DAR1HELP.TXT FILE

DAR1HELP.TXT file (8/19/05 2:52p) imported into DAR1HELP.WPD for easy viewing: this cover page and spacing added.

AG7HELP.DAT file (08-19-05 2:36p) edited to create DAR1HELP.TXT file: headers added.

File contains:

1. "WHAT'S NEW in version 3.6 of the DAR-1 program" (README.TXT);

2. "USER'S GUIDE for the DAR-1 software program";

3. "Appendix B of Air Guide-1" (October 16, 1995);

4. "Modifications to the Screening Procedures for Air Toxic Impact Analyses" (Sedefian/Wade, 11/1/93);

5. "Technical Reference for the Screening Procedures of the Air Guide-1 Software Program" (Wade/Sedefian, 1/11/94).

```
********************************************************************************
******** WHAT'S NEW in version 3.6 of the DAR-1 (Air Guide-1) program *********
********************************************************************************
```

WHAT'S NEW in version 3.6 of the DAR-1 (Air Guide-1) program

- Changes from version 3.1 of the DAR-1 Software Program.

Several changes have been made to old version 3.1 of the DAR-1 software program. These changes have been incorporated into new version 3.6 as outlined below:

I. GENERAL PROGRAM MAINTENANCE

This section describes the changes that have been made to the DAR-1 software program related to general program maintenance.

A. NAME CHANGE for the AIR-GUIDE-1 SOFTWARE PROGRAM

The name of the Air Guide-1 (AG-1) software program has been officially changed to DAR-1. This name change was made for consistency with the DAR-1 guidance document and AGC/SGC tables.

B. DAR-1 PROGRAM NOW RUNS ON WINDOWS 2000, NT and XP

New version 3.6 of the DAR-1 software program now runs on PC's with Windows 2000, NT and XP operating systems in addition to DOS 3.x, Windows 95 and 98. The DAR-1 software will not run on PC's with Windows Me.

NOTE: The 5/11/04 Windows 2000 security patch made earlier versions of the DAR-1 software program inoperable on PC's with Windows 2000 operating systems. This problem was corrected in version 3.6 by recompiling the Fortran 77 software code with a Lahey Fortran 90 compiler on a PC with Windows 98 installed. This odd combination is the only known fix for updating Fortran 77 legacy programs.

C. NEW DAR-1 INSTALLATION PROGRAM

The installation program for the DAR-1 software has been rewritten. The program now directly installs the DAR-1 software on PC's with DOS, Windows 3.x, 95, 98, 2000, NT and XP operating systems. The DAR-1 program can be run on an IBM compatible PC with a 386, 486 or Pentium processor and at least 4 MB of RAM. The older 386 and 486 systems must have a math co-processor installed.

The DAR-1 installation program consists of four files (INSTALL.BAT, AG7SYS.EXE, AG1V35.ZIP and PKUNZIP.EXE) that can be downloaded from the DEC website (www.dec.state.ny.us/website/dar/boss/toxics.html). These four files should be downloaded onto a 3.5 inch floppy disk or the C:\AG1 directory of your hard drive. The installation procedures are presented below:

1. FOR WINDOWS 3.x, 95, 98, 2000, NT and XP OPERATING SYSTEMS

   a. INSTALLING FROM A 3.5 INCH FLOPPY DISK
      1. Insert the DAR-1 floppy disk into the "A:" drive bay.
      2. START - RUN A:\INSTALL.BAT
      3. Follow installation instructions.

   b. INSTALLING THE DAR-1 FROM THE HARD DRIVE
      1. Create a C:\AG1 directory.
      2. Download or copy the 4 DAR-1 installation files into the C:\AG1 directory.
      3. START - RUN C:\AG1\INSTALL.BAT
      4. Follow installation instructions.

   c. RE-INSTALLING DAR-1 FROM THE C:\AG1 DIRECTORY
      1. START - RUN C:\AG1\INSTALL.BAT
      2. Follow installation instructions.

2. FOR DOS INSTALLATIONS

   a. INSTALLING FROM A 3.5 INCH FLOPPY DISK
      1. Insert the DAR-1 floppy disk in the "A:" drive bay.
      2. Type "A:" and then press Enter.
      3. Type INSTALL.BAT and then press Enter.
      4. Follow installation instructions.

   b. RE-INSTALLING FROM THE C:\AG1 DIRECTORY
      1. CD C:\AG1
      2. Type INSTALL.BAT and then press Enter.
      3. Follow installation instructions.

D. NEW HELP FILE FOR DAR-1 SOFTWARE

The DAR-1 HELP file has been updated in version 3.6 of the DAR-1 software program. This file was last updated for version 2. The HELP file contains: "WHAT'S NEW in version 3.6 of the DAR-1 program" (README.TXT), the "USER'S GUIDE for the DAR-1 software program", "Appendix B of Air Guide-1" (October 16, 1995), "Modifications to the Screening Procedures for Air Toxic Impact Analyses" (Sedefian/Wade, 11/1/93) and "Technical Reference for the Screening Procedures of the Air Guide-1 Software Program" (Wade/Sedefian, 1/11/94). You can read any section of these documents (without Figures) by following the computer prompts.

NOTE: The entire HELP file may be found in the DAR1HELP.TXT file. This ASCII text file may be imported into a word processing program for printing. When importing the file, select an uncompressed font (e.g., Courier New), set the text size to 10 characters per inch and set the left and right margins to 0.75 inches.

E. DAR-1 PRINTING

There are two ways to print out information from the DAR-1 program. You may either use the menu selections of the DAR-1 program or use WINDOWS to copy and paste data from the active DAR-1 program window.

DAR-1 RUN files can be printed out by selecting menu item (5) in the DAR-1 PROGRAM MENU. The screening results can be printed out by choosing menu item (9) of the DAR-1 ANALYSIS MENU. Once selected, the program sends output directly to the local parallel printer port (LPT1). For network printing, you must first assign or capture the LPT1 port to the desired network printer. This can be done by using Novell iPrint or by following the procedures outlined in Section I.F and restated in the README.TXT file. Contact your computer specialist for help.

Using WINDOWS you can copy and paste a color image, or text data, from the active DAR-1 program window. To copy a color image, hold down the "Alt" key and then press "Print Screen" to copy the image to the Windows buffer. To copy text, hold down and drag the left mouse button to mark a box of text and then press Enter to copy it to the Windows buffer. Once the color image or text data has been copied to the Windows buffer, it can be pasted into a word processing program like Word Perfect for later printing.

F. INSTALLATION INSTRUCTION FOR NETWORK PRINTERS

The DAR-1 program sends output directly to the local parallel printer port (LPT1). Where network printers are being utilized, special software or commands must be used to assign or capture the LPT1 port to the desired network printer. NYSDEC uses Novell iPrint to assign network printers and employees should follow the procedures outlined below to capture the LPT1 port to the desired network printer. Contact you local computer specialist if you need help.

1. FOR WINDOWS 2000 OPERATION SYSTEMS

   a. Click Start - Programs - Novell iPrint & Click iPrint Client
   b. Click iCapture tab
      1. Click LPT1 port
      2. Click Select Printer - click printer - click OK (Select Printer Port)
   c. Click OK (Novell iPrint Client - Settings)
   d. Continue with DAR-1 installation program.

2. FOR ALL OTHER WINDOWS OPERATING SYSTEMS

   a. Click Start - Settings - Click Printers
   b. Right click Printer & Click Properties
   c. Click Details & Click Capture Printer Port
      1. Select LPT1 for Device (use arrow key)
      2. Select printer pathway for Path (use arrow key)
      3. Check box that says Reconnect at logon
      4. Click OK (Capture Printer Port)
   d. Click OK (Properties)
   e. Continue with DAR-1 installation program.

II. DAR-1 PROGRAM MENU CHANGES

Several minor changes have been made to the DAR-1 PROGRAM MENU. These changes are shown below under the program menu headings.

A. Create new RUN File, (1).

When you create a new RUN file, the DAR-1 program queries you for the information needed to conduct the DAR-1 analysis. This information has been changed as shown below:

1. Enter the APPLICATION TYPE.

   The program now presents the user with several new choices for assigning the application type. These are in addition to the old Permit to Construct (P) and Certificate to Operate (C) choices. The user may now specify the application type for Title V (V), State (S), Registration (R), Permit to Construct (P)and Certificate to Operate (C) permits.

2. UTM ZONE.

   The user is now prompted to enter the UTM zone for the assigned UTM coordinates. This information is not necessary for running version 3.6 of the DAR-1 software program and the user is encouraged to assign the default value (just press Enter and the program will assign 0). This new feature was added for national scale modeling applications.

   NOTE: Almost all of New York State is located in UTM zone 18. The only areas outside of this zone are the tip of Long Island and west of Buffalo. Outside of zone 18, the Department assigns UTMs for extended zone 18 (NYTMs).

