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USER'S GUIDE

TO

TSCREEN

**A Model for Screening Toxic Air
Pollutant Concentrations
(Revised)**

Office of Air Quality Planning and Standards
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PREFACE

This revised document illustrates how to setup and use the TSCREEN model. The release scenarios and methods in TSCREEN are described in "Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants (Revised)", EPA-454/R-92-024.

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1. Introduction

To correctly analyze toxic emissions and their subsequent dispersion from one of many different types of possible releases, the computer program TSCREEN, A Model for Screening Toxic Air Pollutant Concentrations, should be used in conjunction with the "Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants (Revised)" (EPA, 1992a). With the use of these tools one can determine the type of release and the steps to be followed to simulate the release via an applicable computer model. Then, the dispersion characteristics and pollutant concentrations of the resulting plume can be calculated. The air toxics dispersion screening models imbedded in TSCREEN that are used for the various scenarios are SCREEN2, RVD, PUFF, and the Britter-McQuaid model. Using TSCREEN, a particular release scenario is selected via input parameters, and TSCREEN automatically selects and executes the appropriate dispersion model to simulate that scenario. The model to be used and the worst case meteorological conditions are automatically selected based on criteria given in the workbook. TSCREEN has a front-end control program to the models that also provides, by use of interactive menus and data entry screen, the same steps as the workbook. The correct release scenario and associated characteristics of a toxic emissions release are selected with the help of on-screen text and graphics and data input is performed in a full-screen edit mode. TSCREEN saves the input data for each release scenario to a file that can be retrieved and later edited or executed. TSCREEN also provides a method of easily viewing and saving the modeling results for each modeled scenario.

2. Getting Started

Hardware Requirements

TSCREEN is an IBM PC-based software application written and compiled in FoxPro™, a software application development system, Microsoft™ C Version 5.1, Microsoft™ FORTRAN, and BASIC. The program requires 500 kilobytes (KB) of free Random Access Memory (RAM). Although TSCREEN may operate with certain memory resident programs installed, no attempt has been made to test its operation against all memory resident programs available today. If problems occur while TSCREEN and memory resident programs are running simultaneously, try removing the memory resident programs from memory and re-executing TSCREEN. The TSCREEN program files occupy about 2.2 megabytes (MB) of disk space. As data from scenario runs are saved, the hard disk space needed will increase. To install TSCREEN on hard disk systems, make sure there is at least 2.5 MB of free disk space available to load and execute the program. The time required to run the dispersion models will be greatly reduced if the computer has a math co-

processor.

The computer running TSCREEN must be booted with the CONFIG.SYS file in the root directory of the boot up disk containing the following parameters:

Files = 30
Buffers = 22

If the CONFIG.SYS file already has these statements with higher values assigned, then no modification is necessary, otherwise either add the needed statements or increase their value to that of the example and reboot the computer.

Software requirements

The files required to run TSCREEN are as follows:

BMTS.EXE - The Britter & McQuaid model
CHEMBASE.DBF - The chemical database
CHEMBASE.IDX - The chemical database index file
DISPLAY.DBF - File used to display file lists
ERHANDLE.EXE - The error handling program
ERMSG.DAT - Error message file
FOXSWAP.COM - FoxPro memory management program
FOXUSER.DBF - FoxPro database
FOXPRO.ESL - FoxPro run-time library
FOXPRO.ESO - FoxPro run-time library
FOXUSER.FPT - FoxPro database
GRAPH.EXE - The graphics generation program
OLDRUNS.DBF - Database that contains previously entered data
OUTPUT.DBF - File used to display model output
PIPERES.EXE - Program that performs calculations for the scenarios involving gas leaks from a pipe attached to a reservoir
PUFFTS.EXE - The PUFF model
RVDTS.EXE - The RVD model
SCREENTS.EXE - The SCREEN2 model
TSCREEN.EXE - The main program
TSHELP.DBF - The help database
TSHELP.FPT - File containing help text
TSMACRO.FKY - FoxPro macro file
VFONT101.FNT - The graph font file

Installing TSCREEN

Because of the size of the TSCREEN program, TSCREEN is separated into four separate zipped (compressed) files:

File	Size(K)
-----	-----
TSCREEN1.ZIP	520
TSCREEN2.ZIP	175
TSCREEN3.ZIP	378
TSCREEN4.ZIP	181

TSCREEN1.ZIP contains the FoxPro runtime program, FOXPRO.ESO, and TSCREEN2.ZIP contains the FoxPro runtime program, FOXPRO.ESL, and the FoxPro memory manager FOXSWAP.COM.

To unzip (decompress) the files, you will need to have a copy of the PKUNZIP.EXE file, version 2.04g or higher. PKUNZIP.EXE is available on the Technology Transfer Network's SCRAM Bulletin Board Systems, along with the TSCREEN model.

Please refer to your DOS manual for the relevant commands for creating sub-directories and copying files if the following instructions are unclear.

TSCREEN must be installed on a hard disk in order to run. To install TSCREEN on a hard disk, check the available disk space by running the DOS program CHKDSK. To check to see if the DOS programs are accessible from the PATH setting simply type:

PATH

If the DOS sub-directory or sub-directories containing the DOS files is listed the type:

CHKDSK

at the hard disk prompt where TSCREEN is to be installed. If not, read your DOS manual to understand what you have to do to run CHKDSK. Check to make sure there is at least 2.5 MB of available disk space. If there is enough free disk space, then create a TSCREEN sub-directory from the root directory of the hard drive on which TSCREEN will be installed. The command to create a TSCREEN sub-directory off the main or root directory is:

```
CD\  
MD TSCREEN
```

Once the sub-directory is created, insert the first TSCREEN diskette in the high-density drive of the computer (usually the A drive on IBM AT-type machines) and copy the files from the

diskette to the sub-directory by typing the command:

```
COPY A:*. * X:\TSCREEN
```

where X is the letter designation of the drive which TSCREEN is

to be installed (where the sub-directory was created). Repeat the command above for the other diskettes. Also, copy the PKUNZIP.EXE file to your TSCREEN sub-directory. While in the TSCREEN sub-directory, decompress the TSCREEN zip files by typing following command:

```
PKUNZIP TSCREEN1.ZIP
```

Repeat the command for the other three TSCREEN zip files replacing TSCREEN1.ZIP with the other file names: TSCREEN2.ZIP, TSCREEN3.ZIP, TSCREEN4.ZIP. Once the files are unzipped (decompressed), the installation is complete. Type the following command :

```
TSCREEN
```

to start the program.

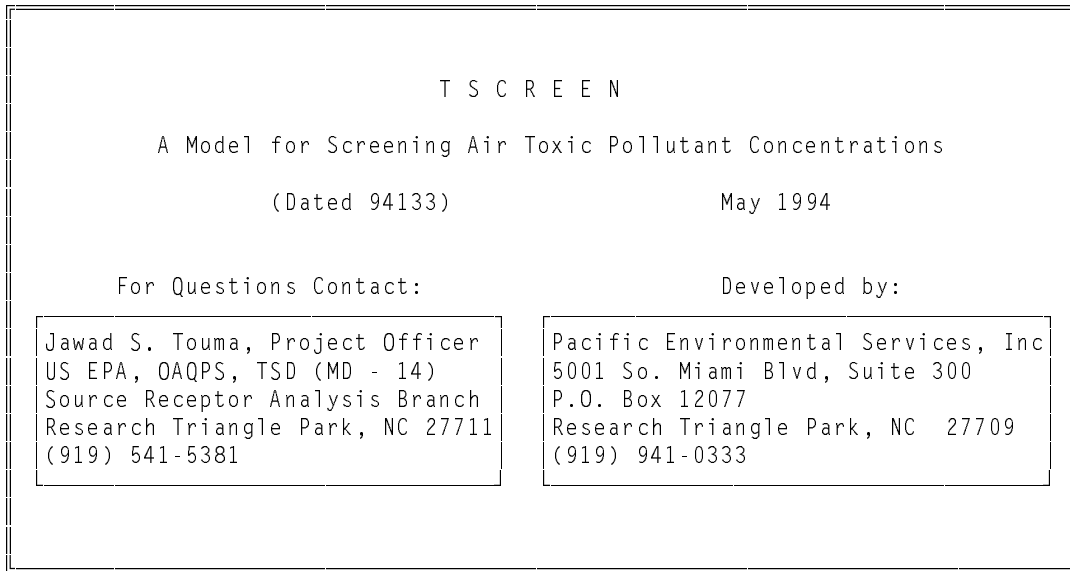
3. Example Scenario

An example TSCREEN session is demonstrated in this section. For more information on the scenarios in TSCREEN, see Sections 4 and 5 of this workbook.

Title Screen

Upon starting the program a title screen will appear as shown in Figure 1.

Figure 1. Title Screen

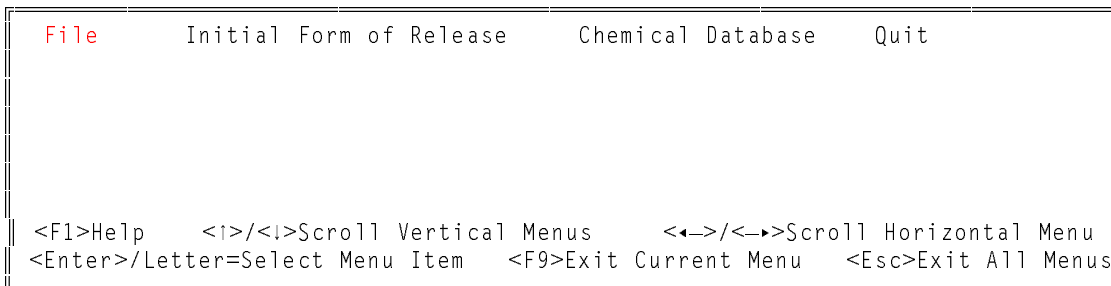


Selection Windows

After the reference pages, the main menu bar appears across the top of the screen, and a list available keys appears across the bottom of the screen as shown in Figure 2. From this menu the user can select:

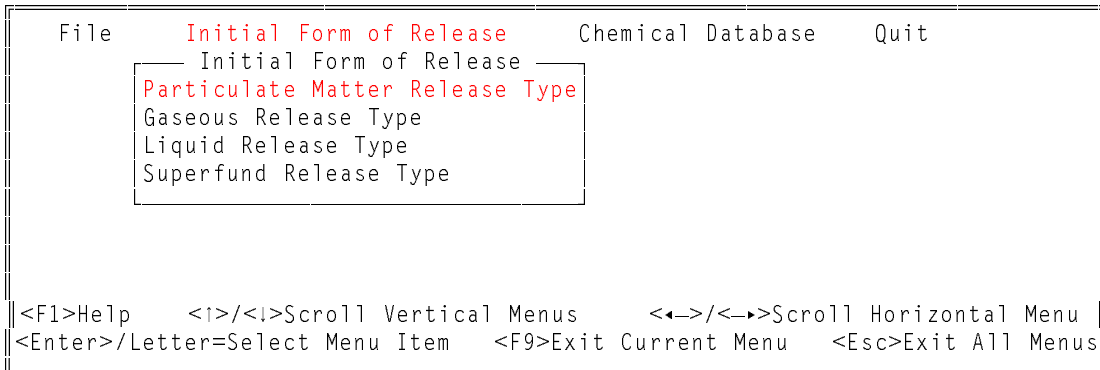
- File - to retrieve previously entered data, previously saved model printed output, or previously saved model graphic output
- Initial Form of Release - to select a form of release and enter a new scenario
- Chemical Database - to view or edit the Chemical Database
- Quit - to exit TSCREEN.

