can modify this file (using a text editor) to enter wind direction variation data of interest. The necessary data are: a) the clock time at which the wind direction data starts (Decimal 24 hour clock, 6:30 pm = 18.5), b) the constant time interval between wind direction data information, and c) the wind direction (in degrees, clockwise from North) at the next time interval. The clock time and time interval are on line 7 of the file and the wind direction data are on the remaining lines.

4) **Replot Results:** This selection continues the processing on to replot the data with the changes made by the user.

B. SAVE DATA/RESULTS: This selection allows the storage of the data in a case file using user supplied filenames. After this option has been selected, the Data Storage Information panel (Figure 3.26a) is displayed for retrieving the filenames to be used.

The filenames may be entered by the user at this point, or if the user wishes to see the current listing of files already saved under the case storage system, pressing <F2> will display this listing on the screen for user reference (Figure 3.26b). (Note: Pressing <F9> within the Data Storage Information panel will abort the SAVE process and no files will be stored at the end of the run). Only valid DOS filenames should be used.

Pressing <ESC> will validate the panel and the program will check if the input filenames are unique entries. In the event that the user has supplied a filename for an existing case file, the program will display Figure 3.26c to ask the user if the data should overwrite the existing files. A Y(es) response will continue the program and set the

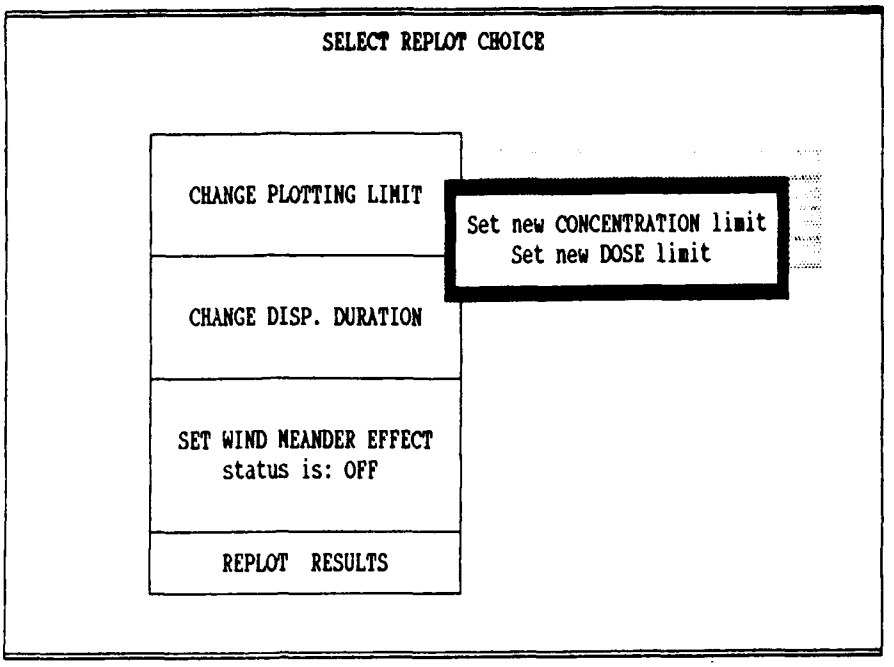


Figure 3.24a

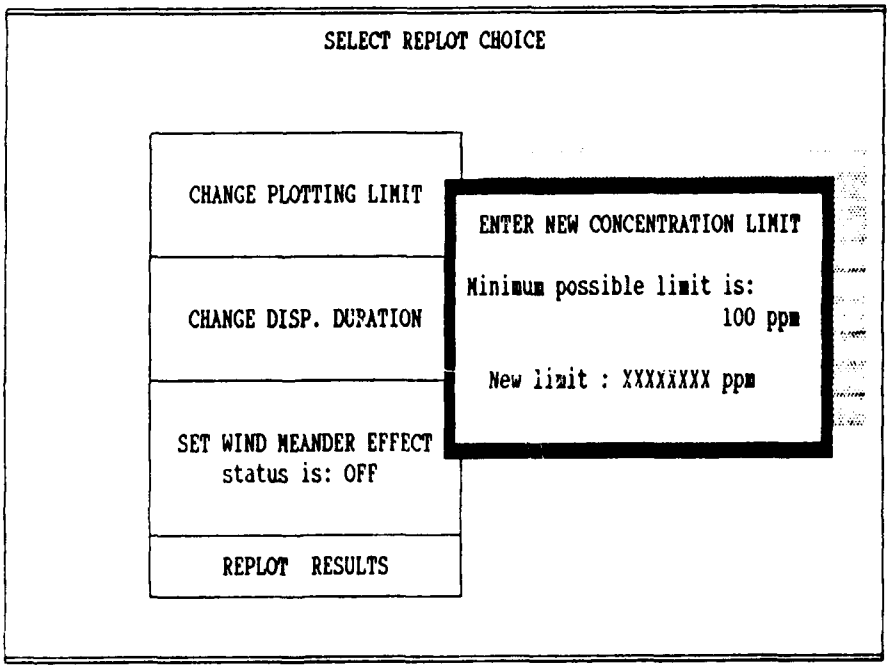


Figure 3.24b

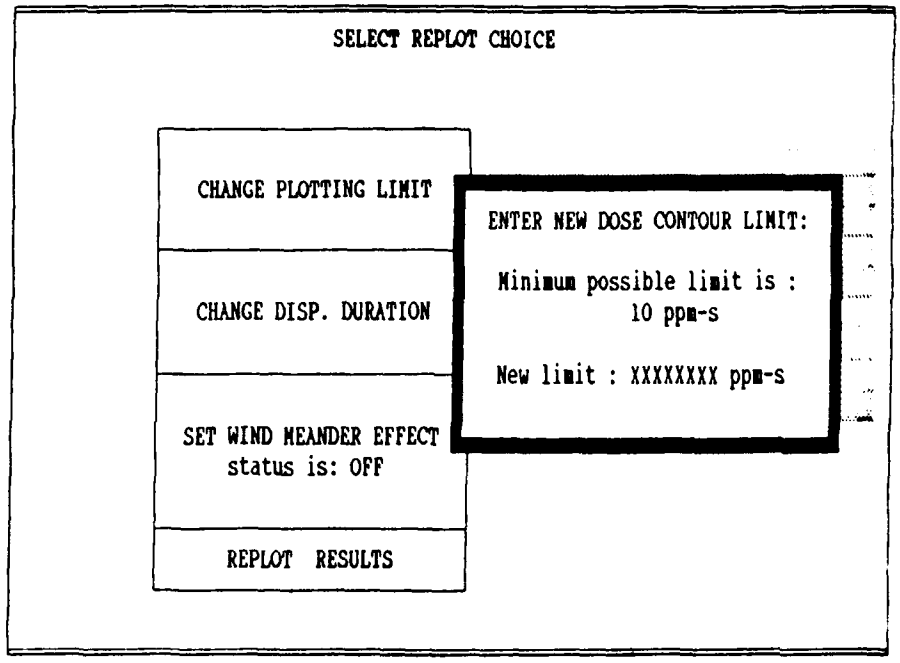


Figure 3.24c

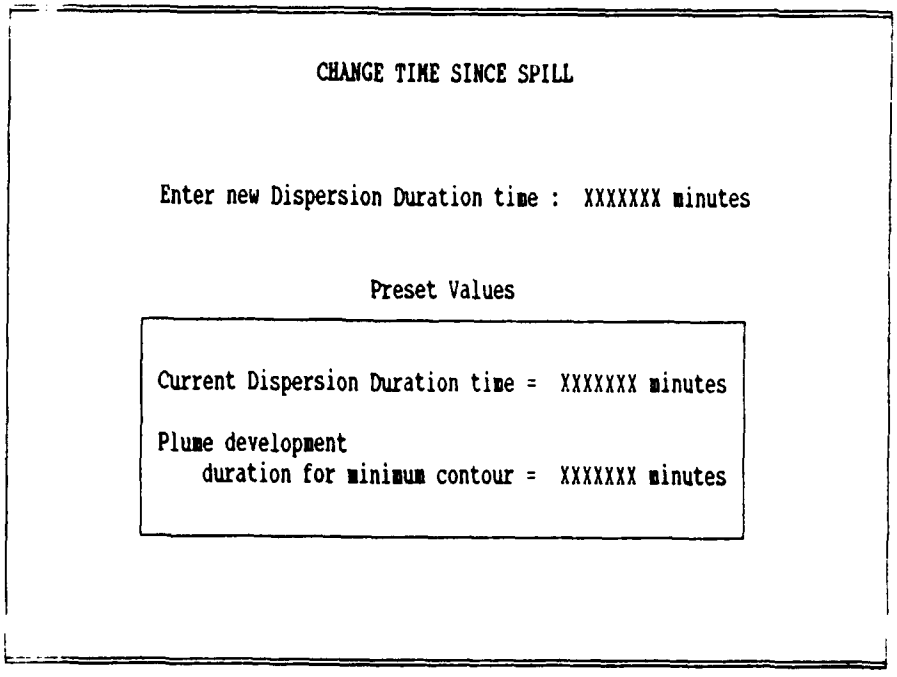


Figure 3.25

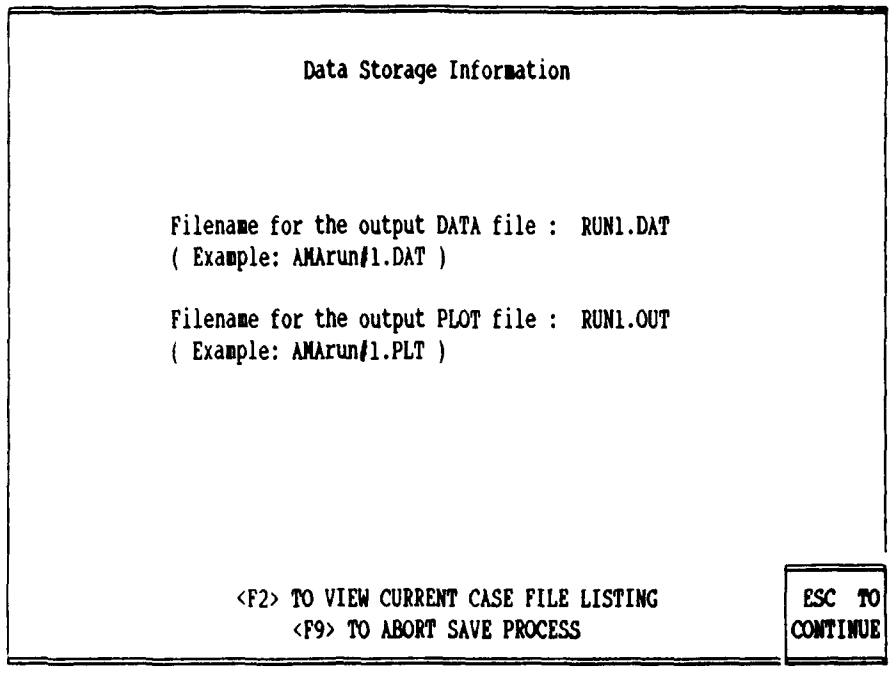


Figure 3.26a

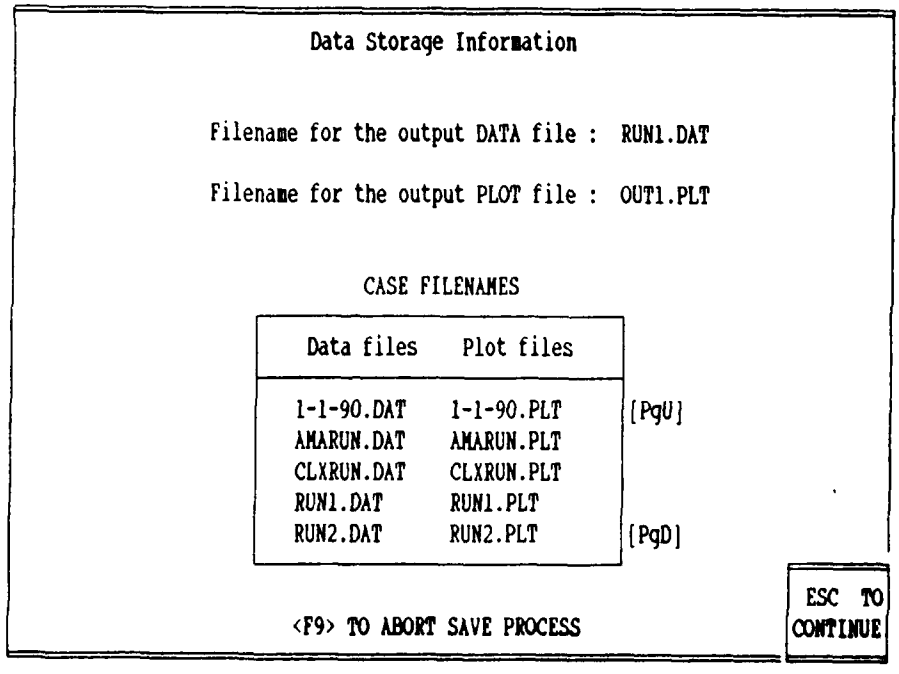


Figure 3.26b

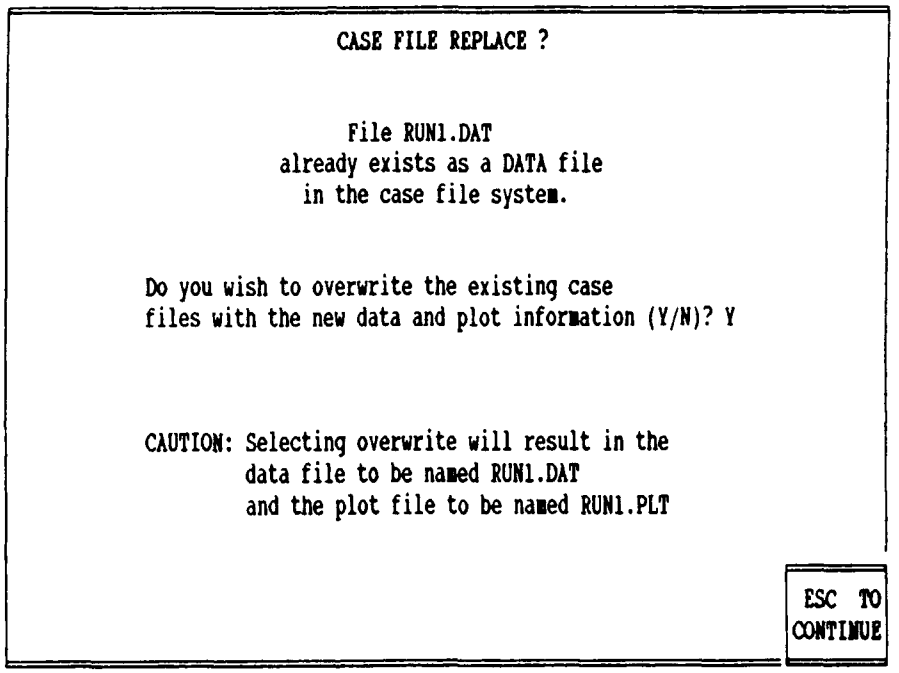

CASE FILE REPLACE ?
File RUN1.DAT
already exists as a DATA file
in the case file system.
Do you wish to overwrite the existing case
files with the new data and plot information (Y/N)? Y
CAUTION: Selecting overwrite will result in the
data file to be named RUN1.DAT
and the plot file to be named RUN1.PLT
ESC TO
CONTINUE

Figure 3.26c

filenames for storage as indicated at the base of this panel. Due to the method by which the program saves the data and plots filenames in CASE.DAT, if one file is selected to be overwritten, both it and its counterpart (data or plot) file must be selected for overwrite as displayed under the caution at the base of the screen. A N(o) response will return the processing to the Data Storage Information panel as described above.

The filenames are stored for program reference in CASE.DAT after the user has selected from the ADAM Main Menu (see Section 3.3) to either continue or stop the program. CASE.DAT is intended for program access only, the user should NOT attempt to add or erase files from this file using an editor. The user is also advised not to erase any of the filenames listed in CASE.DAT directly from the system without program aid, either of these actions could result in CASE.DAT listing non-existent case files, or result in existing case files being inaccessible to the program for the reason that they do not exist in CASE.DAT.

This system is configured to allow up to 40 case files (with companion plot files) to be stored.

C. **RUN A NEW CASE:** This selection will execute a new ADAM run and bring the program back to the Input Data Information panel (see Section 3.2).

D. **EXIT TO DOS:** This selection will cause the program to erase intermediate files created during the program execution, store the results in the user-named data files, and then terminate execution and return the user to the DOS prompt.

3.6 PROGRAM OUTPUT

The ADAM program graphically displays the results of the calculations on the screen as well as creating output files containing both the input data and the calculation results used to plot the contours. The files can be saved by user supplied filenames as described above in Section 3.5B above. The two files saved are for regenerating contour plots and providing a summary of the program results. A brief description of the contents of these two files is indicated below. Other files may be resident in the directory if the program does not end successfully. These files will be erased the next time ADAM is run.