B. RUN FILE DIRECTORY, (4).

In version 3.1 of the DAR-1 software program, both RUN and R65 files could be viewed in separate directory displays (FILE DIRECTORIES: RUN & R65 files). This has been changed in new version 3.6 as the R65 file directory is no longer created by the DAR-1 software program. The R65 file directory was eliminated because the needed permitting data is no longer retrievable from the Air Facility System (AFS). For historical purposes, the old R65 files can still be retrieved using option (3) of the DAR-1 Program Menu.

C. Run DAR-1 (with RUN file), (6).

When you select option (4) or (6) to run DAR-1, the program asks if you "Want to run DAR-1 with the entire input file (Default = YES)? (Y/N)." If you want to run only a few sources, respond "N" and the program will allow you to "SELECT the CRITERIA for inputting the RUN File DATA." In version 3.6, a new selection criteria has been added that allows you to retrieve source data "for a specified YEAR." This is described below:

1. ENTER the YEAR (XX) of the DATA (Default = All YEARS) :

   This option lets you to retrieve source data by permit issuance date (DATE). It will not let you retrieve source data for a specified year where permits are issued for multiple years. This option was added to retrieve source data from special database files (e.g., TRI) where the permit issuance date is entered as the year the emissions were released.

D. Create new Summary RUN file, (8).

This option lets you sum the emissions by State, County, Town, Facility and AIRS code. The format has been slightly altered for summing national database files.

III. DAR-1 ANALYSIS MENU CHANGES

Several changes have been made to the DAR-1 ANALYSIS MENU. Aside from the enhancements to the DAR-1 ISCLT2 Model (IV.), the most significant change was the addition of a new sorting option (III.F). The changes are described below:

A. INDIVIDUAL SOURCE ASSESSMENT MENU (3), INDIVIDUAL SOURCE IMPACT MENU (4) and MENU of Selected INPUT DATA (8).

Several minor changes were made to the selection criteria in the above menus. Some of the selection choices were renamed to improve clarity and a new selection criteria was added to display information by permit issuance date (DATE). The permit issuance date selection lets you display sources with permits issued "for a specified YEAR." Source information will not be displayed if the specified year falls between the permit issuance and expiration dates.

B. DAR-1 PRINTOUT MENU, (9).

A new addition has been added to the DAR-1 PRINTOUT MENU. This lets the user print out the total emissions by contaminant.

1. Print out Contaminant Emissions Summary, (7).

   Select option (7) to print out a summary of the emissions by contaminant.

C. ISCLT2 ANNUAL DISPERSION MODEL MENU, (0).

Several changes have been made to the DAR-1 ISCLT2 ANNUAL DISPERSION MODEL. These are discussed is Section IV below.

D. SORTING MENU, (S).

A new sorting menu has been added to the DAR-1 ANALYSIS MENU. This addition lets the user sort, or unsort, the DAR-1 analysis by highest AGC/SGC exceedance ratio or highest ambient impact. When the DAR-1 analysis is sorted, the sorting is done for all the menu selections in the analysis menu. For example, when you sort by highest ambient impact, those contaminants with the highest impacts will appear on top of the AGCs & SGCs display (Menu option 6).

IV. ENHANCEMENTS TO DAR-1 ISCLT2 MODEL

Three changes have been made to the DAR-1 version of the ISCLT2 model. The most important change uses pollutant half-lives to account for pollutant removal by physical or chemical processes. Another new option displays the TOP 100 CONTRIBUTORS (TOP100) impacting the point of maximum predicted concentration, impact to AGC ratio, cancer risk or hazard index. Lastly, some minor modifications were made to the MODEL RUN INFORMATION (INFO) display.

A. NEW HALF-LIVES OPTION FOR DAR-1 ISCLT2 PROGRAM

In version 3.6 of the DAR-1 software, an option was added to consider pollutant half-lives for applications using the DAR-1 Industrial Source Complex Long Term 2 (ISCLT2) model. The ISCLT2 model uses half-lives in a simple method that accounts for pollutant removal by physical or chemical processes. For most contaminants, this removal process begins to take place downwind of the point of maximum predicted concentration.

You may use the half-lives contained in the DAR-1 database file (AG1CHEM.TXT) or use this program to assign and save your own values in the YOURCHEM.TXT file. Almost all of the half-lives contained in the DAR-1 database file were taken from EPA source documents and are considered conservative. Therefore, with the exception of the sulfur dioxide half-life (use only for urban settings), you may use the AG1CHEM.TXT values without review. Otherwise, you can use your own values if you can support them with documentation. All half-lives assigned by, and contained in the YOURCHEM.TXT database file, must be acceptable to the Department for regulatory modeling applications.

NOTE: For almost all the near-field modeling applications of DAR-1, modeling with half-lives will not significantly reduce the maximum predicted ambient impacts from a facility. Additionally, modeling with half-lives can slow down the speed of the DAR-1 ISCLT2 program.

B. TOP 100 CONTRIBUTORS (TOP100)

A new feature has been added to the ISCLT2 modeling grid display. You may now view the top 100 contributing sources impacting the predicted maximum concentration, maximum impact to AGC ratio, maximum cancer risk or maximum hazard index for each 13 x 8 modeling grid presented. To view this information, type "T" and then press Enter. The program will then display the Emission Point ID, Facility Name, CAS number, predicted value and the percentage of the predicted value to the overall maximum. Additionally, where the user prints out the top contributors to the maximum concentration, the program will also list the compass direction of the source and the distance from that source to the point of maximum predicted concentration.

C. MODEL RUN INFORMATION (INFO)

Minor changes have been made to the MODEL RUN INFORMATION display for the DAR-1 ISCLT2 model. To view this information, type "I" and then press Enter where the 13 by 8 modeling grid is presented. This information now includes the UTM coordinates for the highest calculated value and a description of the procedures used for pollutant HALF-LIVES.

****
************** USER's GUIDE for the DAR-1 (Air Guide-1) Software **************
****

USER's GUIDE for the DAR-1 (Air Guide-1) Software Program
version 3.6, for public release

Guidelines for the Control of
Toxic Ambient Air Contaminants
Division of Air Resources
Air Toxics Section
May 31, 2005

ACKNOWLEDGEMENTS

This software program was developed by Eric Wade. Leon Sedefian and Eric Wade wrote the technical modeling procedures used by this program. Tom Gentile, Steve DeSantis, Marilyn Wurth and Eric Wade developed the AGC/SGC tables. Vito Pagnotti coordinated the development of the STAR meteorological data packages. Stan Byer, Matt Reis and Patrick Lavin made major contributions to the DAR-1 main document and many of the source review procedures used by this program. The key subroutines of the ISCLT2 model, that have been incorporated into this software program, were written by Roger W. Brode and JieFu Wang of Pacific Environmental Services, Durham, North Carolina, under the direction of Russell F. Lee of USEPA.

I. INTRODUCTION

The DAR-1 (also known as Air Guide-1 and AG-1) software program was written to evaluate short-term and annual impacts from sources of toxic emissions in New York State. The program performs a comprehensive screening analysis using enhanced DAR-1 Appendix B screening procedures and a refined analysis using an enhanced and user-friendly version of USEPA's ISCLT2 model (version 93109). All of the procedures are detailed in the January 11, 1994 paper, "Technical Reference for the Screening Procedures of the Air Guide-1 Software Program" by Eric Wade and Leon Sedefian. Like the screening procedures, the enhanced DAR-1 ISCLT2 model provides default "worst case" input values whenever actual parameters are unknown. As a general rule, the more information you provide the program, the more accurate and less conservative the resulting assessment. The software program can model single or multiple emission points from both stack and area sources. This could include all the sources of selected contaminants at a facility or within a region. Before using the program you should be familiar with DAR-1, the Appendix B screening procedures, the "Technical Reference for the Screening Procedures of the Air Guide-1 Software Program" and the ISCLT model.

CAUTION: The area source impact calculation methods of this program do not conform to the latest revisions to the EPA Guideline on Air Quality Models (Appendix W of 40 CFR Part 51, July 2003). These revisions are reflected in the latest recommended EPA models: SCREEN3, ISCST3 and ISCLT3. Using this program, predicted impacts from area sources at close-in distances could be underestimated by a factor of up to three. Therefore, when a predicted area source impact is greater than one-third an SGC or AGC value, the EPA SCREEN3 or ISCST3/ISCLT3 model should be used to derive a better impact estimate. To convert a 1 hour SCREEN3 impact to an annual impact, a 0.1 factor is recommended.

NOTE: All the cavity and point source methods contained in this software program are valid. This includes both the Appendix B screening procedures and the DAR-1 ISCLT2 model as the latest EPA revisions did not include any changes to the cavity impact and point source methods used by this program.