Figure 2. Main Menu



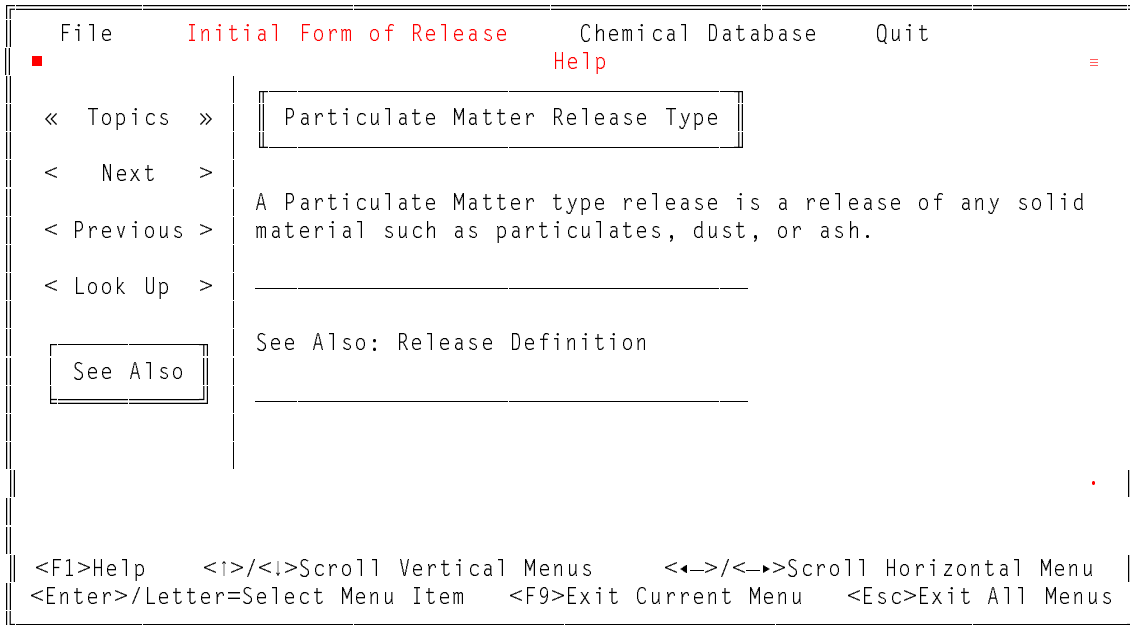
Menu selections in TSCREEN can be made by clicking a mouse, by moving the highlight bar with the arrow keys and pressing <Enter>, or by pressing the letter of a menu item that is a different color. To enter data for this scenario, select 'Initial Form of Release' from the menu bar. The pull-down menu shown in Figure 3 will appear.

Figure 3. Initial Form of Release



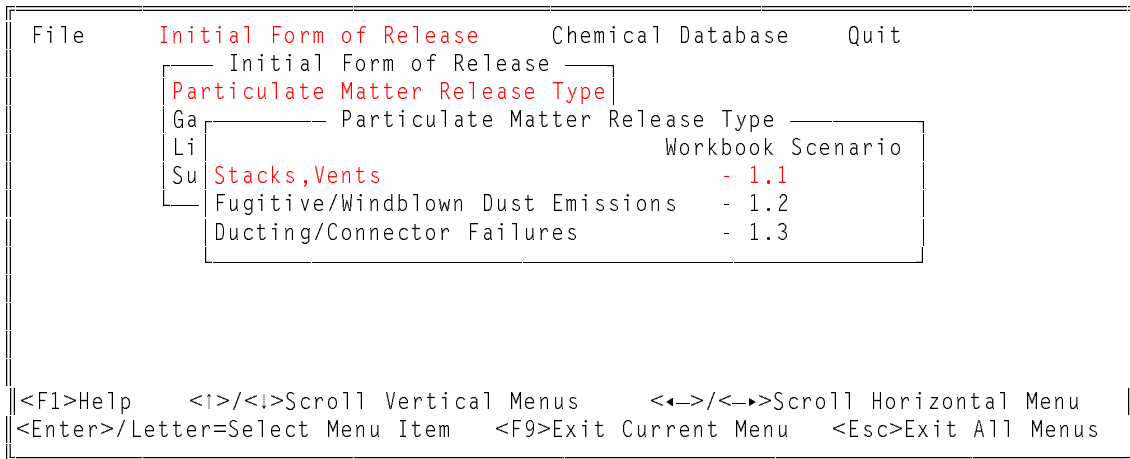
TSCREEN has help available at each point in the system, activated by pressing the <F1> key. Even the selection windows have help pages associated with them. An example of pressing the <F1> key from the first menu item in the 'Initial Form of Release' menu is shown in Figure 4. (See Section 7 for a detailed discussion on the use of the help system.)

Figure 4. Help Window



Next select 'Particulate Matter Release Type' from the 'Initial Form of Release' menu. Then the menu in Figure 5 will appear.

Figure 5. Particulate Matter Release Type Menu



The second menu of release types that appears lists only the scenarios specific to the Initial Form of Release selected from the first selection menu (See Section 4 for a complete list of the scenario selection menus). The user can return to previous menus or data entry windows by pressing the <F9> key. Pressing <Esc> from a menu item or from the data entry windows that follow

will cause the user to return to the main menu bar.

Data Entry Screens

Once the scenario has been selected, unique data entry screens will appear for that scenario. These screens will guide the user through calculations that will select the appropriate dispersion model based on the data entered. For example, some of the screens calculate gas densities and others help calculate emission rates. Data entry screens for this example are shown in Figures 6 through 8. Note that in this example there is no scenario input section since the scenario has already been determined. Thus, the user is taken directly to the model input section.

Figure 6. Data Entry Screen

```
Continuous Particulate Releases from Stacks, Vents - Scenario 1.1
Based on user input, SCREEN2 model has been selected.

SCREEN2 MODEL INPUTS - Page 1 of 7
Enter a unique title for this data's model run:
Particulate Stack Release

RELEASE PARAMETERS
      Emission Rate (Qm) -> 9.3E-4    g/s
      Exit Velocity (ExitV)-> 17.8    m/s
      Release Height above Ground (Hs) -> 16    m
      Diameter at Release Point (D) -> .15    m
      Temperature of the Material Released (Ts) -> 298    °K

AMBIENT PARAMETER
      Ambient Temperature (Ta) -> 298    °K

<F2> Edit    <F9> Previous Screen    <F10> Next Screen    <Esc> Abort
```

Figure 7. Data Entry Screen

```
Continuous Particulate Releases from Stacks, Vents - Scenario 1.1

SCREEN2 MODEL INPUTS - Page 2 of 7

BUILDING PARAMETERS
      Building Height (enter 0 if no building) -> 19    m
      Building Minimum Horizontal Dimension -> 19    m
      Building Maximum Horizontal Dimension -> 19    m

URBAN/RURAL CLASSIFICATION
      Enter U for Urban - R for Rural -> R

FENCELINE DISTANCE
      Enter the distance from the base of the stack
      to the plant fenceline -> 100    m
```

```

<F1> Help    <F3> Calculator    <F9> Previous Screen    <Esc> Abort

```

Figure 8. Data Entry Screen

```

Continuous Particulate Releases from Stacks, Vents - Scenario 1.1
SCREEN2 MODEL INPUTS - Page 3 of 7

TERRAIN TYPE
  Is this a FLAT or SIMPLE TERRAIN evaluation (Y/N) -> Y

SIMPLE TERRAIN
  Are receptors above stack-base (Y/N) -> N

FLAT TERRAIN
  Do you have specific locations where you would like
  pollutant concentrations to be calculated (Y/N) -> Y

  Do you have receptors above ground level
  (i.e. Flag Pole Receptors) (Y/N) -> N

<F2> Edit    <F9> Previous Screen    <F10> Next Screen    <Esc> Abort

```

Based on user input, the SCREEN2 model has been selected with Flat terrain only. Note that the program automatically calculates concentrations for many receptors. If the user selects "Y" to enter discrete receptors, pressing <F10> will advance TSCREEN to the next page (see Figure 9) and allow the user to enter specified distances of interest that will be added to the automatic receptors.

If the user enters "N" for discrete receptors, SCREEN2 is executed with only the automated receptor distances, which extend from the fenceline distance out to 50,000 meters.

Figure 9. Data Entry Screen for Discrete Receptors

```

Continuous Particulate Releases from Stacks, Vents - Scenario 1.1
SCREEN2 MODEL INPUTS - Page 4 of 7
RECEPTOR LOCATIONS: Enter (up to 30) distances from
the source at which concentrations should be calculated.
Enter a blank after the last distance to stop input.

Distance from          Distance from          Distance from
source (meters)        source (meters)        source (meters)
-----
 1 100      fence      11              21
 2              12              22
 3              13              23
 4              14              24
 5              15              25

```

6	16	26
7	17	27
8	18	28
9	19	29
10	20	30

<F2> Edit <F9> Previous Screen <F10> Run Model <Esc> Abort

In Figure 9, the first distance is the fenceline distance specified on the previous page. It will appear automatically. All subsequent distances entered must be greater than the fenceline. <F10> will execute the SCREEN2 model. As the program executes the user is shown what percent of the program is complete.

Parts Per Million

After the SCREEN2 model has run, the data entry window in Figure 10 appears. The user can choose to have the maximum concentrations displayed in parts per million (ppm) in addition to $\mu\text{g}/\text{m}^3$. "N" is entered in this example. If "Y" had been entered the user would then be required to enter the appropriate molecular weight and the concentration in ppm would be calculated using the following formula:

$$\text{concentration (ppm)} = \text{concentration } (\mu\text{g}/\text{m}^3) \frac{0.0245}{M_w}$$

where: M_w = molecular weight (g/g-mole)

Figure 10. Parts Per Million

Do you want maximum concentrations
in parts per million (ppm) (Y/N) -> N

<F1>Help <↑>Up <↓>Down <Esc>Exit/No ppm calculation

Averaging Times

The default averaging time in the SCREEN2 model is 1 hour. If the SCREEN2 model is used, the maximum concentration can be calculated for additional averaging times selected from the menu shown in Figure 11. Since we are only interested in 1-hour averages for this example, we will not select any of the

additional averaging periods.

Figure 11. Averaging Times

```
----- Averaging Time -----
The default averaging time is 1 hour
select one or more from below. . .
-----
15 Minutes
30 Minutes
3 Hours
8 Hours
24 Hours
Annual
-----
<↑>Up <↓>Down
<Enter>/<Space> Mark/Unmark Time
<F5> Select Marked Times
<Esc> Abort Without Selection
```

Averaging times can be selected by pressing the <Enter> key or the Space bar to mark the averaging time with an asterisk. After all of the desired averaging times have been selected, press <F5> to proceed. If additional averaging times were selected, the estimated concentrations for the new averaging times would appear at the end of the model output.

Model Output

When the model has completed execution, the output will be presented on the screen. A portion of the model's output as it would appear on the screen is shown in Figure 12. A complete listing of the model's output is shown in Figure 13. The user can scroll through the output with the <↑>/<↓> or <PgUp>/<PgDn> keys. A complete list of the SCREEN2 model output is shown in Figure 13. The user can scroll through the output using the various keys shown. The user can also graph, print or save the entire output to a file. The instructions for the keys used in viewing the model output are explained in Section 6 of this appendix.