A. Program Results Summary File

This file contains a summary of the most recent program run. The first part is a copy of the input data with the calculated source and atmospheric results appended to it. The next section of the file has 6 columns detailing the dispersion results, as shown in Table 3.1. These columns indicate: time since release, distance from source, cloud or plume mean velocity, peak centerline concentration, peak centerline dose (if calculated), contour semi width. This information can be used to more closely examine the behavior of the chemical after release. During the program run, this file is stored as the temporary file XXSAVEXX.OUT and will be erased upon program completion. However, if the user has selected to save the data as described

Table 3.1

ADAM Program Results Summary File Listing

DISPERSION CALCULATION RESULTS

98 = # of Points
Contour for Concentration = 30.0000000 ppm

Time Since Release (s)	Distance From Source (m)	Velocity of Plume or Puff (m/s)	Peak Concentration (ppm)	Peak Dose (ppm-s)	Contour Width (m)
10.03	35.01	3.4827	43591.	.0000	14.70
10.17	35.50	3.4799	43176.	.0000	15.46
10.41	36.32	3.4763	42423.	.0000	15.84
10.76	37.55	3.4707	41408.	.0000	16.39
11.26	39.27	3.4633	40093.	.0000	17.16
11.93	41.59	3.4539	38502.	.0000	18.18
12.81	44.64	3.4429	36628.	.0000	19.50
13.97	48.60	3.4305	34376.	.0000	21.15
15.44	53.65	3.4384	30183.	.0000	23.18
17.30	60.03	3.4284	26623.	.0000	25.03
19.65	68.06	3.4176	22212.	.0000	27.29
22.59	78.08	3.4065	17727.	.0000	30.02
26.26	90.55	3.3953	13709.	.0000	33.32
30.82	106.0	3.3848	10370.	.0000	37.30
36.48	125.1	3.3756	7719.2	.0000	42.08
43.46	148.6	3.3688	5676.2	.0000	47.82
52.07	177.6	3.3654	4137.1	.0000	54.69
62.64	213.2	3.3664	2992.7	.0000	63.21
75.61	256.9	3.3716	2150.9	.0000	73.29
91.45	310.5	3.3832	1528.4	.0000	100.6
110.7	376.2	3.4086	1086.7	.0000	116.3
134.0	456.6	3.4508	772.13	.0000	134.0
162.1	555.1	3.5121	547.59	.0000	153.7
190.0	655.1	3.5818	408.88	.0000	172.0
217.4	755.1	3.6537	317.87	.0000	189.1
244.2	855.1	3.7241	254.66	.0000	205.2
270.6	955.1	3.7911	208.84	.0000	220.6
296.5	1055.	3.8537	174.50	.0000	235.4

in Section 3.5B, this Results Summary file will be renamed to the user defined case filename. The program Results Summary File has the same general format as the default data file. DEFIN.DAT. The user can find the details of the default data file in Appendix B. Also indicated in this appendix are the more complete definitions of the input data.

B. Contour Plot Data File

This is a data file which when called by a program called REPLOT allows the user to regenerate contour plots. If the user wishes to save a contour plot for a later replotting, he/she must enter a name for the file as described in Section 3.5B (e.g., AMARUN#1.PLT). The plot can be recreated by running the REPLOT program with the following command:

REPLOT AMARUN#1.PLT

For additional information or for any clarification type of questions, please contact:

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Burlington, MA 01803-5128

Telephone #: 617-272-3033
Fax #: 617-272-5038

APPENDIX A

This appendix contains excerpts from the GRAFPLUS™ User's Manual. GRAFPLUS™ is loaded automatically, each time you start ADAM. The SETASP program (Chapter 2) reflects the information necessary for GRAFPLUS™.

In some cases, the GRAFPLUS™ EDITGRAF program must be run to set some print characteristic (e.g., printer port, shading). Instructions for running EDITGRAF are given after the Supported Printers.

SUPPORTED PRINTERS

The selection column shows the appropriate GRAFPLUS™ (if the selection starts with P) or GRAFLASR (if the selection starts with L) selection to make to support the given printer. For example, to support the AMT Office Printer (selection column is P39) you would use GRAFPLUS™ and selection 39. To support the HP LaserJet+ (selection column is L1) you would use GRAFLASR and selection 1.

Manufacturers	Models	Selection
Alphacom	Aero	P1
AMT	Office Printer	P39
Anadex	DP Series	P2
	WP Series	P8
Antex Data Systems	ADS 2000	P1
Apple	Dot Matrix	P36
	Laserwriter	L18
AT&T	475	P7
Brother	2024L, 3x density	P14
	Twinriter 5 WP mode	P38
	1550	P1
CAL-ABCO	Legend 1385	P1
	CP-VII	P1
Centronics	All	P10
CIE	CI-300	L5
	CI-600	L5

Manufacturers	Models	Selection
Citizen	MSP-10	P1
	MSP-25	P1
C.Itoh	8510, 8600	P7
	Prowriter I & II	P7
Canon	PJ-1080A	L9
	PW-1156A	P1
	F-60	P37
	LBP-8	L17
	BJ Inkjet	P44
Dataproducts	8050, 8070	P21
	8052C	P13
Datasouth	All	P2
DEC	DECwriter IV	P11
	LA100, LA50	P11
	LN03	P11
Diablo	P series, 34LQ	P1
	S32	P25
Dynax-Fortis	DM20	P38
	DH45	P38
Epson	FX,JX,EX,LX,RX series	P1
	MX series, CR-420i	P3
	LQ series	P14
	GQ-3500 native mode	L15
Facit	4528	P28
	4542, 4544	P29
Fujitsu	DPL24, 2400	P31
	JDL 750 series	P31
GENICOM	3180-3404 Series	P17
Gorilla	All	P16
Hermes	Printer I	P1
Hewlett-Packard	LaserJet	L1
	LaserJet Plus	L1, L13
	Series II	L1, L13
	ThinkJet	L2
	QuietJet	L2
	PaintJet	L16
	DeskJet	L1, L13