The DAR-1 program is made up of five main executable programs (AG7LMENU.EXE, SMSREAD.EXE, AG7INPUT.EXE, AG7LMAIN.EXE, AG7GRID.EXE) linked within a batch file (AIRGUIDE.BAT). To run the software under Windows, either click the DAR-1 desktop icon or use Explorer to find and click the AIRGUIDE.BAT file in the program resident directory (C:\AG1). To run it under DOS, go to the DAR-1 program resident directory (cd\AG1), type AIRGUIDE, and then press Enter.

The DAR-1 program lets you create, edit, scan, print out, summarize and delete program data files, perform a DAR-1 air quality impact screening analysis, and run the DAR-1 ISCLT2 model. In order to perform the impact analysis, you must first create a RUN file. The program then retrieves this input file when the program is run. An in-depth DAR-1 screening analysis is then presented that compares predicted short-term and annual impacts to the AGC/SGC guideline values and Federal and State Standards. By sorting the results (SORTING MENU), you can quickly identify the critical contaminants of concern at a facility or within a region. The annual impact estimates for those critical contaminants can then be refined using the DAR-1 ISCLT2 model. The screening analysis presents ambient impacts, AGC/SGC exceedance ratios, contaminant emission summaries, AGCs & SGCs, and a step-by-step analysis using the enhanced Appendix B procedures.

The DAR-1 ISCLT2 model can calculate annual impacts, impact/AGC exceedance ratios, inhalation cancer risks and inhalation hazard indices. These values are presented in a 13 by 8 receptor grid display. From this display, sources can be remodeled for different receptors without reentering the input selection criteria. For example, you can move the grid east, west, north or south a specified number of meters. Else, you can use "zoom" to change the receptor grid spacing or "auto-zoom" to help find the overall maximum predicted value. Grid receptor values may be copied into a file for later importing into programs like SURFER or GIS to generate isopleth maps.

Although the DAR-1 software program can be used to evaluate the impact from a single emission point, it was designed to assess the impact from all sources of all contaminants at a facility or in all of New York State. To evaluate the air quality impacts from all sources at a facility, it is not always necessary to enter the individual source data for each source. Instead, you can assume that a single source, with conservative source parameters, is discharging the emissions from the entire facility. These conservative parameters are listed as the Air Guide-1 Default Values in Section IV.D of the October 16, 1995 edition of Appendix B, DAR-1. When source information is unknown, any of these default values may be assigned to provide a worst case estimate of a source's maximum impact.

For historical purposes, a single master file (NYPUBLIC.RUN) was created that contains all non-confidential sources with 1996 emission records in New York State. This file was compressed in a self extracting zipped file (NYPUBLIC.EXE) that can be downloaded from the NYSDEC website (www.dec.state.ny.us/website/dar/boss/ag1_too.html). The NYPUBLIC.RUN file can be extracted from this file and copied into the program resident directory (usually C:\AG1). Using the DAR-1 program, you may extract smaller RUN files from this, or any other RUN file, based on the selection criteria you specify. The selection criteria lets you extract all sources within a given radius, or for a specified county, town, facility, emission point, or permit issuance year. You also may specify contaminants, minimum and maximum emission rates, Environmental Ratings, Control Efficiencies, SIC code(s), Source Code(s) and Toxicity Classification(s). Additionally, you may extract carcinogens, non-carcinogens, HAPs, and non-HAPs.

You may also "scan" a RUN file using selection criteria. The program will then highlight the critical data that appears invalid. The includes questionable UTM coordinates, short stacks (less than 33 feet), very short stacks (less than 10 feet: flashing), hourly emissions that are greater than annual emissions (flashing), and annual emissions that are greater than hourly emission times 9736 hours per year (8760 x 110%).

The DAR-1 software program will provide guidance as you execute the program. That guidance is contained in this written document (DAR1HELP.TXT) and duplicated in the programs HELP file. The HELP option lets you display any portion of this written document from its Table of Contents. The Table of Contents is made up from the different menus and screens that appear in the software program.

A. DAR-1 INSTALLATION PROGRAM

The DAR-1 installation program directly installs the DAR-1 software on PC's with DOS, Windows 3.x, 95, 98, 2000, NT and XP operating systems. The program will not run under Windows Me. It can be run on older IBM compatible PC's with a 386 or 486 CPU, 4MB of RAM and math co-processor installed but the new Pentium processors are recommended. In general, the faster the computer, the faster the program runs. On newer PC's, this faster speed is most noticeable on applications where the DAR-1 ISCLT2 model is run for multiple sources. The installation program consists of four files (INSTALL.BAT, AG7SYS.EXE, AG1V35.ZIP and PKUNZIP.EXE) that can be downloaded from the DEC website (www.dec.state.ny.us/website/dar/boss/airguide.html). These four files should be copied onto a 3.5 inch floppy disk or the C:\AG1 directory of your hard drive. The installation procedures are presented below:

1. FOR WINDOWS 3.x, 95, 98, 2000, NT and XP OPERATING SYSTEMS

a. INSTALLING FROM A 3.5 INCH FLOPPY DISK

1. Insert the DAR-1 floppy disk in the "A:" drive bay
2. START - RUN A:\INSTALL.BAT
3. Follow installation instructions.

b. INSTALLING OR RE-INSTALLING DAR-1 FROM THE HARD DRIVE
  1. NEW INSTALLATION:
    a. Create a C:\AG1 directory
    b. Download or copy the 4 DAR-1 installation files into the C:\AG1 directory.
  2. START - RUN C:\AG1\INSTALL.BAT
  3. Follow installation instructions.

2. FOR DOS INSTALLATIONS

a. INSTALLING FROM A 3.5 INCH FLOPPY DISK
  1. Insert the DAR-1 floppy disk in the "A:" drive bay
  2. Type "A:" and then press Enter
  3. Type INSTALL.BAT and then press Enter
  4. Follow installation instructions.

b. RE-INSTALLING FROM THE C:\AG1 DIRECTORY
  1. CD C:\AG1
  2. Type INSTALL.BAT and then press Enter
  3. Follow installation instructions.

B. HELP, (H)

HELP can be requested from many key locations within the DAR-1 program. The display will note when this feature is available. To call for HELP, type "H" and then press Enter. The program will then display the appropriate written guidance. The written guidance was updated in version 3.6 of the DAR-1 software program. It was last updated for version 2.

Using the HELP feature you may access the "DAR-1 HELP Menu Directory". This is presented in a Table of Contents format with your current position highlighted. Follow the instructions to read specific sections of the HELP file. The HELP file contains "WHAT'S NEW in version 3.6 of the DAR-1 program" (README.TXT), the "USER'S GUIDE for the DAR-1 software program", "Appendix B of Air Guide-1" (October 16, 1995), "Modifications to the Screening Procedures for Air Toxic Impact Analyses" (Sedefian/Wade, 11/1/93) and "Technical Reference for the Screening Procedures of the Air Guide-1 Software Program" (Wade/Sedefian, 1/11/94). By scanning the directory, you can read any section of these documents (without Figures) by following the computer prompts. Upon exiting, the program returns to the previous location where HELP was requested.

NOTE: The entire HELP file may be found in the DAR1HELP.TXT file. This ASCII text file may be imported into a word processing program for printing. When importing the file, select an uncompressed font (e.g., Courier New), set the text size to 10 characters per inch and set the left and right margins to 0.75 inches.

C. DAR-1 PRINTING

There are two ways to print out information from the DAR-1 program. You may either use the menu selections of the DAR-1 program or use WINDOWS to copy and paste data from the active DAR-1 program window.

DAR-1 RUN files can be printed out by selecting menu item (5) in the DAR-1 PROGRAM MENU. The screening results can be printed out by choosing menu item (9) of the DAR-1 ANALYSIS MENU. Once selected, the program sends output directly to the local parallel printer port (LPT1). For network printing, you must first assign or capture the LPT1 port to the desired network printer. This can be done by using Novell iPrint or by following the procedures outlined in Section I.D and restated in the README.TXT file. Contact your computer specialist for help.

Using WINDOWS, you can copy and paste a color image, or text data, from the active DAR-1 program window. To copy a color image, hold down the "Alt" key and then press "Print Screen" to copy the image to the Windows buffer. To copy text, you must first mark a block of text by holding down the left mouse button and then dragging it to create a marked box of text. Next press Enter to copy the text to the Windows buffer. Once the color image or text data has been copied to the Windows buffer, it can be pasted to a word processing program, such as Word Perfect, for later printing.

D. INSTALLATION INSTRUCTION FOR NETWORK PRINTERS

The DAR-1 program sends its output directly to the local parallel printer port (LPT1). For network printers, special software or commands must be used to assign or capture the LPT1 port to the desired network printer. NYSDEC uses Novell iPrint to assign network printers. For NYSDEC employees, follow the procedures below to capture the LPT1 port to your desired network printer. Contact your local computer specialist if you need help.