The SCREEN2 model output begins with the time and date that the model was run. Next, there is the model name and version number. Following the model name is the run's title and the user input. Next, the output contains a summary of results showing the maximum concentration and the distance to the maximum. Next, there is a list of concentrations for SCREEN2's automated distances. Finally, there is a listing of the cavity concentrations since the effects of building downwash are being considered. If additional averaging times had been selected, these results would appear at the end of the model output.

Figure 12. Model Output on the Screen

```
----- Continuous Particulate Releases from Stacks and Vents - Scenario 1.1 -----  
  
05-13-94  
15:47:05  
  
*** SCREEN2 MODEL RUN ***  
*** VERSION DATED 92245 ***  
  
Particulate Stack Release  
  
SIMPLE TERRAIN INPUTS:  
SOURCE TYPE = POINT  
EMISSION RATE (G/S) = .930000E-03  
STACK HEIGHT (M) = 16.0000  
STK INSIDE DIAM (M) = .1500  
STK EXIT VELOCITY (M/S)= 17.8000  
STK GAS EXIT TEMP (K) = 298.0000  
AMBIENT AIR TEMP (K) = 298.0000  
RECEPTOR HEIGHT (M) = .0000  
URBAN/RURAL OPTION = RURAL  
  
-----  
<I>, <I>, <←>, <→>, Alt<I>, Alt<I>, <PgUp>, <PgDn>, <Home>, <End>  
<G> Graph <P> Print <F> Save to File <Esc> Exit
```

Figure 13. Complete Model Output

```
05/13/94  
15:47:05  
  
*** SCREEN2 MODEL RUN ***  
*** VERSION DATED 92245 ***  
  
Particulate Stack Release  
  
SIMPLE TERRAIN INPUTS:  
SOURCE TYPE = POINT  
EMISSION RATE (G/S) = .930000E-03  
STACK HEIGHT (M) = 16.0000  
STK INSIDE DIAM (M) = .1500  
STK EXIT VELOCITY (M/S)= 17.8000  
STK GAS EXIT TEMP (K) = 298.0000  
AMBIENT AIR TEMP (K) = 293.0000  
RECEPTOR HEIGHT (M) = .0000  
URBAN/RURAL OPTION = RURAL  
BUILDING HEIGHT (M) = 19.0000  
MIN HORIZ BLDG DIM (M) = 19.0000  
MAX HORIZ BLDG DIM (M) = 19.0000  
  
*****  
*** SUMMARY OF SCREEN MODEL RESULTS ***  
*****
```

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	1.241	100.	0.
BUILDING CAVITY-1	1.717	28.	-- (DIST = CAVITY LENGTH)
BUILDING CAVITY-2	1.717	28.	-- (DIST = CAVITY LENGTH)

 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

BUOY. FLUX = .016 M**4/S**3; MOM. FLUX = 1.752 M**4/S**2.

*** FULL METEOROLOGY ***

 *** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
100.	1.241	4	1.0	1.1	320.0	16.18	8.20	14.30	SS
200.	.6341	4	1.0	1.1	320.0	16.18	15.56	20.44	SS
300.	.4117	4	1.0	1.1	320.0	16.18	22.61	23.28	SS
400.	.3084	6	1.0	1.3	10000.0	16.09	25.71	22.13	SS
500.	.2712	6	1.0	1.3	10000.0	16.09	28.87	22.70	SS
600.	.2417	6	1.0	1.3	10000.0	16.09	32.00	23.26	SS
700.	.2177	6	1.0	1.3	10000.0	16.09	35.10	23.81	SS
800.	.1977	6	1.0	1.3	10000.0	16.09	38.17	24.35	SS
900.	.1809	6	1.0	1.3	10000.0	16.09	41.21	24.88	SS
1000.	.1665	6	1.0	1.3	10000.0	16.09	44.23	25.40	SS
1100.	.1540	6	1.0	1.3	10000.0	16.09	47.22	25.91	SS
1200.	.1432	6	1.0	1.3	10000.0	16.09	50.20	26.41	SS
1300.	.1336	6	1.0	1.3	10000.0	16.09	53.15	26.91	SS
1400.	.1273	6	1.0	1.3	10000.0	16.09	56.09	26.68	SS
1500.	.1197	6	1.0	1.3	10000.0	16.09	59.01	27.15	SS
1600.	.1130	6	1.0	1.3	10000.0	16.09	61.92	27.56	SS
1700.	.1069	6	1.0	1.3	10000.0	16.09	64.81	27.96	SS
1800.	.1014	6	1.0	1.3	10000.0	16.09	67.69	28.36	SS
1900.	.9636E-01	6	1.0	1.3	10000.0	16.09	70.55	28.75	SS
2000.	.9177E-01	6	1.0	1.3	10000.0	16.09	73.40	29.14	SS
2100.	.8756E-01	6	1.0	1.3	10000.0	16.09	76.23	29.52	SS
2200.	.8368E-01	6	1.0	1.3	10000.0	16.09	79.06	29.89	SS
2300.	.8011E-01	6	1.0	1.3	10000.0	16.09	81.87	30.26	SS
2400.	.7679E-01	6	1.0	1.3	10000.0	16.09	84.67	30.62	SS
2500.	.7371E-01	6	1.0	1.3	10000.0	16.09	87.46	30.98	SS
2600.	.7085E-01	6	1.0	1.3	10000.0	16.09	90.24	31.34	SS
2700.	.6818E-01	6	1.0	1.3	10000.0	16.09	93.01	31.69	SS
2800.	.6568E-01	6	1.0	1.3	10000.0	16.09	95.77	32.03	SS
2900.	.6334E-01	6	1.0	1.3	10000.0	16.09	98.52	32.37	SS
3000.	.6115E-01	6	1.0	1.3	10000.0	16.09	101.26	32.71	SS
3500.	.5194E-01	6	1.0	1.3	10000.0	16.09	114.85	34.34	SS
4000.	.4493E-01	6	1.0	1.3	10000.0	16.09	128.24	35.88	SS

4500.	.3943E-01	6	1.0	1.3	10000.0	16.09	141.46	37.35	SS
5000.	.3502E-01	6	1.0	1.3	10000.0	16.09	154.52	38.76	SS
5500.	.3188E-01	6	1.0	1.3	10000.0	16.09	167.45	39.39	SS
6000.	.2885E-01	6	1.0	1.3	10000.0	16.09	180.25	40.64	SS
6500.	.2633E-01	6	1.0	1.3	10000.0	16.09	192.94	41.78	SS
7000.	.2418E-01	6	1.0	1.3	10000.0	16.09	205.52	42.87	SS
7500.	.2232E-01	6	1.0	1.3	10000.0	16.09	218.00	43.93	SS
8000.	.2070E-01	6	1.0	1.3	10000.0	16.09	230.38	44.95	SS
8500.	.1928E-01	6	1.0	1.3	10000.0	16.09	242.67	45.94	SS
9000.	.1803E-01	6	1.0	1.3	10000.0	16.09	254.89	46.91	SS
9500.	.1691E-01	6	1.0	1.3	10000.0	16.09	267.02	47.84	SS
10000.	.1591E-01	6	1.0	1.3	10000.0	16.09	279.08	48.75	SS
15000.	.9954E-02	6	1.0	1.3	10000.0	16.09	396.20	55.58	SS
20000.	.7132E-02	6	1.0	1.3	10000.0	16.09	508.44	60.87	SS
25000.	.5500E-02	6	1.0	1.3	10000.0	16.09	617.02	65.35	SS
30000.	.4464E-02	6	1.0	1.3	10000.0	16.09	722.68	68.96	SS
40000.	.3230E-02	6	1.0	1.3	10000.0	16.09	927.03	74.59	SS
50000.	.2513E-02	6	1.0	1.3	10000.0	16.09	1124.00	79.28	SS

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 100. M:

100.	1.241	4	1.0	1.1	320.0	16.18	8.20	14.30	SS
------	-------	---	-----	-----	-------	-------	------	-------	----

DIST = DISTANCE FROM THE SOURCE
 CONC = MAXIMUM GROUND LEVEL CONCENTRATION
 STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
 U10M = WIND SPEED AT THE 10-M LEVEL
 USTK = WIND SPEED AT STACK HEIGHT
 MIX HT = MIXING HEIGHT
 PLUME HT= PLUME CENTERLINE HEIGHT
 SIGMA Y = LATERAL DISPERSION PARAMETER
 SIGMA Z = VERTICAL DISPERSION PARAMETER
 DWASH = BUILDING DOWNWASH:
 DWASH= MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** SCREEN DISCRETE DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
100.	1.241	4	1.0	1.1	320.0	16.18	8.20	14.30	SS

DWASH= MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

*** CAVITY CALCULATION - 1 *** *** CAVITY CALCULATION - 2 ***
 CONC (UG/M**3) = 1.717 CONC (UG/M**3) = 1.717
 CRIT WS @10M (M/S) = 1.00 CRIT WS @10M (M/S) = 1.00
 CRIT WS @ HS (M/S) = 1.10 CRIT WS @ HS (M/S) = 1.10

```

DILUTION WS (M/S) = 1.00          DILUTION WS (M/S) = 1.00
CAVITY HT (M)     = 27.28         CAVITY HT (M)     = 27.28
CAVITY LENGTH (M) = 27.97         CAVITY LENGTH (M) = 27.97
ALONGWIND DIM (M) = 19.00         ALONGWIND DIM (M) = 19.00

```

```

*****
*** END OF SCREEN MODEL OUTPUT ***
*****

```

Save to File

If the 'Save to File' option is selected, the user will be asked to enter a file name of no more than eight characters in the data entry window shown in Figure 13. To view previously saved model output at a later time, select 'File' from the main menu bar. Then select 'Access Model Printer Output' and a list of files containing previously saved model output will appear as shown in Figure 14. The menu in Figure 14 also contains 'Access Data from Previous Scenario' which allows the user to retrieve data from previously run scenarios by selecting the scenario's title from a list. The other menu item is 'Access Model Graphic Output' which allows the user the retrieve a graph from a list of files containing previously saved graphs.