Manufacturers	Models	Selection
Hush	80P	P41
IBM	Color Printer	P13
	Graphics Printer	P15
	Proprinter	P15
	Color Jetprinter	P33
	3852	L12
IDS	560, 480, P132	P9
	P80	P9
	440	P32
Integrex	Colour Jet 132	P27
Inteq	LP-5100A	P2
Malibu	165	P20
Mannesman	160	P23
Tally	420, 440	P24
	Sprint 80	P1
MPI	All	P19
NEC	P2, P3, CP2, CP3	P1
	8023	P6
	24 pin printers	P14
North Atlantic Quantex	All	P30
Okidata	ML-92, ML-93	P4
	ML-82 w/out P&P	P4
	ML-84 w/out P&P	P4
	Above, w/P&P	P15
	2410, 2350	P5
	ML-192, ML-193	P4
	Laserline (HP)	L1, L13
Olivetti	PR2300	L3
Olympia	NP	P1
Panasonic	All	P1
PMC	DMP-85	P6
Postscript	All	L18
Printek	900 Series	L4

Manufacturers	Models	Selection
Quadram	Quadjet in color	L7
	Quadjet in b&w	P26
Radio Shack	LP-VII	P16
	DMP-500, DMP-420	P18
	DMP-430, DMP-2100	P18
	CGP-220 in color	L8
	CGP-220 in b&w	P22
	2100 series - 24 pin	P45
	DMP-440	P46
Riteman	All	P1
Seikosha	GP-100A	P16
Sharp	JX 720	P43
Siemens	PT88, PT89	P40
Smith-Corona	D-200, D-300	P1
Star Micronics	Delta, Radix	P3
	Gemini, SG-15	P3
	SD-15, SR-15	P3
	SB-10 24 pin mode	P42
Texas Instruments	TI 850	P1
	TI 855	P15
	810 LQ	L10
Toshiba	50% duty cycle	P34
	100% duty cycle	P12*
Unisys	AP 1327/9 Mod 5, 115, 37	P1
	TO 425/Mod 25C	P24
	AP 92/94 Mod 37 (HP)	L1, L13
	AP 94 (Postscript)	L18
Xerox	4045, 2700	L19

**Be careful with 100% duty cycle on Toshiba printers. Some models will fail if 100% duty cycle is used.*

Using EDITGRAF To Modify Printer Installations

EDITGRAF is a powerful menu driven editing program designed to allow you to make modifications to GRAFPLUS to meet your specific requirements quickly and easily. This is the program you will use if you wish to change the size of the image, location of the image, change the color and gray scale values, change the printer interface, or virtually any other value in the printer driver.

EDITGRAF is also the way to install a new printer that is not listed on the menu. It lets you change either an existing printer driver or the default printer settings to get your new printer running quickly and easily. The on-screen help facility gives precise instructions for each element of the printer driver.

NOTE: Using EDITGRAF to install a new printer requires that you are very familiar with the printer, and that you have had some experience with setting up printer drivers.

Getting Started with EDITGRAF

EDITGRAF is a menu driven edit program designed for use with GRAFPLUS. Several of the most commonly changed values are simple menu selections.

Before running EDITGRAF run the SETUP program in ADAM. To get started with EDITGRAF, go to the ADAM directory and from the DOS prompt type:

```
CD GRP <ENTER>
TYPE SETPRINT.BAT <ENTER>
```

The information typed to the screen shows the current (set using ADAM SETUP) printer program execution line. Note whether the line contains GRAFPLUS or GRAFLASR.

Next, run the EDITGRAF program:

```
EDITGRAF <ENTER>
```

The menu in Figure A.1 will appear on the screen as follows:

Select the program you wish to edit based on whether the GRF.BAT contained GRAFPLUS or GRAFLASR. This will be the same program that you had been using for your printer.

After you have made your selection, the list of printers available in that program will appear in Figure A.2.

```
GRAFPLUS and GRAFLASR Editor
VERSION 4.0
Copyright (c) 1989 Jewell Technologies, Inc.

What is the name of the program you wish to edit?

1) GRAFPLUS
2) GRAFLASR
3) Return to DOS

Enter the number of your selection:
```

Figure A.1

```
GRAFPLUS and GRAFLASR Editor
VERSION 4.0
Copyright (c) 1989 Jewell Technologies, Inc.

 0. User defined printer
 1. HP LaserJet, LaserJet+, DeskJet, Series II - 100 dpi
 2. HP Thinkjet
 3. Olivetti PR2300 ink jet
 4. Printek 900 Series Printers
 5. CIE Terminals CI-300,CI-600
 6. Printronix 150, 300, 600, MVP, 4160
 7. Quadjet - color printing
 8. Radio Shack CGP-220 - color printing
 9. Canon PJ-1080A - color printing
10. Texas Instruments 810LQ
11. Tektronix 4695, 4696
12. IBM Color Inkjet - Model 3852
13. HP LaserJet+, DeskJet, Series II - 300 dpi
14. PCX File Format

Enter the number of the printer you wish to edit:
Press Enter to see more...
```

Figure A.2

Select the printer you wish to edit, or press <ENTER> to see more choices.

When you have selected the printer to edit, you will be asked to select which orientation you wish to edit as in Figure A.3.

GRAFPLUS maintains two complete printer drivers for each printer; one for printing horizontally, one for printing vertically. If you wish to edit both orientations, you will have to first edit one then repeat the selection process for the other. Choose the horizontal selection.

At this point, GRAFPLUS has all of the information it requires to edit the printer driver you have selected, and you are now ready to modify the existing driver.