1. FOR WINDOWS 2000 OPERATION SYSTEMS

   a. Click Start - Programs - Novell iPrint & Click iPrint Client
   b. Click iCapture tab
      1. Click LPT1 port
      2. Click Select Printer - click printer - OK (Select Printer Port)
   c. OK (Novell iPrint Client - Settings)
   d. Continue with DAR-1 installation program.

2. FOR ALL OTHER WINDOWS OPERATING SYSTEMS

   a. Click Start - Settings - Click Printers
   b. Right click printer & Click Properties
   c. Click Details & Click Capture Printer Port
      1. Select LPT1 for Device (use arrow key)
      2. Select printer pathway for Path (use arrow key)
      3. Check box for Reconnect at logon
      4. OK (Capture Printer Port)
   d. OK (Properties)
   e. Continue with DAR-1 installation program.

E. EXIT DAR-1 Program, (X)

To exit the DAR-1 program, type "X" and then press Enter. This exit procedure is the same throughout the program. However, in many areas of the program, you will only exit to the previous program level. When this happens, keep exiting each program level until a full exit is achieved.

To immediately exit the DAR-1 program from any location, hold down the "CTRL" key and press "BREAK". This command will terminate the program from any location and under all circumstances.

II. DAR-1 SOFTWARE PROGRAM

```
******************************************************************************
*                                                                version 3.6 *
*                                                                            *
*                            DAR-1 SOFTWARE PROGRAM                          *
*                                                                            *
*                                                                            *
*        WARNING:  SOURCE INFORMATION PROVIDED BY NYSDEC OR CONTAINED        *
*        IN THE RUN FILES LISTED BELOW MAY CONTAIN CLERICAL ERRORS.          *
*        THIS DATA SHOULD ONLY BE USED FOR ADMINISTRATIVE OR QUALITATIVE     *
*        PURPOSES.  ALL DATA MUST BE VERIFIED FOR REGULATORY OR MODELING     *
*        APPLICATIONS.                                                       *
*                                                                            *
*                                                                            *
*                                                                            *
*          NYSTATE.RUN: File of all sources in NYS, as of file date,         *
*                       less some combustion sources.  CONTAINS SOME         *
*                       CONFIDENTIAL DATA.                                   *
*                                                                            *
*         NYPUBLIC.RUN: File of all sources in NYS, as of file               *
*                       date, less some combustion sources.  CONTAINS        *
*                       ALL NON-CONFIDENTIAL DATA.                           *
*                                                                            *
*                                                                            *
*                                                                            *
*                      Press (   Enter ) to continue:                        *
*                                                                            *
******************************************************************************
```

The DAR-1 SOFTWARE PROGRAM introductory message is the first screen displayed when you execute the software program. This screen warns the user that all source information provided by NYSDEC must be verified for regulatory modeling applications. Press Enter to proceed to the DAR-1 PROGRAM MENU.

III. DAR-1 PROGRAM MENU

```
******************************************************************************
*                                                             version 3.6 *
*                              DAR-1 PROGRAM MENU                            *
*                                                                            *
*                                                                            *
*               (1)  Create New RUN file.                                    *
*                                                                            *
*               (2)  Edit existing RUN file.                                 *
*                                                                            *
*               (3)  Retrieve downloaded R65 file and create new RUN file.   *
*                                                                            *
*               (4)  RUN FILE DIRECTORY.                                     *
*                                                                            *
*               (5)  Print out DAR-1 RUN file.                               *
*                                                                            *
*               (6)  Run DAR-1 (with RUN file).                              *
*                                                                            *
*               (7)  Merge DAR-1 Run files.                                  *
*                                                                            *
*               (8)  Create New Summary RUN file.                            *
*                                                                            *
*               (X)  EXIT DAR-1 Program.                                     *
*                                                                            *
*                                                                            *
*      Type 1,2,3,4,5,6,7,8 or X and Press (   Enter ) for selection :       *
*                 Type "H" and then Press (   Enter ) for HELP.              *
******************************************************************************
```

The DAR-1 PROGRAM MENU presents eight (8) options in addition to the EXIT and HELP selections. Each option is discussed below:

A. (1) Create New RUN file.

Select this option to create a new RUN file from scratch. Do not use this option when retrieving a downloaded /REPORT 65 file. When prompted, enter the new OUTPUT filename. New data entered will then be copied into the specified file. For a temporary file, press Enter and the program will automatically assign the name "TEMP.RUN". It will be replaced the next time a new temporary file is created. If a new permanent file is desired, type any new filename and include the extension ".RUN" (e.g., "SOURCE1.RUN"). The program will then store the file in the installation directory on the hard drive. Should you specify a different storage location, you will not be able to access the file using the RUN FILE DIRECTORY.

After you assign the OUTPUT filename, the program goes into the INPUT MODE and prompts you to "ENTER THE LOCATION CODE UNDER THE ******(S)". The program will then prompt you for the rest of the data necessary to perform the DAR-1 review. This prompting is done in the same order that data appeared on the old DAR process source application form. Input data is then checked for "size and shape" errors. When information is missing or unknown, the program will assign the DAR-1 default values when you press Enter.

** NOTE: To exit the INPUT MODE, you must type the word "DONE " when the computer prompts you to "ENTER THE LOCATION CODE UNDER THE ******(S)". This is the only way to exit the data entry loop. The word "DONE " must be all capitals (DONE), or lowercase (done).

After all the data for an emission point has been entered, three screen displays follow summarizing the keyed data. The first display shows the STACK PARAMETERS, STACK LOCATION & BUILDING DIMENSIONS. If all the data displayed is correct, press Enter. Any errors may be corrected by following the screen directions. Next, a display shows the CONTAMINANT EMISSIONS DATA. Any errors on this display may be corrected in a similar manner. The third display lets you view an emission point listing for the OUTPUT FILE already created. This final display shows the 15 character emission point, application type, source type, date, the number of contaminants, and how the data was entered. The program then returns you to the start of the INPUT MODE where you can either enter more emission point data or exit. Again, when you've finished entering all emission point data, you must type the word "DONE " when the computer prompts you to "ENTER THE LOCATION CODE UNDER THE ******(S)" to exit the INPUT MODE.

B. (2) Edit existing RUN file.

Select this option to edit an existing RUN file. When prompted for the INPUT file, enter only the file and extension names (e.g., FACILITY.RUN). That is, unless a special directory location was specified when the file was created. If the file is stored on a floppy disk, or a special directory location (i.e., on the hard drive but not in the program resident directory), you must also specify the correct Drive and Path (e.g., C:\AG1FILES\FACILITY.RUN).

After the INPUT file has been assigned, the DAR-1 program calls the FILE EDITOR. The editor works on a two file system, one file for input and another for output. As the existing INPUT file is edited, the new OUTPUT file is created.

Two choices are then presented for assigning the OUTPUT filename: (1) assign the same name to the INPUT and OUTPUT files, or (2) assign a new filename. When the same name is assigned, the program copies the output into the temporary file "SAMENAME.RUN." The computer then replaces the INPUT file with this temporary OUTPUT file (SAMENAME.RUN) when you have finished editing. When a different OUTPUT filename is assigned, include the extension ".RUN" as the program identifies the DAR-1 file by this extension name.

The RUN FILE EDITOR edits a file line-by-line on an emission point basis in a WYSIWYG format ("What You See, Is What You Get"). In other words, the program will tell you, and show you, what it is doing. The program lets you edit a file sequentially while displaying the action taken under the "OUTPUT File Status" line. When editing a file, the emission point under review will be highlighted. You may then copy, edit, add (new) or delete (omit from new) that emission point and associated data. The result is then transferred to the new OUTPUT file. NOTE, when an emission point is "deleted" from an INPUT file, it is never deleted, it is just omitted from the new OUTPUT file.

To list the emission points from an existing INPUT file, type "L" and then press Enter. The program will then display a summary listing of the emission points showing the emission point numbers, application types, dates, number of contaminants and the output file status. When all the emission points have been displayed, the program returns you to the FILE EDITOR's main screen.

An emission point listing of the new OUTPUT file can be viewed using the view selection. Remember, "what you see, is what you get." Type "V" and then press Enter to view the new OUTPUT file. The program will then display a summary listing of the emission points from the newly created OUTPUT file. When all the emission points have been displayed, the program returns you to the FILE EDITOR's main screen.

After file editing is complete, or to abort, type "X" to exit. The program then creates the specified OUTPUT file upon exiting. Note, when you exit in the middle of a file, the emission points at the end of the file will not be copied into the new file. Only those emission points that are copied, edited or added are transferred into the OUTPUT file.

When you copy, edit or delete the last emission point of an INPUT file, the program automatically exits from the FILE EDITOR. The program then goes into the INPUT MODE already discussed. Remember, the only way to exit from the INPUT MODE is to type the word "DONE " when the computer prompts you to "ENTER THE LOCATION CODE UNDER THE ******(S)".