Figure 13. Save to File

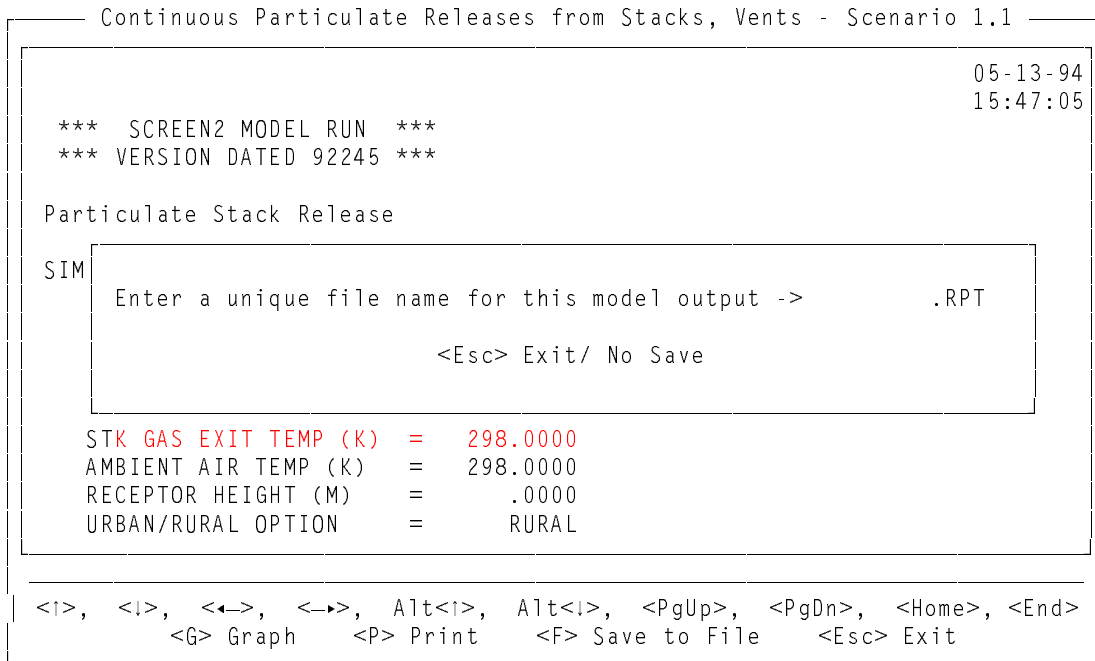
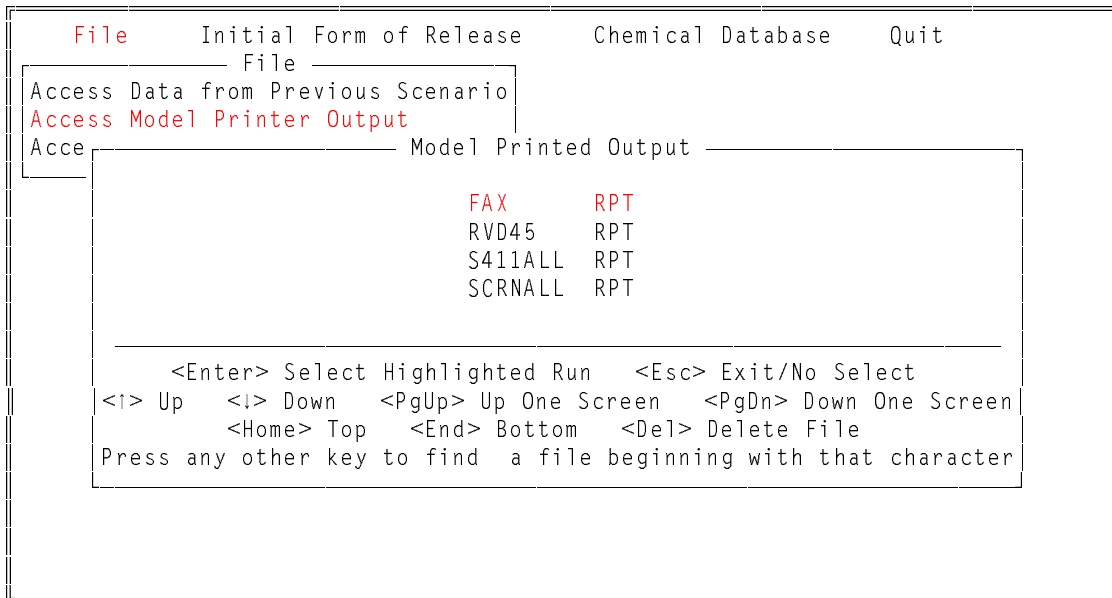


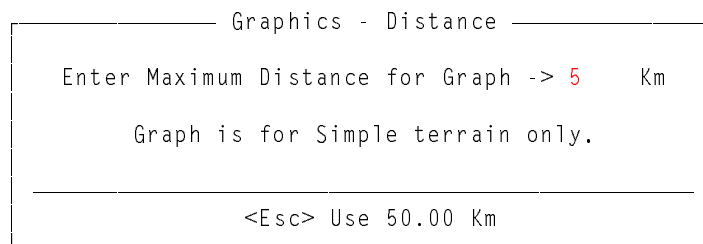
Figure 14. Retrieve Model Output



Graph

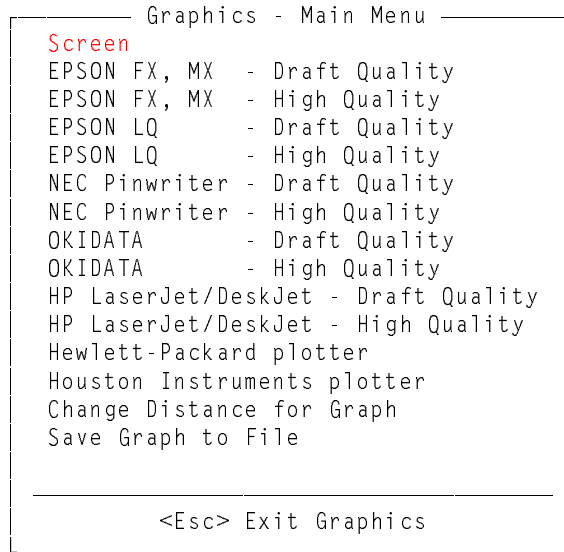
If the 'Graph' option in Figure 12 is selected, a plot of the concentrations vs distances will be drawn. The following window will appear first as shown in Figure 15.

Figure 15. Distance for Graph



In this example 5 km has been selected. If the <Esc> key had been pressed, the graph would be plotted from 100 m to 50.00 km downwind. Once a distance has been specified, the following menu will appear as shown in Figure 16 from which you can select an output device for the graph.

Figure 16. Graphic Output Menu



From this menu the output device is selected. For this example, the user should select 'Screen'.

Note that if your computer does not have the ability to display graphics, the option 'Screen' will not be on this menu. If a printer is selected then the output device is assumed to be LPT1. If a plotter is selected then the output device is assumed to be COM1. For more information on redirection of output, the user should consult the DOS manual. Before printing the graph, be sure that the printer is connected and on-line. After exiting from the Graphics menu the user is returned to the model output. Consult your printer's user's manual to determine which of the above printers is compatible with your printer.

If 'Save Graph to File' is chosen from the bottom of the menu shown in Figure 16, then the data entry window in Figure 17 will appear. Enter a filename of not more than eight characters. If you choose to save the graph's data, then the graph can be generated at a later time. To view a previously saved graph at a later time, select 'File' from the main menu bar. Then select 'Access Model Graphic Output' and a list of previously saved graphs will appear as shown in Figure 18.

Figure 17. Save Graph

```
Graphics - Save
Enter a unique file name for this graphic output -> .GRF
<Esc> Exit/ No Save
```

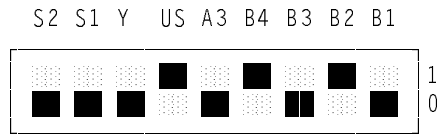
Figure 18. Retrieve Graph

```
File      Initial Form of Release  Chemical Database  Quit
-----
Access Data from Previous Scenario
Access Model Printer Output
Access Model Graphic Output
Model Graphic Output
          SCRNP2  GRF
          PUFF1  GRF
          SCRNP1  GRF
          SCRNP6  GRF
-----
<Enter> Select Highlighted Run  <Esc> Exit/No Select
<i> Up  <l> Down  <PgUp> Up One Screen  <PgDn> Down One Screen
          <Home> Top  <End> Bottom  <Del> Delete File
Press any other key to find a file beginning with that character
```

If you are using a plotter, the DOS MODE command should be used to configure your computer's communications port to correctly match the communications settings of the plotter. Otherwise, you will probably not get any output from the plotter.

For example, the Hewlett-Packard 7475A plotter has a set of switches located on the back of the plotter which allows you to set the communications parameters. A common setting for these switches is shown in Figure 19.

Figure 19. Switch Configuration



The DOS MODE command which should be used to correspond to these settings is:

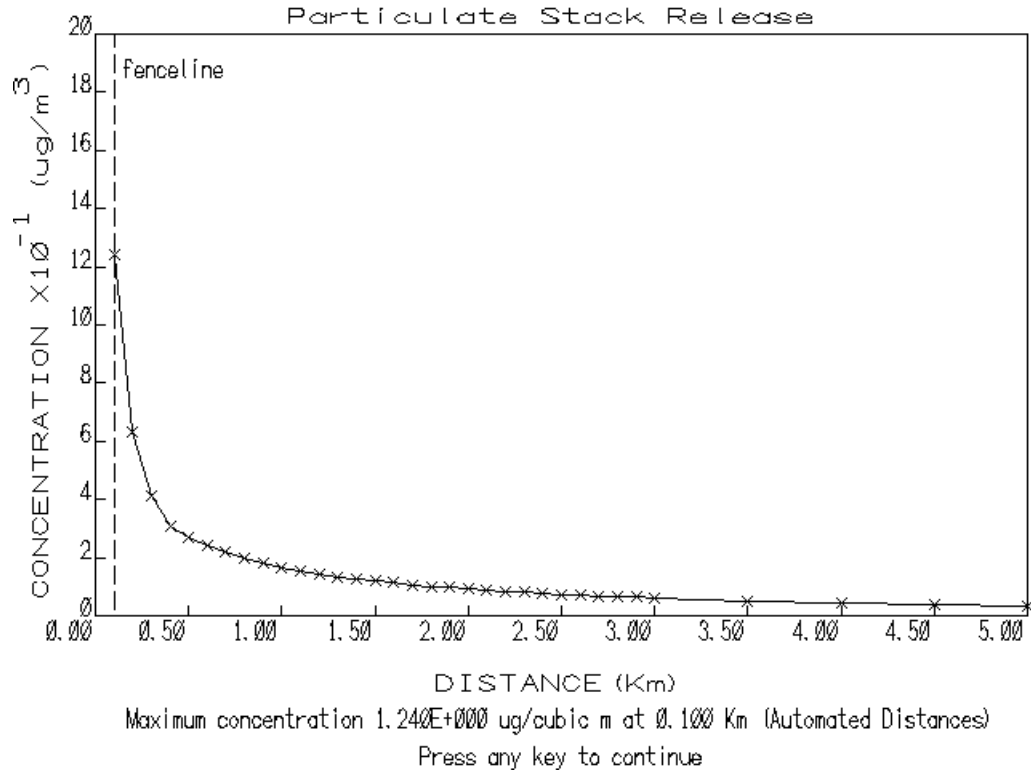
```
MODE COM1:96,E,7,1
```

This command sets serial port 1 (COM1) to 9600 baud with even parity, seven data bits, and 1 stop bit.

Each plotter has unique methods of setting the communications parameters. You should use the plotter's manual for the plotter configuration in conjunction with your DOS manual's explanation on the use of the MODE command to be certain that your computer and plotter are configured correctly.

An example of the graph whose descriptive title was saved as "Particulate Stack Release" in the Data Entry Screen depicted in Figure 6 is shown in Figure 20.

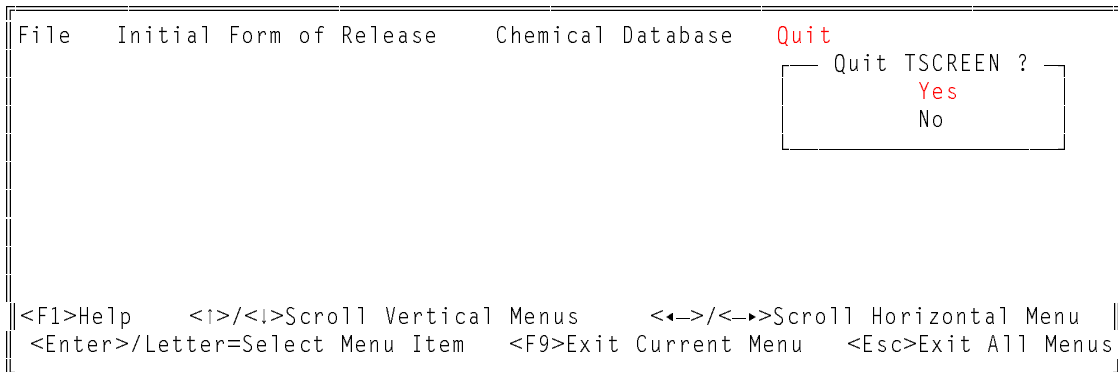
Figure 20. Graphic of Concentration vs Distance



Exiting TSCREEN

After exiting the graph, the user returns to the model output viewing window shown in Figure 13. After pressing <Esc> from this window the user will return to the main menu bar shown in Figure 2. At this point the user can exit TSCREEN by selecting 'Quit' from the main menu bar as shown in Figure 21.