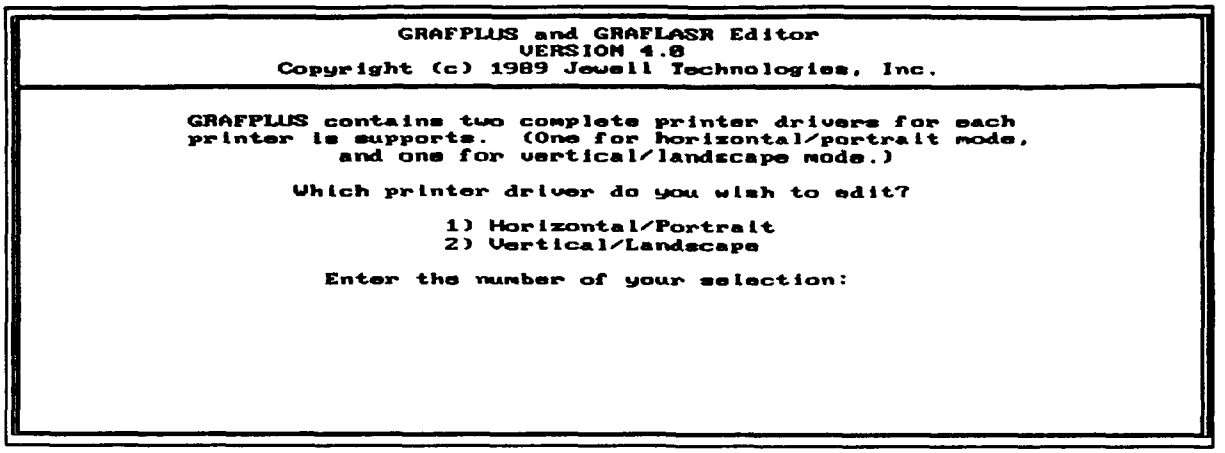

Figure A.3

Modifying the Printer Driver

Once you have selected the program to edit and the orientation, EDITGRAF will display the menu in Figure A.4.

On this menu are individual selections for the most common changes (such as size, location, etc.), as well as a selection to edit the entire printer driver to make changes to the less commonly changed values. Use of these selections are described in the following sections. The ones of interest to most users are in Sections A.3 and A.4 below.

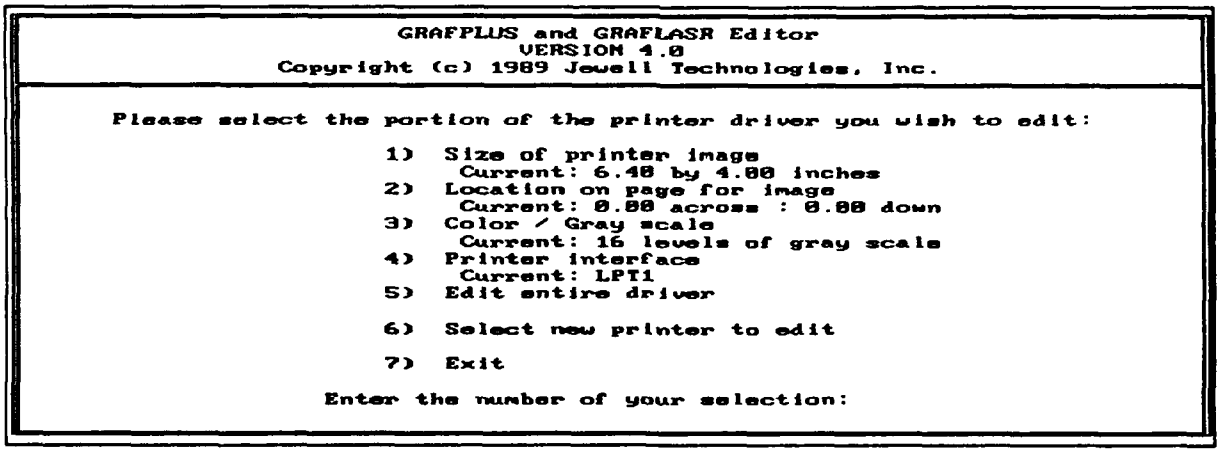

Figure A.4

A.1 Setting the Size of the Image

GRAFPLUS allows you to change the size of the printed image to virtually any size. The size of the image to be printed is determined at the time GRAFPLUS is installed, using the current settings found in the printer driver. These settings can be modified by selecting the number 1 entry on the menu shown in Figure A.4. When you do, the menu in Figure A.5 will appear.

The cursor will initially be positioned at the number of horizontal printer pixels. Also shown are the number of vertical printer pixels, and the corresponding resolution and size in inches for each value. By entering a value smaller than the current value, the size will decrease, and conversely, entering a larger value will increase the size.

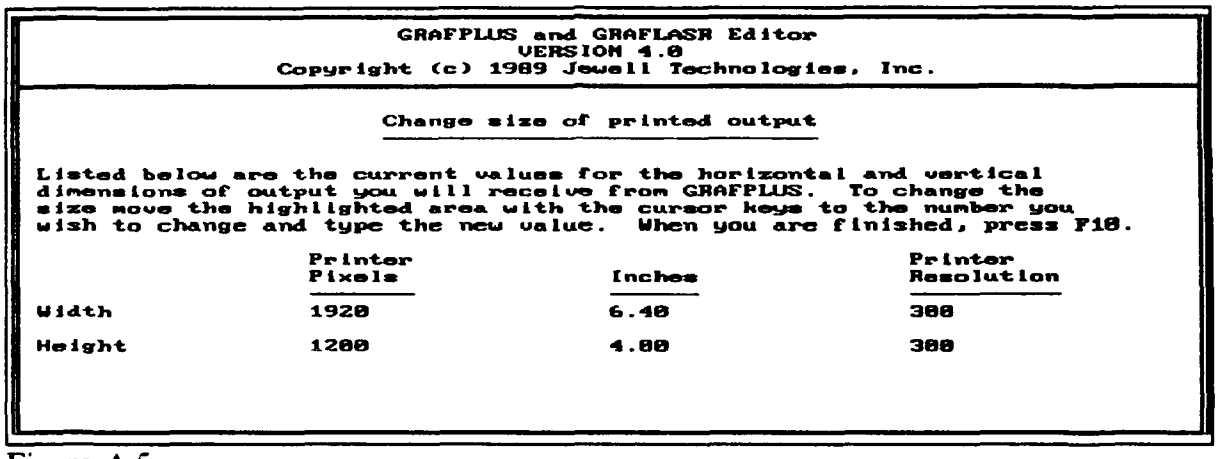

Figure A.5

To change the size, simply enter the new value. When you have finished, press any direction key or <ENTER> and the cursor will move to the next value to change and the size in inches will be updated. When you have changed the numbers to the desired values, press <F10> and you will be returned to the previous menu.