C. (3) Retrieve downloaded R65 file and create new RUN file.

Select this option to retrieve and convert old downloaded /REPORT 65 files from the Source Management System. The Source Management System is no longer in use by the Department as it was replaced by the Air Facility System (AFS) in 1996. The Air Facility System can not generate /REPORT 65 files. As such, this conversion utility is only maintained for retrieving historical data files.

To retrieve an old /REPORT 65 file, specify the filename (INPUT FILE*) when prompted. This filename must be limited to 25 characters and include the Drive, Path and extension name (e.g., C:\DATACOM\FACILITY.R65). Next, enter the name of the OUTPUT conversion RUN file. To assign a temporary file, press Enter and the program will automatically assign the name "TEMP.RUN". It will then be replaced the next time a new temporary file is created. If a permanent file is desired, type any filename and include the extension ".RUN" (e.g.,"FACILITY.RUN"). The program will then store the RUN file in the current directory of the hard drive.

After the RUN file has been selected, the program asks: "Do you want to retrieve the entire R65 file (Default = YES) ? (Y/N)." Answer YES (Y) to retrieve the entire file. When you want to retrieve only part of the file, answer NO (N). You may then select a specific emission point or all the sources within a county, town or facility.

This option was created to retrieve portions of the large Regional R65 files that have been made available to staff. It also provides a source specific method for adding missing data and correcting the invalid data in the original R65 data files. NOTE, generic assumptions were made to AUTOMATICALLY assign default values to all missing and invalid data (INCLUDING EMISSION RATES) in the 1996 New York State source files (NYPUBLIC.RUN and NYSTATE.RUN).

The program next states that additional data is needed to run the program and presents three choices: (1) assign one Distance to Property Line (Dpl), Building Width (BW), Building Length (BL) and building orientation to every emission point; (2) assign the data individually for each and every emission point; or (3) AUTOMATICALLY assign default values to all missing and invalid data (INCLUDING EMISSION RATES) without computer prompts. If a facility has only one building and the default parameters are desired, choose "1". Select "2" if you want to enter the correct data for all emission points. Lastly, "3" is reserved for retrieving huge data files (e.g., all sources within a Region) where you want to quickly assign the default values while avoiding the computer prompts. Data can be entered very quickly using any of the selections. Try them all, as the R65 file will not be changed or deleted.

The downloaded /REPORT 65 file is then checked for data transmission (See Section V.B) and "size and shape" errors. Missing data may then be added, or invalid data replaced, by assigning the correct data or DAR-1 default values.

NOTE: Although there is no DAR-1 default value for the hourly emission rate, the AUTOMATIC selection "3" allows the input of a user defined default value. This is included to permit the importing of huge SMS & BARAMIS data files into the DAR-1 software program. When this is done, it is suggested that you assign an extremely small hourly emission rate, such as 0.000001 lbs/hour, so that you can recognize your default assignments. For most sources, the smallest emission rate coded in the Source Management System was only 0.001 lbs/hour.

D. (4) RUN FILE DIRECTORY.

The RUN FILE DIRECTORY presents a listing of all the RUN files stored in the DAR-1 default directory (usually C:\AG1). From this directory, you may Edit, Scan, Delete or Run chosen files. The first page of the RUN file directory is immediately displayed after option (4) is selected. Subsequent file pages can be displayed by pressing the Enter key. Following the last page, the program returns you to the DAR-1 PROGRAM MENU.

To initiate file selection, you first must type "ANY CHARACTER" (e.g., "T") and then press Enter. The program will then highlight the selected first file in the directory. To select the next file, just press the Enter key. You may then Edit, Scan, Delete or Run the highlighted file by following the program prompts.

The Scan feature is one of the most powerful tools in the DAR-1 RUN FILE DIRECTORY. This feature lets you display those sources that meet your selection criteria and highlights the data that appears invalid. The program highlights invalid UTM coordinates, short stacks (less than 33 feet), very short stacks (less than 10 feet: flashing), hourly emissions that are greater than annual emissions (flashing), and annual emissions that are greater than hourly emission times 9736 hours per year (8760 x 110 %). These are the most critical variables in a modeling analysis.

Using the Scan function you may query all sources within a given radius, for a specified permit issuance year or for a specific county, town, facility or emission point. You may Scan for specify contaminants, minimum and maximum emission rates, Environmental Ratings, Control Efficiencies, SIC codes, Source Codes, Toxicity Classifications, carcinogens, non-carcinogens, HAPs and non-HAPs.

E. (5) Print DAR-1 RUN File.

Use this option to print out DAR-1 RUN files. RUN files contain the DAR-1 input data: they do not contain the DAR-1 screening results. Screening results must be printed out from the DAR-1 ANALYSIS MENU.

There are two different types of RUN files, standard RUN files and summary RUN files. Standard RUN files are created using option (1) in the AIR GUIDE-1 PROGRAM MENU. Whereas, summary RUN files are created using option (8). Both types of files can be printed out using this option although the summary RUN file printouts include the contaminant name, AIRS code, Average Environmental Rating (Av Rat) and Average Percent Control (Av % CTL). The Average Environmental Rating and Average Percent Control are averages calculated from all sources in the summary group. These average values are reported in place of the Environmental Rating and Percent Control for the individual sources.

Once selected, the program asks for a title to be assigned. If you have an old dot matrix printer, the program directs you to set the printer head to the top of the form. The message "PRINTING ..." is then displayed when the output is sent to the printer.

NOTE: The DAR-1 program sends output directly to the local parallel printer port (LPT1). For network printing, you must first assign or capture the LPT1 port to the desired network printer. This can be done by using Novell iPrint or by following the procedures outlined in Section I.D and restated in the README.TXT file. Contact your computer specialist for help.

F. (6) Run DAR-1 (with RUN File).

Select this option to "run" (execute) DAR-1 with a chosen input file. You may also execute the program with a selected input file in the RUN FILE DIRECTORY.

After assigning the INPUT FILE, the program queries the user for the run criteria. The program first asks: "Want to assign a 33 foot minimum stack height (Default = NO) ? (Y/N)". The answer to this question, when conducting a permit review, is NO (N). The option was added solely for mass screening applications. When a source has a stack height less than 33 feet, the maximum impact from that source may occur on plant property. Further, when the stack height is less than 10 feet, it's very likely. Many of the reported short stack heights less than 33 feet are likely inaccurate. Therefore, the override option was added to produce more reasonable estimates of off-plant property ambient impacts relative to all the other sources in the Department's database file. NOTE, the override option will never change any stack heights in the INPUT FILE.

The program next asks: "Want to run DAR-1 with the entire input file (Default = YES) ? (Y/N)". Answer YES (Y), if you want to run the entire file. However, if you want to create a smaller RUN file of selected sources, and you want to run the DAR-1 program with those sources, answer NO (N). The program then lets you extract the desired sources from the original data file based on your selection criteria. This option is very powerful when you access one of the files containing all of the sources in New York State (NYSTATE.RUN or NYPUBLIC.RUN). For example, you could retrieve all sources emitting HAPs or those emitting certain contaminants within a specified radius of a receptor. You could also retrieve all of the High toxicity contaminants without control equipment but have emissions greater than one pound per hour. Then again, maybe you'd want to extract a source data file for a consultant, or source owner, upon request.

After you have entered the run criteria, the program displays the message, "WAIT: SEARCHING FOR AGCs & SGCs ...", and searches for the AGCs and SGCs in the AG7CAS.ACC database file. This file contains the AGC and SGC values for every contaminant in the DAR-1 AGC/SGC Tables. Not all of these contaminants have been assigned both Annual (AGC) and Short-term (SGC) Guideline Concentration values. Those without AGCs have dominant short-term effects. A message then follows if an AGC is found for every contaminant.

When a contaminant has no annual or short-term guideline values in the AG7CAS.ACC file, you must assign a temporary AGC value. The program then compares this temporary value to the predicted maximum annual concentration and assigns the SGC equal to 0.0 æg/m3. The program then calculates the short-term impact as 0.0 percent of the Short-term Guideline Concentration (SGC). Both temporary AGC/SGC assignments will not change the programs's AGC/SGC database file. The three methods for assigning these temporary AGCs are described below:

1. Assign ALL unassigned AGCs equal to the Moderate Toxicity de minimis value (0.1 æg/m3).

   Select this choice to assign the DAR-1 Moderate Toxicity de minimis value (0.1 æg/m3) to all contaminants without AGCs. You should be careful not to assign the de minimis value to any contaminants that appear to meet the High Toxicity definition.