Figure 21. Quit Menu



4. Scenario Selection

Twenty-four of most prevalent release scenarios were selected for TSCREEN and are grouped according to four categories: particulate matter, gases, liquids, and releases from Superfund sites.

To select a scenario in TSCREEN, first select 'Initial Form of Release' from the menu bar across the top of the screen. The 'Initial Form of Release' Menu as shown in Figure 22 will then appear.

Figure 22. Initial Form of Release Menu

```
File  Initial Form of Release  Chemical Database  Quit
      Initial Form of Release
      Particulate Matter Release Type
      Gaseous Release Type
      Liquid Release Type
      Superfund Release Type

|<F1>Help  <I>/<I>Scroll Vertical Menus  <←>/<→>Scroll Horizontal Menu
|<Enter>/Letter=Select Menu Item  <F9>Exit Current Menu  <Esc>Exit All Menus
```

If the release is any solid material such as particulates, dust, or ash, then 'Particulate Matter Release Type' should be selected. The menu in Figure 23 will appear listing particulate scenarios.

Figure 23. Particulate Matter Release Type Menu

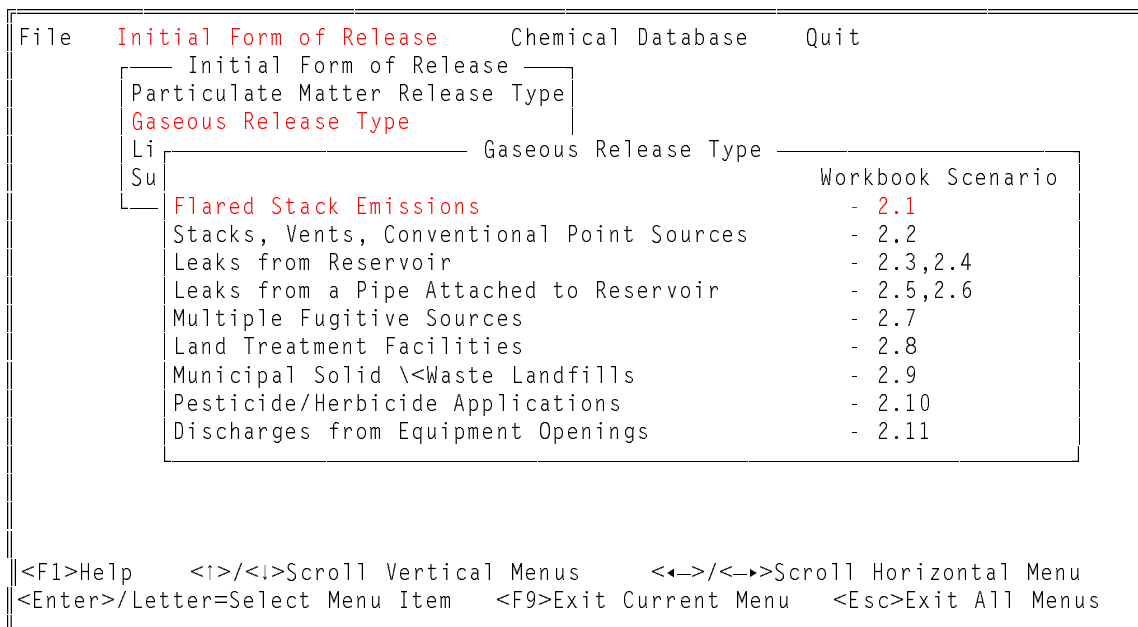
```
File  Initial Form of Release  Chemical Database  Quit
      Initial Form of Release
      Particulate Matter Release Type
      Ga  Particulate Matter Release Type
      Li  Workbook Scenario
      Su  Stacks,Vents - 1.1
      Fugitive/Windblown Dust Emissions - 1.2
      Ducting/Connector Failures - 1.3

|<F1>Help  <I>/<I>Scroll Vertical Menus  <←>/<→>Scroll Horizontal Menu
|<Enter>/Letter=Select Menu Item  <F9>Exit Current Menu  <Esc>Exit All Menus
```

If the release is any matter in vapor form such as sulfur dioxide, volatile organics, etc, then the user should select

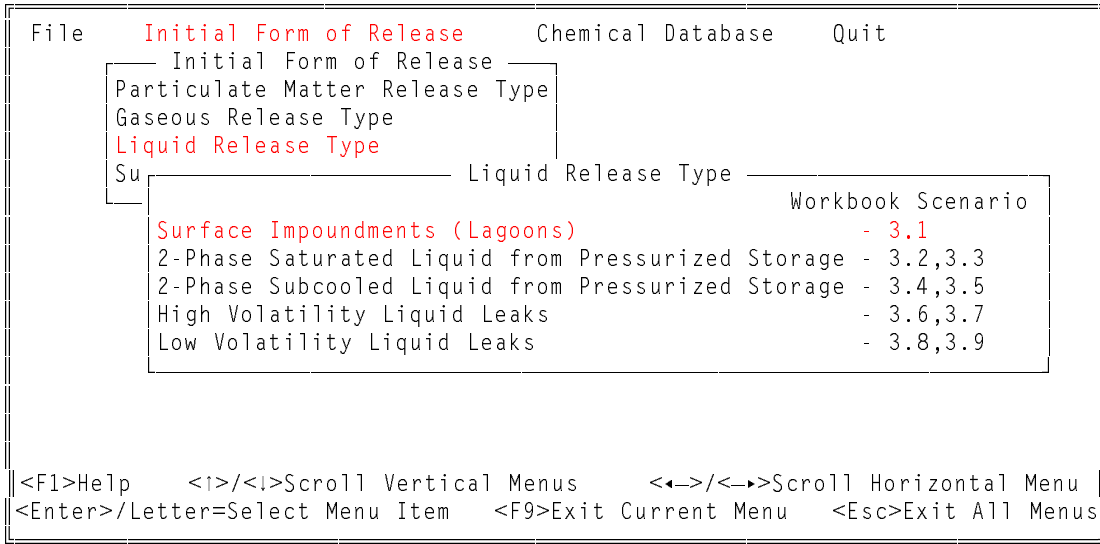
'Gaseous Release Type'. The menu in Figure 24 will appear listing gaseous scenarios. Two scenario numbers for one menu choice indicates that there is both a continuous (first number) and instantaneous (second number) scenario.

Figure 24. Gaseous Release Type Menu



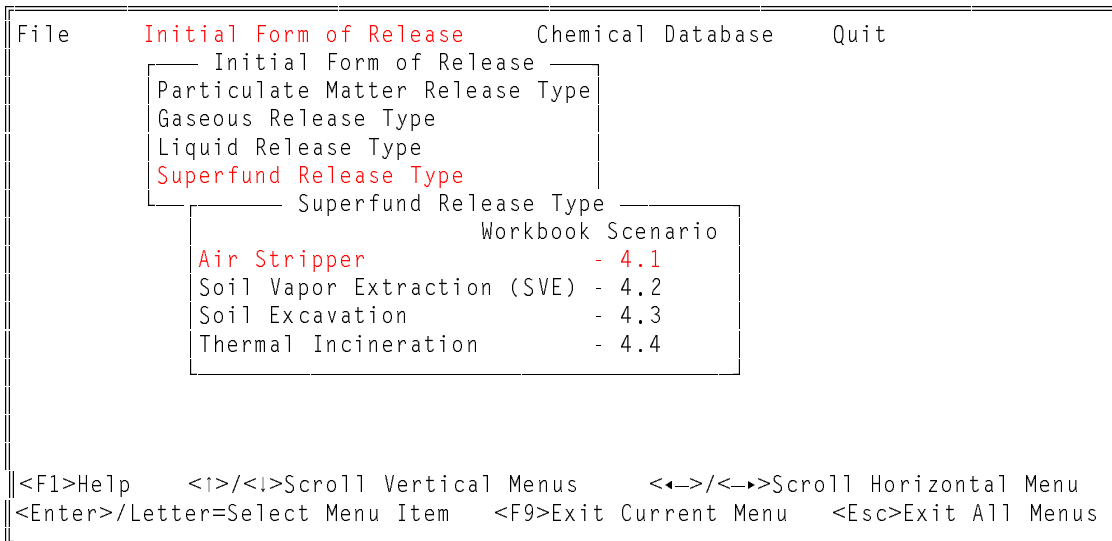
If the release is material that may immediately evaporate (no pooling results) or may pool first and then evaporate, then the user should select 'Liquid Release Type'. The menu in Figure 25 will appear listing liquid scenarios. Two scenario numbers for one menu choice indicates that there is both a continuous (first number) and instantaneous (second number) scenario.

Figure 25. Liquid Release Type



If 'Superfund Release Type' is selected then the menu in Figure 26 will appear listing Superfund scenarios.

Figure 26. Superfund Release Type



5. Determining Maximum Short-Term Ground Level Concentration

Maximum short-term ground level concentrations in TSCREEN are based on three current EPA screening models (SCREEN2, RVD, and PUFF) that are imbedded in the TSCREEN model and an implementation of the Britter-McQuaid model. SCREEN2 is a Gaussian dispersion model applicable to continuous releases of

particulate matter and non-reactive, non-dense gases that are emitted from point, area, volume and flared sources. The SCREEN2 model implements all of the single source short-term procedures contained in the EPA screening procedures document (EPA, 1992b). This includes providing estimated maximum ground-level concentrations and distances to the maximum based on a pre-selected range of meteorological conditions. In addition, SCREEN2 has the option of incorporating the effects of building downwash. The RVD model (EPA, 1989) provides short-term ambient concentration estimates for screening pollutant sources emitting denser-than-air gases and aerosols through vertically-directed releases. The model is based on empirical equations derived from wind tunnel tests and estimates the maximum ground level concentration at plume touchdown at up to 30 downwind receptor locations. The PUFF model (Petersen, 1982) is used where the release duration is finite but smaller than the travel time (i.e., an instantaneous release.) This model is based on the Gaussian instantaneous puff equation and is applicable for neutrally buoyant non-reactive toxic air releases. The Britter-McQuaid model is used for continuous and instantaneous denser-than-air scenarios.

6. Enter/Edit Scenario Data

This section describes the data entry procedures and the function of various keys.

Data Fields

Data for each scenario is entered in two sections. There is the scenario input section which contains a unique set of inputs for each scenario. The user enters this section first and inputs data. Based on user data, one of the four models is selected by TSCREEN, and the user proceeds to the model input section. The inputs for this section are unique for each model although they are not unique for each scenario. For certain scenarios there is no unique scenario input section, and the user proceeds directly to the model input section. Each input section starts with 'Page 1 of. . .'. A typical data entry window for a scenario input section is shown in Figure 27.