Note: Although not a requirement, the best image is produced when the number of horizontal and vertical printer pixels is an integer multiple of the screen resolution due to the scaling algorithm used by GRAFPLUS. Using non-integer multiples may lead to some distortion of the image which is particularly noticeable in text. This is not usually a factor in printer drivers which have horizontal and vertical resolutions greater than 120 dots per inch.

A.2 Setting the Location of the Image

The location of the printed image on the page may be changed so that the image is placed just where you wish. The location of the image to be printed is determined at the time GRAFPLUS is installed, using the current settings found in the printer driver. These settings can be modified by selecting the number 2 entry on the menu shown in Figure A.4. When you do, the menu in Figure A.6 will appear:

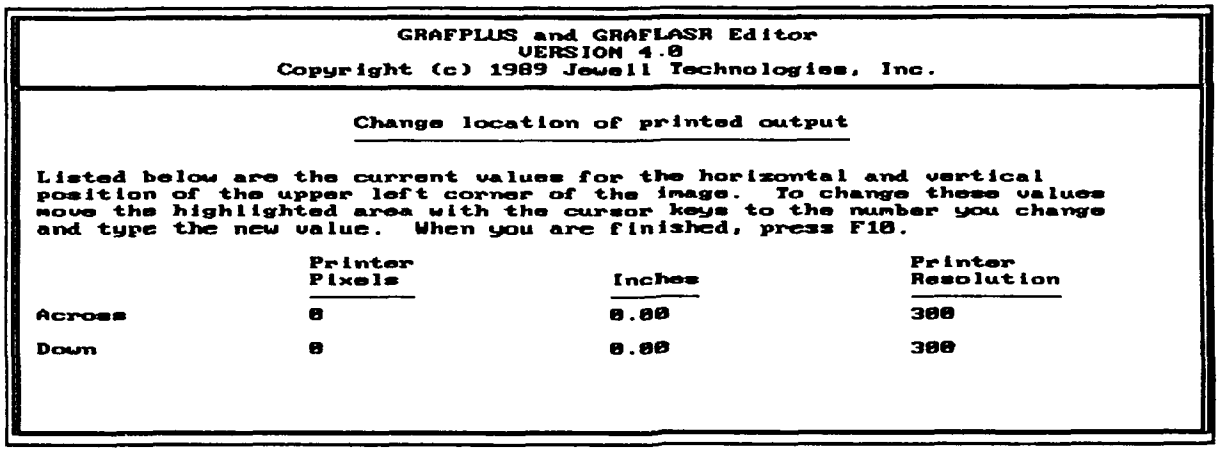

Figure A.6

The cursor will initially be positioned at the horizontal printer pixel location for the upper left hand corner of the printed image. Also displayed will be the vertical printer pixel location and the corresponding resolution and locations in inches for each value. By entering a value smaller than the current horizontal and vertical values, the image will move left and up respectively. Entering a value of 0 for the horizontal and vertical locations will result in the image being printed in the upper leftmost corner of the page.

To change the size, simply enter the new value. When you have finished, press any direction key or <ENTER> and the cursor will move to the next value to change and the size in inches will be updated. When you have changed the numbers to the desired values, press <F10> and you will be returned to the previous menu.

A.3 Setting Gray Scales

GRAFPLUS supports up to 16 different shades of gray depending upon your printer. You may select how many shades are available by selecting number 3 on the menu shown in Figure A.4. When you do, the menu in Figure A.7 will appear:

Select from this menu the number of gray shades you wish to use. In general, you will want to select the same number of shades as appear on your screen image. When you have made your selection, you will be returned to the previous menu.

A.4 Setting the Printer Interface

GRAFPLUS will direct the output to any interface, or disk file that you request. When you select 4 on the menu shown in Figure A.4, the menu in Figure A.8 will appear:

Select from the menu the interface you wish to direct the output. If you select to write to a disk file, then when you perform a print screen, you will be prompted for the name of the file. When you have made your selection, you will be returned to the previous menu.