   The Moderate Toxicity de minimis value is a relatively small screening value. Many sources with emissions greater than 0.005 lbs/hr will have maximum ambient impacts that exceed the de minimis value if they operate continuously (8760 hrs/yr). However, the de minimis value is also a reasonable number from a toxicological viewpoint. It represents the Most Likely Estimate (MLE) of the 95 percent exceedance value for AGCs. Excluding the High Toxicity contaminants, 95 percent of all AGCs exceed this value, whereas only 5 percent of the AGCs are less. Thus, in situations where no contaminant specific guidance is available, it is reasonably conservative and provides adequate protection most of the time. However, because AGCs are lognormally distributed, there is more than a hundred fold difference between the median value (14 æg/m3) and this protective de minimis value (0.1 æg/m3). Thus, while it may seem extremely conservative, in fact, it is considered reasonably protective.

2. Assign ALL unassigned AGCs equal to 9999999 æg/m3.

To calculate known potential health impacts, select this assignment choice. When this is done, the relative impacts from all sources without assigned AGCs are ignored. The program does this by assigning all unknown AGCs equal to 9999999 æg/m3. This assignment makes a contaminant's impact insignificant in relation to this very large number. Note, this is not part of the normal DAR-1 screening procedure.

There are about 1000 AGCs listed in the AGC/SGC Tables. This represents about half the number of contaminants known to be emitted from sources in New York State. Over the years, some of these other contaminants have been reviewed by the Air Toxics Section but not officially placed in the tables.

When all emissions are accounted for at a facility, a facility known potential health impact can be calculated. This numerical value can be used to help determine control priorities by ranking facilities. It is calculated by dividing each contaminant's actual annual impact by the appropriate AGC and then summing the fractions for all contaminants. The DAR-1 program presents this fraction on a percentage basis in the Contaminant ASSESSMENT SUMMARY of the DAR-1 ANALYSIS MENU (Section IV.A). This procedure is essentially the same approach used in the ACGIH TLV handbook for mixtures.

A calculated facility potential health impact can be misleading when de minimis values have been assigned to those contaminants without AGCs. Some of these values have already been assigned in the AG7CAS.ACC reference file; others, may be assigned using this option. Those already assigned, appear in the DAR-1 AGC/SGC Tables with no numerical guidance or with the de minimis value already assigned. De minimis values are misleading when evaluating potential health impacts because the health impacts associated with exposure to the de minimis concentration can not be quantified. Additionally, consideration should be given to those AGCs based upon "one in a million" cancer risk as compared to those based upon other toxicological effects.

Caution is advised when emissions are listed as a trace amount (0.001 lbs/hr). This represents the smallest hourly emission rate that was usually entered into the Department's old database and it probably represents a worst case emissions estimate.

3. Assign ALL unassigned AGCs individually.

Select this third choice to assign all the missing AGCs individually. The program then allows you to assign the missing AGCs individually for each unassigned contaminant. Once selected, the program searches for name of the first contaminant. Then, it asks if you want to assign the Moderate Toxicity de minimis value. If yes ("Y"), the de minimis value will be assigned to the contaminant. If no ("N"), the message: "Please assign an AGC for the contaminant xxxxx-xx-x" will be displayed. A temporary value must then be assigned as the "AGC" for the specified contaminant. Lastly, if a contaminant name is not found by the program, a prompt for a 20 character chemical name appears. The program then repeats the assignment process for all of the other contaminants without AGCs.

After the temporary AGCs have been assigned, the program displays the message, "WAIT: RUNNING DAR-1 ...". A significant waiting period may then follow while the program completes the enhanced Appendix B screening analysis. Temporary output files are generated detailing the in-depth analysis. Afterwards, the Contaminant ASSESSMENT SUMMARY is displayed. This summary totals the short-term and annual impacts from all sources of each contaminant. Predicted ambient impacts are compared to the appropriate AGC, SGC, or standard, on a percentage basis. Upon exiting the ASSESSMENT SUMMARY, the program presents the "DAR-1 ANALYSIS MENU". This menu presents the entire in-depth screening analysis for review without computational delays. It is discussed in Section IV.

G. (7) Merge DAR-1 RUN Files.

Select this option to merge two or more RUN files into a single file. Use it to evaluate the combined impact from multiple sources, or facilities, stored as individual files. For example, you could merge separate files containing existing and proposed sources.

H. (8) Create New Summary RUN File.

Use this option to create a summary file by contaminant, or AIRS code (new NEDS code), of all sources by State, county, town or facility. You may then run DAR-1 with this summary file to determine what contaminants may have problems meeting the AGCs & SGCs specified in the guidance document. Refer to section V.C of this User's Guide for an example of mass screening.

I. (X) EXIT DAR-1 Program.

To exit the DAR-1 PROGRAM MENU, type "X" and then press Enter. The program will then terminate from this location.

IV. DAR-1 ANALYSIS MENU

```
*************************************************************************
*                                                         version 3.6 *
*                          DAR-1 ANALYSIS MENU                          *
*                                                                       *
*                 (1)  Contaminant ASSESSMENT SUMMARY.                  *
*                                                                       *
*                 (2)  Contaminant IMPACT SUMMARY.                      *
*                                                                       *
*                 (3)  INDIVIDUAL SOURCE ASSESSMENT MENU.               *
*                                                                       *
*                 (4)  INDIVIDUAL SOURCE IMPACT MENU.                   *
*                                                                       *
*                 (5)  STEP BY STEP MENU.                               *
*                                                                       *
*                 (6)  AGCs & SGCs.                                     *
*                                                                       *
*                 (7)  Contaminant Emissions Summary.                   *
*                                                                       *
*                 (8)  MENU of Selected INPUT DATA.                     *
*                 (9)  DAR-1 PRINTOUT MENU.                             *
*                 (0)  ISCLT2 ANNUAL DISPERSION MODEL MENU.             *
*                 (S)  SORTING MENU.                                    *
*                 (X)  EXIT and return to PROGRAM MENU.                 *
*                                                                       *
*   Type 1,2,3,4,5,6,7,8,9,0,S or X and Press (   Enter ) for selection :   *
*            Type "H" and then Press (   Enter ) for HELP.              *
*************************************************************************
```

The DAR-1 ANALYSIS MENU performs an in-depth DAR-1 screening analysis. When this menu is displayed, the screening analysis is essentially complete. To reach this menu, first run (execute) a RUN file in the DAR-1 PROGRAM MENU. The program then performs the enhanced Appendix B screening analysis as discussed in the Introduction. The Contaminant ASSESSMENT SUMMARY, as described below, is then displayed. It can be viewed again by selecting option "1" of this menu.

The analysis menu was designed so that the critical contaminants at a facility can be quickly identified. Sorting the results (SORTING MENU) can help to speed up this process. Screening level failures are highlighted in red whereas potential and possible failures are highlighted in white. When an individual source or contaminant is not highlighted, the individual source passes the screening test. However, that source may still contribute to an overall exceedance when the impacts from all sources are summed (Contaminant ASSESSMENT SUMMARY and Contaminant IMPACT SUMMARY).

Failing an initial screening test isn't the final answer. A screening test only represents an initial assessment of predicted ambient impacts. Failing this test requires the user to perform a better impact assessment using a more refined model. For better predicted annual impacts, the DAR-1 version of USEPA's ISCLT2 model (version 93109) is recommended. For better predicted short-term impacts, the SCREEN3 model is generally recommended. Please note that when you refine the impact estimates using the DAR-1 ISCLT2 model, the refined impacts will not replace the screening estimates shown in the analysis menu.

The DAR-1 program is consistent with all highlighting in the different menu choices. For example, in the AGCs & SGCs display, the program highlights the AGC in red when there is an actual annual impact failure. This same failure is shown in the Contaminant ASSESSMENT SUMMARY where the magnitude of the ambient impact exceedance will also be highlighted in red. Try the different menu choices to see what the program does.

DISPLAY NOTE: When asterisks (****'s) appear instead of a number, this does not signify an error, as the program will still use the correct number in all calculations. Asterisks simply indicate the number was too large for the numerical field. In some instances, this was done deliberately to draw attention to the number.

The DAR-1 ANALYSIS MENU options are discussed below. Read each section to understand the different options. Try them out to see what the program does.

A. (1) Contaminant ASSESSMENT SUMMARY.

This option displays a summary of the DAR-1 screening analysis. It is the first table displayed after a RUN file has been executed. The table shows a summation of the individual source impacts for each and every contaminant. This is done in accordance with the Appendix B DAR-1 screening procedures. Actual failures are highlighted in red (actual annual), whereas possible failures (short-term & cavity annual) and potential failures (potential annual) are highlighted in white. Potential annual failures represent actual failures that may occur if the source operates continuously for a full year. When all sources at a facility have been modeled, and no red or white highlights appear, the facility passes the Appendix B DAR-1 screening analysis. If anything is highlighted, follow the procedures below to determine why the contaminant failed. If the contaminant failed because of an error in the input data, or because a critical default value was used, rerun the program with the corrected data.