Figure 27. Typical Data Entry Window

```
----- Flared Stack Emissions - Scenario 2.1 -----
Based on user input, SCREEN2 model has been selected.

SCREEN MODEL INPUTS - Page 1 of 7
Enter a unique title for this data's model run:

RELEASE PARAMETERS
Enter the Emission Rate (Qm), if unknown enter
the boxed variables below to calculate ->          g/s

  Volume Fraction of Pollutant (Vol) ->          %
  Material Flow Rate (V) ->          cubic m/s
  Molecular Weight of Material Released (Mw) ->    g/g-mole

  Total Heat Release Rate (Hr) ->          cal/s
  Release Height above Ground (Hs) ->          m

-----
<F1> Help      <F3> Calculator      <F9> Previous Screen  <Esc> Abort
```

Commands active while editing data fields include:

- <F1> - Help on current field
- <F3> - Calculator
- <F9> - Return to previous screen
- <Esc> - Abort entry and return to the main menu bar

The keys that can be used for editing while in the highlighted data entry fields are as follows:

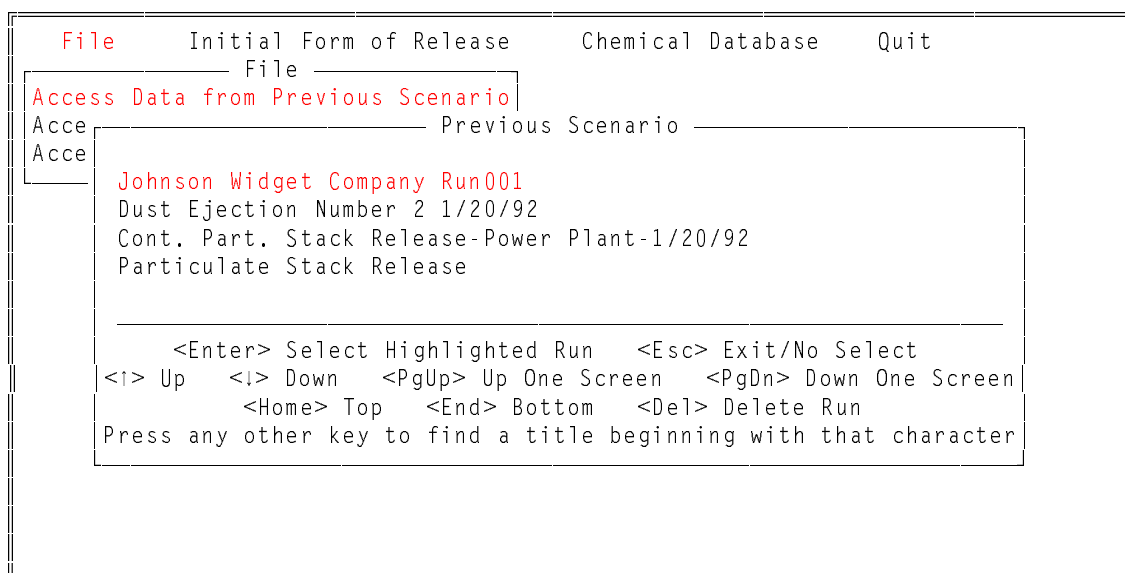
- <Insert> or <Ins> - toggle insert/overwrite mode (cursor changes size)
- <Delete> or - delete character at cursor position
- <←> (left arrow) - move cursor left one character
- <→> (right arrow) - move cursor right one character
- <Ctrl><←> (Control key and left arrow) - move cursor left one word
- <Ctrl><→> (Control key and right arrow) - move cursor right one word
- <Backspace> - move cursor back one character and delete character
- <Home> - move cursor to beginning of data in field
- <End> - move cursor to end of data in field

Valid entry into numeric fields are numbers, minus signs(-), plus signs(+), a decimal(.), and the letter E or e to stand for scientific notation (6.02E026 = 6.02e026 = 6.02E+26 = 6.02e+26 = 6.02 x 10²⁶).

Titles

An important data field in TSCREEN for rerunning old scenarios is the Scenario Title field. This field should contain a unique title for each run. Several ways to make the title unique are to give the facility name or add example 1, example 2, etc, or the date and time to the title. This is helpful when the user wants to retrieve data from a previously entered scenario run by selecting 'File' from the main menu bar then selecting 'Access Data from Previous Scenario'. The selection window will appear allowing the user to view the titles of all previously run scenarios. A previous scenario may be selected to either run again or update the data for another run. This window is shown in Figure 28. The last scenario entered appears at the bottom of the list.

Figure 28. Previously Entered Scenarios



From this window a previous scenario's data can be reloaded by highlighting that scenario's title and pressing the <Enter> key or clicking with the mouse. The 'Initial Form of Release' menu will appear with the highlighted bar on the form of release of the selected scenario. By selecting the highlighted bar on the preselected release type, a second menu will appear with the appropriate scenario name and number highlighted. By selecting this scenario, the data entry windows of the scenario are displayed with the data fields filled with the loaded scenario's data. Menu selections can be changed at any point, but changing the selections will cause the loaded data to be lost, and the user will have to retrieve that scenario's data again from the menu in Figure 28.

Calculated Fields

Some of the data entry screens have fields that can be input directly or calculated automatically from certain other parameters. The alternative parameters will be located inside a box directly below the unknown parameter. In Figure 29, the user did not know the emission rate; therefore, the data fields in the box were entered. Once all of the boxed variables were entered, the emission rate was calculated and displayed. If the screen is reedited and the calculated field is changed then the other parameter fields making up the calculated value will be blanked out. If the emission rate is known it can be entered directly and the program will automatically skip over the parameter fields in the box.

Figure 29. Calculated Field Illustration

```

----- Flared Stack Emissions - Scenario 2.1 -----
Based on user input, SCREEN2 model has been selected.

SCREEN MODEL INPUTS - Page 1 of 7
Enter a unique title for this data's model run:
Gaseous Release from Flared Source

RELEASE PARAMETERS
Enter the Emission Rate (Qm), if unknown enter
the boxed variables below to calculate -> 0.917675 g/s

  Volume Fraction of Pollutant (Vol) -> .2      %
  Material Flow Rate (V) -> 6.58      cubic m/s
  Molecular Weight of Material Released (Mw) -> 78.1    g/g mole

  Total Heat Release Rate (Hr) -> 3.84E7    cal/s
  Release Height above Ground (Hs) -> 32      m

-----
<F2> Edit    <F9> Previous Screen    <F10> Next Screen    <Esc> Abort
  
```

End of Screen Action

Once data entry on the screen has been completed, the program presents the user with a chance to visually review the data entered on the current screen as shown in Figure 29. The only active keyboard commands are highlighted at the bottom of the screen:

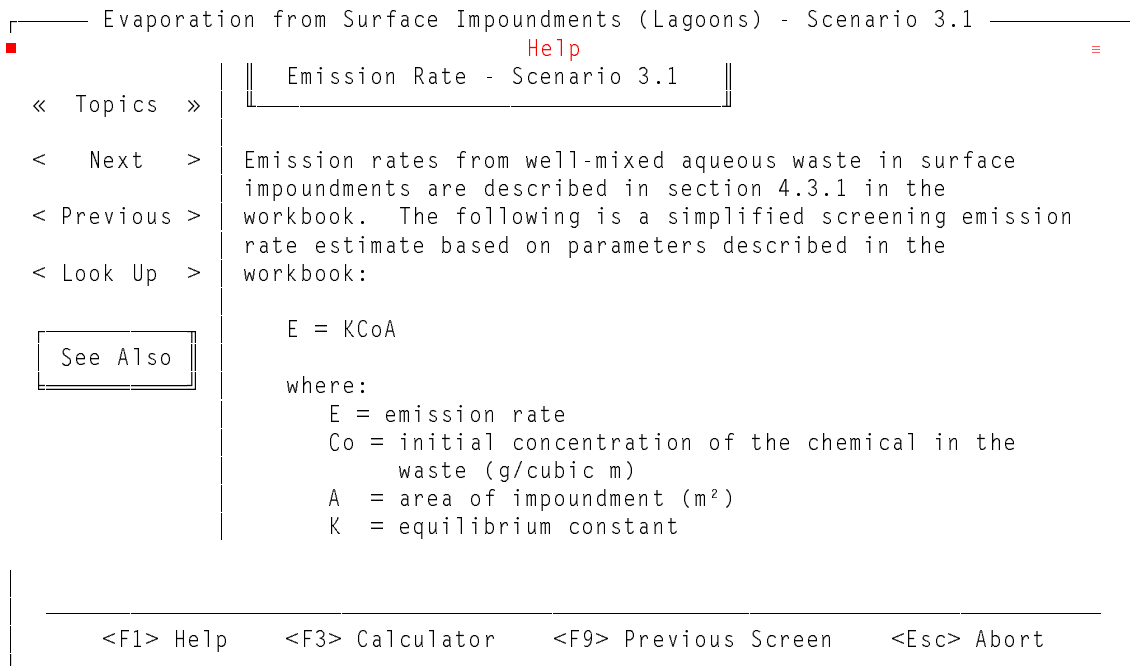
- <F2> - Edit the current screen
- <F9> - Return to previous screen
- <F10> - Proceed to next screen
- <Esc> - Abort current scenario and return to main menu bar

Field Sensitive Help

The help facility (see Section 7.) can be accessed by

pressing the <F1> key from any of the selection menus or data entry fields. After pressing the <F1> key a window with help text will appear to further define or clarify the current data entry field. The user can then scroll up or down through the help text or view help for other data fields using the buttons on the left side of the help window. An example of a help screen is shown in Figure 30.

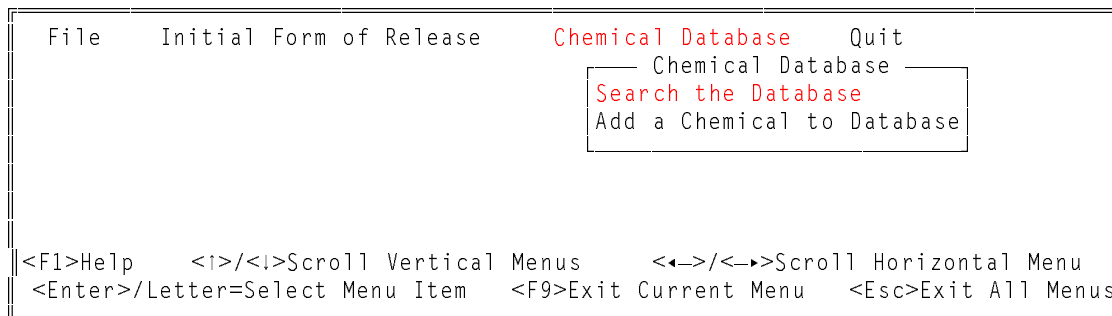
Figure 30. Sample Help Screen



Chemical Look-up Database

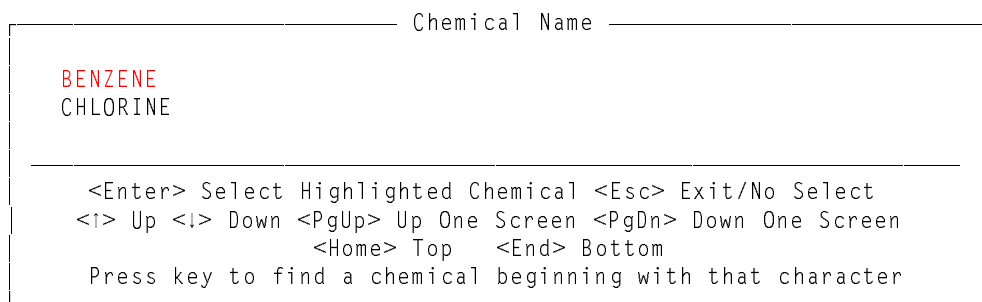
The chemical look-up database is a table of chemicals and their associated parameters that are applicable to TSCREEN. TSCREEN is initially distributed with only two chemicals. Any desired chemical and its associated parameters may be added to suit the specific needs of the user. The chemical database can be accessed in two ways. First, the chemical database can be accessed by selecting 'Chemical Database' from the main menu bar. If this selection is made the menu shown in Figure 31 will appear.