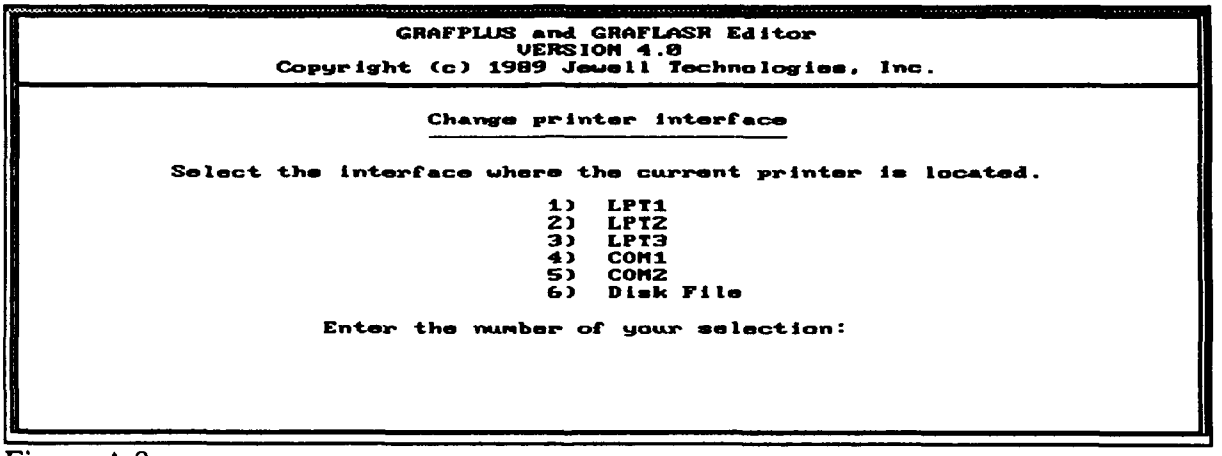

Figure A.8

APPENDIX B

DEFAULT DATA FILE (DEFIN.DAT)

```
DEFIN.dat (for DEFault data INput) is the default data file for the
        input ADAM variables. This file is divided up into 9 sections
        of  input data values for each of the 9 section routines.
        Called from READDEF.

-----------------------------------------------------------------------

       SECTION1: Release information.

Test Data                                                  = TITLE of run
02     = MENU1, the chemical (1=AMA,2=CLX,3=fxx,4=HDS,4=HFX,6=NOX,7=PHG,8=SFD)
CLX    = CH, the chemical

-----------------------------------------------------------------------

       SECTION2: Type of release & source spec.s

02     = IREL,  instantaneous/continuous ( 1=inst, 2=cont)
01     = ISOUR, perform source calculations ( 1=Y, 0=N)

-----------------------------------------------------------------------

       SECTION3: Instantaneous release.

  2.5    DTANK, tank diameter
00       IDIKE, dike flag
  6.6        PSTOR, storage pressure (ATM)
293.0    TSTOR, storage temperature
    3.0  VCH, volume of chemical
 20.0    DDIKE, dike diameter

-----------------------------------------------------------------------

       SECTION4: Continuous release (variables which have not yet been read)

01       menu42, continuous release method
01       ihole   ( 1=Y, 0=N)
00       iholpip ( 1=Y, 0=N)
00       ipipe   ( 1=Y, 0=N)
  0.025  DHOLE, hole diameter in meters
  0.0    HHOLE, hole height
  0.05   DPIPE, pipe diameter in meters
 34.5    FPIPE

-----------------------------------------------------------------------

       SECTION5: Ground conditions.

293.0    TG, ground temperature
0.01     ZO, surface roughness
0.01     ZOMT, s.r. at met tower

-----------------------------------------------------------------------

       SECTION6: Atmospheric conditions.

 75.0    RH, relative humidity
293.0    TA1, air temperature
  5.0    UW, wind speed
180.0    WD, wind direction
 10.0    ZW, height at which wind speed is measured
0        ISIGTH, sigma theta flag   ( 1=Y, 0=N)
 15.0    SIGTH, sigma theta
 10.0    WAVGTIM, wind averaging time
01       IATM, flag for overriding atmospheric calculations ( 1=Y, 0=N)
  0.25   CLDFRC, cloud fraction
```

DEFAULT DATA FILE (DEFIN.DAT)

```
  1.5      SP, stability parameter
  0.26     TOW, cloud transmittance
N          IWET, wet ground flag       ( 1=Y, 0=N)
N          ISNOW, snow on ground flag  ( 1=Y, 0=N)
101325.0   PATM, atmospheric pressure
```

```
       SECTION7: Time & location information.

 42.0      LAT, latitude
 72.5      LON, longitude
00         ACYEAR
00         ACMONTH
00         ACDAY
00         ACHOUR
00         ACMIN
00         ACSEC1
00         ACSEC2
000.0      TIME
000.0      TIMESP
```

```
       SECTION8: Output specifications.

    30.0 CLIMIT, concentration limit
 15.0    CAVGTIM, concentration averaging time
  0.0    DLIMIT, dose limit
0        IWINDIR, wind direction flag ( 1=Y, 0=N)
0        IDOSE, dose limit flag ( 1=Y, 0=N)
```

```
       SECTION9: Source specifications.

100.0       MCH, mass of chemical released
290.0       TCH, temperature of chemical
  0.2       FLI,
200.0       MAIR, mass of air entrained in cloud/plume
    0.0     WI, width of release colud/plume
    0.0     HI, height of released cloud/plume
    0.0     QI, heat input to released chemical
    0.0     X0, source length
    0.0     V0, initial velocity of the cloud/plume
    5.0     U10, wind speed at 10 m
    0.0     USTAR,
    0.0     R,
    0.0     ALPHA,
    0.0     GCOEFF,
  300.0     TAIR, temperature of the air
```

APPENDIX C

WIND DIRECTION DATA FILE

The ADAM Vapor Dispersion model can simulate the effects of a variable wind direction occurring during a spill if the wind direction data are available. A data file (WINDIR.DAT) is included with the ADAM files which is a sample wind direction data file (Figure C.1). You may modify this file (using a text editor) to enter wind direction variation data of interest. The necessary data are:

A) The clock time at which the wind direction data starts (decimal 24 hour clock, 6:30 PM = 18.5);

B) The constant time interval between wind direction data information;

C) The wind direction (in degrees, clockwise from north) at the next time interval.

The clock time and the interval are on line 7 of the file and the wind direction data are on the remaining lines.

Please note that in order to view any of the wind effects on the output Vapor Dispersion contour, the clock start time must coincide with the time of release.

```
The first six lines of this data file are for comments.
Provide the values for the starting time, time increment and wind direction
data below in the appropriate lines, keeping all numbers in the first 10
columns.  Up to 100 data points (enough for every 15 mins for 24 hours) can
be entered.
---------1-:-------2:------------------------------------------------------------
   9.5          10.0 :Wind data starting time, time increment, use 24 hr clock
000.00     :Wind direction at starting time, in degrees,      0 deg = from North
000.00     :                                                 90 deg = from East
045.00     :                                                180 deg = from South
045.00     :                                                270 deg = from West
000.00
000.00
045.00     : Example: 9.5    indicates 9:30 am wind information starting time.
045.00     :          10.0   indicates that the wind direction information is
000.00     :                 at 10 minute intervals starting at 9:30.
000.00     :          000.00 indicates a wind from the north (blowing S).
045.00     :          045.00 indicates a wind from the north east (blowing SW).
045.00
000.00
000.00
045.00
045.00
000.00
000.00
045.00
045.00
000.00
000.00
045.00
045.00
```

Figure C.1