The Contaminant ASSESSMENT SUMMARY presents the short-term and annual impacts for each contaminant in addition to the CAS Number and AGC. The impact estimates are represented as a percentage of the appropriate guideline value or standard and are discussed below.

1. SHORT-TERM MAXIMUM impact (Cav,Pt,Area), % of SGC

The SHORT-TERM MAXIMUM impact column presents a summation of the maximum individual short-term contaminant impacts. These impacts may represent a mixture of cavity, point, and area source concentrations. When a summed impact exceeds an SGC or standard, that impact will be highlighted in white and greater than 100 percent of the SGC. This represents a possible short-term impact screening failure. The contaminant passes he short-term impact screening test when the SHORT-TERM MAXIMUM impact is not highlighted.

The Appendix B screening procedures state that cumulative short-term impacts should be evaluated on a "per building" basis for both cavity and point source impacts. Since building identifiers were not originally coded into the Department's database, the software program was not designed to evaluate the impacts on a "per building" basis. As a result, the program sums impacts from all sources of all contaminants. This provides a single worst case assessment both inside and outside the cavity region. Therefore, when a cumulative impact exceeds an SGC, it is highlighted in white because it represents a possible DAR-1 screening failure. When this happens, follow the steps below to reassess the contaminant impacts.

STEP 1 (Evaluate the impacts from each building): Select the INDIVIDUAL SOURCE ASSESSMENT MENU and list the individual impacts for the critical contaminant. Sum the SHORT-TERM MAXIMUM impacts for each contaminant being emitted from each building. If all contaminant impacts from each building are less than the SGC, the facility passes the short-term impact screening test. Proceed to STEP 2 if a cumulative SHORT-TERM MAXIMUM impacts from any building exceeds an SGC.

STEP 2 (Separate, sum and reevaluate each building's cavity and point source impacts): Select the STEP BY STEP MENU to view the DAR-1 Appendix B analysis for the sources in each building with a cumulative SHORT-TERM MAXIMUM impact that exceed an SGC. Separate and sum the "CAVITY Short-Term Impacts" and "Maximum non-cavity Short-Term Impacts" (CST) for the sources in each building. If a "CAVITY Short-Term Impact" exceeds an SGC, refer to Section II.C of Appendix B, and run the SCREEN3 model to recalculate the building's cavity impact. If a "Maximum non-cavity Short-Term Impact" exceeds an SGC, refer to Sections III.D of Appendix B of DAR-1, and run the SCREEN3 model to recalculate the building's maximum impact outside the cavity region.

2. CAVITY ACTUAL ANNUAL impact, % of AGC

The CAVITY ACTUAL ANNUAL impact column presents a summation of the individual cavity annual impacts. When a number in this column exceeds an AGC or annual standard, this number will be greater than 100 and highlighted in white. When the CAVITY ACTUAL ANNUAL is not highlighted, the contaminant passes the Cavity Annual Impact screening test. Numbers highlighted in white represent possible cavity annual impact failures.

When a CAVITY ACTUAL ANNUAL impact is highlighted, the impact for each building must be determined. If all sources are located in the same building, the contaminant fails the cavity annual impact screening test. When there are multiple structures, each building's impact may be determined separately by selecting the INDIVIDUAL SOURCE ASSESSMENT MENU. The individual cavity concentrations are then displayed for each source and the impacts can be totaled for each building. If any building exceeds the AGC or standard, the contaminant fails the cavity annual impact test for the sources in the building.

If a building cavity annual impact exceeds an AGC, refer to Section II.C of Appendix B and run the SCREEN3 model for the sources in the critical building. Then, verify that cavity impacts do occur and also extend beyond the property line. Since cavity impacts are limited to a screening analysis, the annual impacts can be calculated by multiplying the SCREEN3 impacts by a 0.1 factor.

3. POINT or AREA SOURCE POTENTIAL ANNUAL impact, % OF AGC

The POINT or AREA SOURCE POTENTIAL ANNUAL impact column presents a summation of the individual contaminant's potential annual impacts. These individual impacts may be from a point or area source. When a number in this column exceeds an AGC or annual standard, the number will be greater than 100 and highlighted in white. This represents a Potential Annual Impact failure. When the POINT or AREA SOURCE POTENTIAL ANNUAL impact is not highlighted, the contaminant passes the Potential Annual Impact screening test.

When the DAR-1 screening analysis shows that a POTENTIAL ANNUAL impact exceeds an AGC or annual standard, you should conduct a refined analysis using the DAR-1 ISCLT2 model. This model will reduce the conservatism of the screening methods. The DAR-1 ISCLT2 model may be run by selecting option "0" in the DAR-1 ANALYSIS MENU.

A white highlighted POTENTIAL ANNUAL impact presents a warning message. The warning message is simple. If all sources at this facility operated continuously (8760 hours per year), the facility would fail the DAR-1 screening analysis. To Legally restrict this from occurring, attach permit monitoring conditions to restrict the hours per year of operation. These conditions should be considered when an AGC is exceeded only because of a potential increase in operational hours. It is recommended that these conditions be considered only after the DAR-1 ISCLT2 model has been run to refine the impact estimates. You may identify the most significant sources by displaying the individual source impacts (Section IV.C.).

One of the main reasons for considering monitoring conditions is to provide a means for effectively managing sources of contaminants with extremely small AGCs. AGCs based upon cancer risk (U) may be difficult or nearly impossible to meet. Some AGCs are so small, they effectively require a zero emissions discharge or a very high degree of emissions control. Since these risk based AGCs are based upon a lifetime of exposure, the total hours of operation should be considered when permitting a source.

4. POINT or AREA SOURCE ACTUAL ANNUAL impact, % OF AGC

The POINT or AREA SOURCE ACTUAL ANNUAL impact column represents a summation of the individual contaminant's actual annual impacts. These impacts may be from a point or area source. When a number in this column exceeds an AGC or annual standard, the number will be greater than 100 and highlighted in red. This represents an Actual Annual Impact failure. When the POINT or AREA SOURCE ACTUAL ANNUAL impact is not highlighted, the contaminant passes the Actual Annual Impact screening test.

A red highlighted ACTUAL ANNUAL impact represents an DAR-1 screening failure, unless there were errors or inappropriate default values used in the analysis. When an actual annual impact is highlighted, you should verify the failure. Do this by selecting the INDIVIDUAL SOURCE ASSESSMENT MENU and printing out the individual impacts for the failed contaminant. Note the individual failures and then check the input data with the MENU of Selected INPUT DATA. A common error relates to small stack heights. If a stack height is incorrect and/or very small, the predicted impact may be greatly exaggerated. Should any critical errors be found, the program should be rerun with corrected data. When the DAR-1 screening analysis indicates an Actual Annual Impact failure, and the input data has been verified, you should conduct a refined analysis using the DAR-1 ISCLT2 model. When there are questions about the applicability of this model, contact the Impact Assessment & Meteorology Section (518-402-8403).

NOTE: Due to slight differences in the Appendix B equations for the potential and annual impact calculations (due to rounding), at times the potential annual impact may be slightly less than the actual annual impact. When this happens the results should be considered identical. This rounding anomaly occurs when a source operates 8760 hours per year.

B. (2) Contaminant IMPACT SUMMARY.

Select the Contaminant IMPACT SUMMARY to display a summary of the screening impacts in micrograms per cubic meter (æg/m3) of air. The table shows a summation of all individual source impacts for each and every specified contaminant. This is done in accordance with the Appendix B DAR-1 screening procedures. Actual failures are highlighted in red (actual annual), whereas possible failures (short-term & cavity annual) and potential failures (potential annual) are highlighted in white. Potential annual failures represent actual failures that may occur if a source operates continuously. When all sources have been considered and there are no red or white highlights, the facility passes the Appendix B DAR-1 screening procedure. If there are any highlights, follow the procedures described in the Contaminant ASSESSMENT SUMMARY to determine why a contaminant has failed. If a contaminant failed because of an error in the input data, or because a critical default value was used, rerun the program with the data corrected.

The Contaminant IMPACT SUMMARY presents four columns of data in addition to the CAS number and AGC. These columns are briefly described below. Each column shows a contaminant's predicted ambient concentration in æg/m3. Concentrations exceeding the appropriate guideline value or standard are highlighted.

1. SHORT-TERM MAXIMUM impact, (Cav,Pt,Area), æg/m3

   The SHORT-TERM MAXIMUM impact column represents a summation of the maximum individual short-term impacts in micrograms per cubic meter (æg/m3) of air. These individual impacts may be a mixture of cavity, point or area source impacts. When a number exceeds an SGC or standard, the number will be highlighted in white because it represents a possible DAR-1 screening failure. When an impact is not highlighted, the contaminant has passed the short-term impact screening test.