Figure 31. Chemical Database Menu



To search the chemical database for a specific chemical, select 'Search the Database' and a scrollable window appears with a list of the available chemical names as shown in Figure 32.

Figure 32. Chemical Name List



The chemical names contained in the database will be displayed in alphabetical order. The highlighted bar can be moved directly to the first chemical name starting with a certain letter just by pressing that letter key. The 'Chemical Name' window will size itself proportionally to the number of chemical names contained in the database up to the number of chemical names that can fit on the screen. After a chemical is selected, the chemical parameters will be displayed.

If 'Search Chemical Database' was selected from the menu in Figure 31, the Chemical Database parameter window in Figure 33 will appear. If <Ins> is pressed, the user can edit the data in any of the fields except the Chemical Name. If is pressed, the user can delete the chemical that is currently in the window. If <Esc> is pressed, the user will return to the chemical list.

Figure 33. Chemical Database Parameters

Chemical Data		
Chemical Name	BENZENE	
Boiling Point at Ambient Pressure.....	351	°K
Specific Heat of Liquid		
at Constant Pressure		J/kg °K
at Constant Volume		J/kg °K
Specific Heat of Vapor		
at Constant Pressure		J/kg °K
at Constant Volume		J/kg °K
Molecular Weight	78.12	kg/kmol
Latent Heat of Vaporization	3.938E5	J/kg
Liquid Density	885	kg/cubic m
Critical Temperature	562.09	°K
<hr/>		
<Ins> Edit	 Delete	<Esc> Exit View Screen

If 'Add a Chemical to Database' was selected from the menu in Figure 31, the Chemical Data window in Figure 33 will appear. A chemical list will not appear. A chemical name must be entered before any of the other parameters can be entered. If <Esc> is pressed, TSCREEN will ask if the new chemical is to be saved. Then the user will return to the menu in Figure 34.

Figure 34. Chemical Database Parameters for Adding

Chemical Data		
Chemical Name		
Boiling Point at Ambient Pressure.....		°K
Specific Heat of Liquid		
at Constant Pressure		J/kg °K
at Constant Volume		J/kg °K
Specific Heat of Vapor		
at Constant Pressure		J/kg °K
at Constant Volume		J/kg °K
Molecular Weight		kg/kmol
Latent Heat of Vaporization		J/kg
Liquid Density		kg/cubic m
Critical Temperature		°K
<hr/>		
<i> Up	<↓> Down	<Esc> Exit Add Screen

The second way to enter the chemical database is by accessing help for a data entry field that is a chemical parameter. If the user enters the chemical database from a data entry field, a value from the database can be returned to that field. A pointer '>' will appear beside the value that will be

returned. For example, if the user were in a molecular weight input field, the user could press <F1>, and help for that field would appear. After pressing <Esc> to exit the help window, the chemical list shown in Figure 32 would appear. The menu shown in Figure 31 does not appear if the chemical database is accessed through a data entry field. After the user chooses the desired chemical, the chemical data entry screen would appear as in Figure 35. The <Ins>, , and <Esc> keys work as described above when 'Search Chemical Database' was selected from the menu in Figure 31. Pressing <Enter> will exit the chemical database and return the marked value to the data entry field.

Figure 35. Chemical Database Accessed from Data Entry Field

Chemical Data		
Chemical Name	BENZENE	
Boiling Point at Ambient Pressure.....	351	°K
Specific Heat of Liquid		
at Constant Pressure		J/kg °K
at Constant Volume		J/kg °K
Specific Heat of Vapor		
at Constant Pressure		J/kg °K
at Constant Volume		J/kg °K
Molecular Weight	▶78.12	kg/kmol
Latent Heat of Vaporization	3.938E5	J/kg
Liquid Density	885	kg/cubic m
Critical Temperature	562.09	°K

<Ins>Edit Delete <Enter>Exit/Select Data <Esc>Exit/No Select		

Calculator

When entering data, a calculator is available on-line to perform any needed calculations. The calculator is accessed by pressing the <F3> key from any data entry field. The results of a calculation can be passed directly from the calculator to the entry field by pressing the equals <=> key. While in the calculator a help screen on the calculator's functions can be accessed by pressing the <F1> key. The calculator has several built-in functions that include memory clear, memory store, memory recall, square, square root and π . An example of the calculator is shown below in Figure 36.

Figure 36. Calculator

Evaporation from Surface Impoundments (Lagoons) - Scenario 3.1

SOURCE PARAMETE

Enter a unique
The Johnson Wid

IMPOUNDMENT TYP
Enter

EMISSION RATE
Enter the Emiss
the box

In

[Calculator]

F1 HELP	7	8	9	+
F2 MC	4	5	6	-
F3 MS	1	2	3	*
F4 MR	0	.	=	/
F5 SQ	F6 SR	F7 PI	E	

<F1> Help
n <Esc> Abort

g/s

g/cubic m
m²

Model Output

Upon completing the last screen of data entry for the scenario, the <F10> command is 'Run Model' and not 'Next Screen'. When the <F10> key is pressed, the entered data is saved. The dispersion model then executes. For computers without math co-processors, the SCREEN2 model will execute for 3 to 10 minutes, the RVD model for 1 to 5 minutes and the PUFF model for 1 to 5 minutes depending on the data and the computer setup on which TSCREEN is running. The model output will appear on the screen in a window as shown in Figure 37.

Figure 37. Output Window

```
----- Continuous Particulate Releases from Stacks, Vents - Scenario 1.1 -----
                                                                 05-13-94
                                                                 15:47:05

*** SCREEN2 MODEL RUN ***
*** VERSION DATED 92245 ***

Continuous Particulate Stack Release from Power Plant

SIMPLE TERRAIN INPUTS:
SOURCE TYPE           = POINT
EMISSION RATE (G/S)  = 1200.00
STACK HEIGHT (M)     = 20.0000
STK INSIDE DIAM (M)  = 1.5000
STK EXIT VELOCITY (M/S)= 5.0000
STK GAS EXIT TEMP (K) = 400.0000
AMBIENT AIR TEMP (K) = 298.0000
RECEPTOR HEIGHT (M) = .0000
URBAN/RURAL OPTION   = RURAL

-----
<I>, <I>, <←>, <→>, Alt<I>, Alt<I>, <PgUp>, <PgDn>, <Home>, <End>
      <G> Graph   <P> Print   <F> Save to File  <Esc> Exit
```

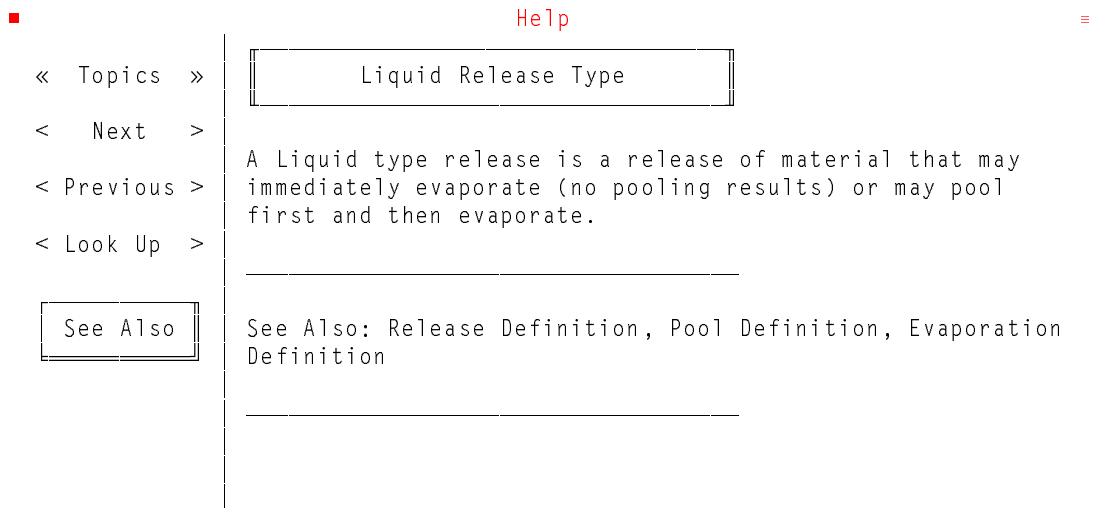
The model output can be scrolled line by line up or down by pressing the up or down arrow keys. The output can be put into a continuous scroll up or down by pressing the Alt - up or down arrow key combinations and stopped by pressing any key. The output can be scrolled a full screen at a time by pressing the <PgUp> or <PgDn> keys. By pressing the <Home> key the output display will show the top of the output listing and by pressing the <End> key the display will show the end of the output listing.

To get a listing of the output on a printer press the <P> key. To avoid some common printing problems, before selecting printed output, make sure that a printer is connected to the computer, that the printer's power is on, that the printer is on-line and that there is plenty of paper loaded in the printer. To save the output data to a file press the <F> key and give a filename for the output. To get a graph of the concentrations vs distances press the <G> key.

7. Help System

The help system included with TSCREEN is field sensitive. As a result, when the <F1> key is pressed from a data entry field or from a menu item, help for that field or menu item will appear in a help window like the one shown in Figure 38.

Figure 38. Example Help Window



After the entering the help system, the user can access help for any data entry field or menu item in TSCREEN pressing the "buttons" on the panel on the left side of the help window. These buttons can be pressed in three ways:

- The user can click on the button with a mouse.
- The user can highlight a button and then press <Enter> to select that button. To highlight a button, press the <Tab> key to first highlight the « Topics » button. Press <Tab> again to move to each succeeding active button on the panel. If a button is not active, its feature will not be available, and it will be a different color than the other buttons.
- Each button has a letter that is a different color (i.e., a "hot-key"). Press that key to select that button.

Each button's function is described below:

« Topics »

If this button is pressed, the table of contents of the help system will appear in the help window. A portion of the table of contents is shown in Figure 39 as it would appear if « Topics » were pressed from the help window in Figure 38. From the table of contents, the user can scroll to and select any definition in the help system. The table of contents is organized as follows: 1) help for the menu items 2) help for the model inputs (SCREEN2, PUFF, RVD, and Britter-McQuaid) 3) help for the scenario inputs in the

order they appear in the workbook and 4) a glossary of terms.

Once the topic of interest has been highlighted, press <Enter> or select the « HELP » button by the methods listed above.

Figure 39. Help System Table of Contents

■ Help ■

File
Access Data From Previous Scenario
Access Model Print Output
Access Model Graphic Output
Quit

Initial Form of Release
Particulate Matter Release Type
Gaseous Release Type
Liquid Release Type

« Help »

< Next >

If this button is pressed, the next help definition as listed in the table of contents will appear.

< Previous >

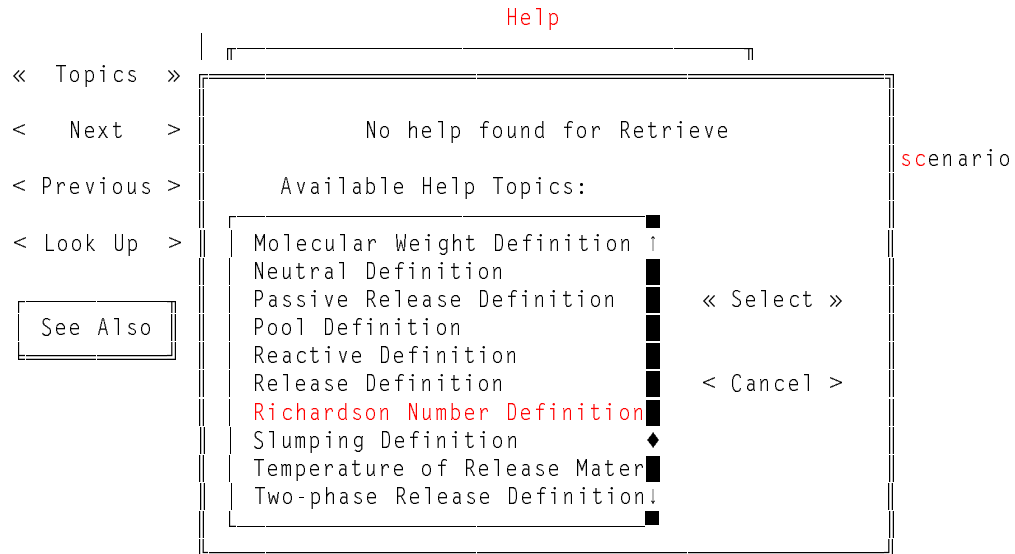
If this button is pressed, the previous help definition as listed in the table of contents will appear.

< Look Up >

This button is not active when the help window first appears. To make this button active, mark (i.e., highlight) a portion of text in the help window. Text can be marked by holding the mouse button and dragging the mouse or by holding down the <Shift> key and moving the arrow keys. Once text has been marked, press this button to bring up help if the marked text is an item in the table of contents. If the marked text is not in the table of contents, another window appears as shown in Figure 40 that contains a list of the topics in the table of contents. In this example "Retrieve" was marked and < Look Up > was pressed. Since this was not found in the table of contents, a second window opens and 'Richardson Number Definition' is highlighted because it is the closest topic alphabetically to

"Retrieve".

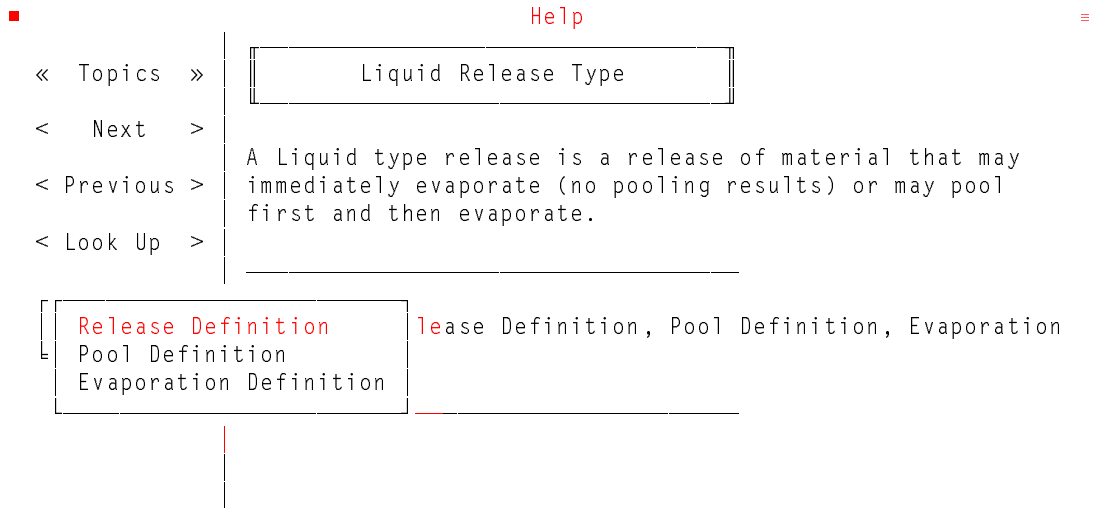
Figure 40. Look Up Window when Topic Is Not Found



See Also

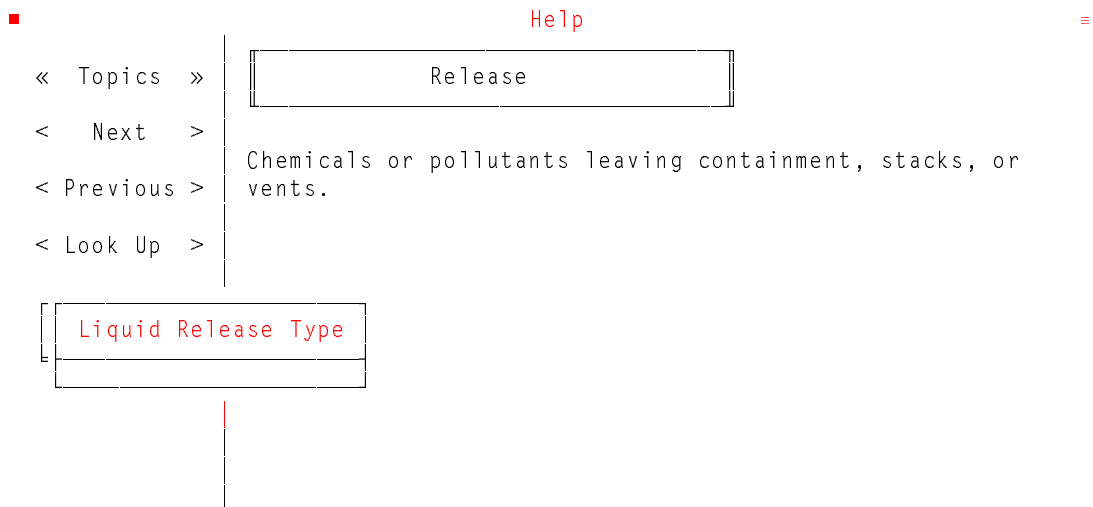
This button is only active if there is a "See Also" list of topics in the help window. If this button is active and is pressed a window will appear as shown in Figure 41 that lists the topics to cross-reference. Making a selection from this menu will bring up the help definition for the selected item.

Figure 41. See Also Example



When a topic is selected from the See Also menu and help for that topic appears in the help window, the first item of the new topic's See Also menu contains a reference to the topic from which the new topic was called. Using the See Also menu from the new topic, the user can then return to the original topic. For example, if "Release Definition" was selected from the menu in Figure 41, the help definition in Figure 42 will appear. The first item in the See Also menu for "Release" is "Liquid Release Type" which the user can select to return to the help definition for "Liquid Release Type".

Figure 42. Cross-Referenced Help Item



8. Error Handling

If an error occurs while TSCREEN is running a window like the one shown in Figure 43 will appear. This window contains an error message, the FoxPro™ error number, the procedure in which the error occurred, and the line number in the code at which the error occurred.

Figure 43. Error Message Window

```
WARNING:

                Error Number :
                In Procedure  :
                At line number:

The error information above are saved in:  ERROR.OUT

Please save this file for use in error diagnosis.

Press any key to continue ...
```

If an error occurs, data entered up to the point at which the error occurred will be saved. The data can be retrieved by selecting 'File' from the main menu bar then selecting 'Access Data from Previous Scenario'. The data will be the last item on the list which appears. In addition, the error information from the window in Figure 43 will be saved in the file "ERROR.OUT". This file should be saved for error diagnosis. After the user exits the window shown in Figure 43, the user will exit TSCREEN.

If an error occurs while a Model is running, the ERROR.OUT file will contain the data that was sent to the Model and the error message which will appear in the error window that is displayed. After the user exits the error window that is displayed when an error in a model occurs, the user will return to the main menu bar.

9. Backing Up Data

The file BACKUP.COM that comes with DOS must be in the DOS PATH as explained in 2.0 GETTING STARTED. To backup the data enter the command:

```
BACKUP X:\TSCREEN\*.* A: /S
```

where X is the drive letter where the TSCREEN system resides.

Note that it is important to back up every time data is edited or added in case of a hard disk failure.

The number of backup disks needed depends upon the amount of data entered into the system. As more data is entered, more backup disks will be required to store the data. These disks must be formatted prior to backing up the data files. Backup disks should be labeled accordingly and stored in a safe place.

To ward off data corruption, rotating back up disks is recommended. Rotating backup diskettes consists of 2 or 3 sets of backup diskettes that are rotated when the backup procedure is called. In using a rotating backup procedure you can minimize the possibility of backing up bad data and having corrupt files on the system and on the backup disks.

The BACKUP.COM program fits as much data on one disk as it is physically capable of storing. If the program is in the middle of backing up a file it will split the file and store the remaining part on another disk(s). These backed up files are not DOS compatible files, DO NOT copy them to another disk, especially NOT to the hard disk. The only way these files can be used is to first restore them with the DOS RESTORE.COM program (discussed below). These diskettes are created for backup purposes only and are to be restored only when the data files on the hard disk have become damaged beyond repair.

The command to restore the data files is:

```
RESTORE A: X: /S
```

where X is the drive letter where the TSCREEN system resides. Note that the RESTORE.COM file must be in the DOS PATH in order to execute this program from any prompt. This command should be used only when there has been damage done to the data files on the hard disk!

10. Notes on Compiling the Source Code

The procedure described on this page is only for those who wish to make changes in the source code and recompile it. Only someone with experience using computers and preferably with compilers should attempt this procedure.

TSCREEN is written in and compiled with FoxPro™ Version 2, Microsoft™ FORTRAN Version 5.1, and Microsoft™ C Version 5.1. One C library was used: INGRAF™ Version 2.10 by Sutrasoft. The program source code is available from the SCRAM Bulletin Board phone (919) 541-5742. Technical questions should be directed to Jawad S. Touma; Office of Air Quality Planning and Standards; Technical Support Division; Source Receptor Analysis Branch (MD-14); Research Triangle Park, NC 27711, phone (919) 541-5381.

FoxPro™ Version 2.0 or later, C Version 5.1 or later, and INGRAF™ Version 2.10 or later are necessary to compile the source code. All of the .PRG (FoxPro™) files and .C (C) files should be on a hard disk with the following files:

C
CL.EXE
LINK.EXE
MLIBCE.LIB
SLIBCE.LIB
[STRING.H]
[STDIO.H]
[STDLIB.H]
[PROCESS.H]
[MATH.H]
[DOS.H]
[IO.H]

The files in brackets are included with the Microsoft C compiler.

INGRAF
INGRAF.LIB
IGEXTERN.H

Note that you may have to change the path specifications in these files as well as in the C files. The compilation process will create: TSCREEN.EXE, GRAPH.EXE.

11. References

- Petersen, W., 1982: Estimating Concentrations Downwind from an Instantaneous Puff Release, EPA 600/3-82-078. U.S. Environmental Protection Agency, Research Triangle Park, NC.
- U.S. Environmental Protection Agency, 1989: User's Guide for RVD 2.0 - A Relief Valve Discharge Screening Model, EPA-450/4-88-024. U.S. Environmental Protection Agency, Research Triangle Park, NC.
- U.S. Environmental Protection Agency, 1992a: Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants (Revised). EPA-454/R-92-024. U.S. Environmental Protection Agency, Research Triangle Park, NC.
- U.S. Environmental Protection Agency, 1992b: Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised. EPA-450/R-92-019. U.S. Environmental Protection Agency, Research Triangle Park, NC.