2. CAVITY ACTUAL ANNUAL impact, æg/m3

   The CAVITY ACTUAL ANNUAL impact column represents a summation of the individual contaminant's cavity annual impacts in micrograms per cubic meter (æg/m3) of air. When a number in this column exceeds an AGC or annual standard, this number will be highlighted in white. This represents a possible cavity annual impact failure. When an impact is not highlighted, the contaminant passes the Cavity Annual Impact screening test.

3. POINT or AREA SOURCE POTENTIAL ANNUAL impact, æg/m3

   The POINT or AREA SOURCE POTENTIAL ANNUAL impact column represents a summation of the individual contaminant's potential annual impacts in micrograms per cubic meter (æg/m3) of air. These impacts may be from point or area sources. When a number in this column exceeds an AGC or annual standard, this number will be highlighted in white. This represents a Potential Annual Impact failure. When an impact is not highlighted, the contaminant passes the Potential Annual Impact screening test.

4. POINT or AREA SOURCE ACTUAL ANNUAL impact, æg/m3

   The POINT or AREA SOURCE ACTUAL ANNUAL impact column represents a summation of the individual contaminant's actual annual impacts in micrograms per cubic meter (æg/m3) of air. These impacts may be from point or area sources. When a number in this column exceeds an AGC or annual standard, this number will be highlighted in red. This represents an Actual Annual Impact screening failure. When an impact is not highlighted, the contaminant passes the Actual Annual Impact screening test.

C. (3) INDIVIDUAL SOURCE ASSESSMENT MENU.

This sub-menu provides several choices for displaying individual source contaminant impacts. These impacts are listed by emission point and CAS number and are shown as a percentage of their respective guideline value or standard. Actual failures are highlighted in red (short-term, cavity annual, actual annual), whereas potential failures (potential annual) are highlighted in white. Potential annual failures represent actual failures that may occur if a source operates continuously.

Individual impacts are represented in the same format as those described in the Contaminant ASSESSMENT SUMMARY. However, highlighted short-term and annual cavity impacts represent actual failures. When an individual source contaminant has failed the short-term or annual cavity test, the building impact associated with that individual source must also have exceeded the guideline limit. The sub-menu choices are briefly discussed below:

1. Display ALL sources.

   Display all sources individually by emission point and CAS number.

2. Display sources with a specified CAS Number.

   Display the individual impacts from all sources emitting the specified contaminant. Once chosen, the program will prompt you for the CAS number.

3. Display sources within specified RADIUS or for specified YEAR and/or LOCATION/FACILITY/EMISSION POINT Source ID and/or CONTAMINANT(s) and/or EMISSION RATES and/or ENVIRONMENTAL RATINGS and/or % CONTROL and/or SIC code(s) and/or SOURCE CODE(s) and/or based upon CANCER RISKS/NO CANCER RISKS/ALL HEALTH EFFECTS and/or HAPS/NO HAPS/ALL CONTAMINANTS and/or TOXICITY CLASSIFICATIONS.

   Display the individual impacts from all sources meeting the selection criteria you specify. With this choice, you may evaluate the impacts from many different perspectives.

4. Display carcinogenic sources with "one in a million" risk AGCs (U).

   Display and sum the individual contaminant impacts for every source with an AGC based upon a "one in a million" inhalation cancer risk. When an annual impact is equal to 100 percent of an AGC, the additional risk associated with lifetime exposure to that contaminant is equivalent to a potential inhalation cancer risk of "one in a million". In other words, one additional person has the potential for developing cancer for every million people exposed to the annual concentration. If a source impact is 1000 percent of an AGC, the additional risk would be equivalent to "one in a hundred thousand." These risk based AGCs are characterized by the code "U" as shown in the AGCs & SGCs menu option.

   When the impacts are summed for all sources with AGCs based upon a "one in a million" risk, the program is in effect performing a basic inhalation Health Risk Assessment for known carcinogens. This screening level assessment is based upon conservative impact estimates and the assumption that carcinogenic risk is additive for all of the contaminants evaluated.

5. Display non carcinogenic sources with health based AGCs (no de minimis or AGCs = 9999999 ug/m3 [HOW: d,*,X or ?]).

   Display and sum the individual contaminant impacts for every source with an AGC based upon non carcinogenic effects. Most of these AGCs are based upon TLV occupational values. The program will then display the impacts from each emission point emitting such a contaminant.

   When these impacts are summed, the total can be used as a relative indicator of a potential non-carcinogenic inhalation health risk. This is called a Hazard Index in Health Risk Assessments. A Hazard Index of "1" is equivalent to 100 percent. This is essentially the same approach used in the ACGIH TLV handbook for mixtures.

6. Display sources that fail DAR-1.

   Display each individual source contaminant that fails the DAR-1 screening analysis. Actual failures (short-term, cavity annual, actual annual) are highlighted in red, whereas potential failures (potential annual) are highlighted in white. Note, since the listing only shows individual source screening failures, a facility contaminant could still fail the screening analysis when the individual impacts are summed (Contaminant ASSESSMENT SUMMARY).

D. (4) INDIVIDUAL SOURCE IMPACT MENU.

This sub-menu is essentially identical to the INDIVIDUAL SOURCE ASSESSMENT MENU except the impacts are shown in micrograms per cubic meter (æg/m3) of air. Several choices are given for displaying individual source impacts for each emission point and CAS number selected. Impacts exceeding the guideline value or standard are highlighted. Actual failures (short-term, cavity annual, actual annual) are highlighted in red, whereas potential failures (potential annual) are highlighted in white.

The INDIVIDUAL SOURCE IMPACT sub-MENU has six choices for displaying individual source impacts. These choices are described in the INDIVIDUAL SOURCE ASSESSMENT MENU and are listed below:

1. Display ALL sources.

2. Display sources with a specified CAS Number.

3. Display sources within specified RADIUS or for specified YEAR and/or LOCATION/FACILITY/EMISSION POINT Source ID and/or CONTAMINANT(s) and/or EMISSION RATES and/or ENVIRONMENTAL RATINGS and/or % CONTROL and/or SIC code(s) and/or SOURCE CODE(s) and/or based upon CANCER RISKS/NO CANCER RISKS/ALL HEALTH EFFECTS and/or HAPS/NO HAPS/ALL CONTAMINANTS and/or TOXICITY CLASSIFICATIONS.

4. Display carcinogenic sources with "one in a million" risk AGCs (U).

5. Display non-carcinogenic sources with health based AGCs (no de minimis or AGCs = 9999999 ug/m3 [HOW: d,*,X or ?]).

6. Display sources that fail DAR-1.

E. (5) STEP BY STEP MENU.

Select this option to display the enhanced Appendix B air quality screening analysis step-by-step. The program will reference both Appendix B and the "Technical Reference for the Screening Procedures of the DAR-1 Software Program" as it goes through the individual steps of the air quality impact analysis. Actual screening failures are highlighted in red (short-term, cavity annual, actual annual), whereas potential failures (potential annual) are highlighted in white. Advisory messages are highlighted in blue.

Use this option to view the individual short-term cavity and point source impacts from a specific source and get a detailed description of how they were calculated. Remember, the maximum of these two values is reported and summed by the DAR-1 software program. When this option is selected, the program will display the step-by-step procedures as it goes through the DAR-1 analysis. To better understand the steps, follow along with Appendix B and the Technical Reference.

The STEP BY STEP sub-MENU displays several choices for displaying the in-depth DAR-1 screening analysis. This analysis will be displayed on the computer monitor. The choices are briefly discussed below:

1. Display Entire Analysis.

   Displays the entire analysis step-by-step.

2. Display Analysis for CAS NUMBER.

   Displays the entire analysis for a specific contaminant. Once chosen, the program will prompt you for the CAS NUMBER of the desired contaminant. Then, the program will display the entire analysis for every emission point that emits the specified contaminant.

3. Display Analysis for 15 character EMISSION POINT.

   Displays the entire analysis for a single specified EMISSION POINT. Once chosen, the program will prompt you for the EMISSION POINT. Then, the program will display the entire analysis for every contaminant emitted from this specified source.

4. Display Analysis for Specific EMISSION POINT and CAS NUMBER.

   Displays the entire analysis for a specific contaminant emitted from a specified emission point. The program will prompt you for the CAS NUMBER and EMISSION POINT. Then, the program will display the entire analysis for the specified source and contaminant.

F. (6) AGCs & SGCs.

This option displays the AGCs, SGCs and standards used in the DAR-1 analysis. SGCs will be highlighted in white if the sources associated with the contaminant are possible short-term impact screening failures. If an SGC is not highlighted, the contaminant passed the DAR-1 short-term impact screening test. AGCs highlighted in red reflect actual screening failures (actual annual impacts). Those highlighted in white represent possible or potential failures. Possible AGC failures are associated with Cavity Annual Impacts, whereas potential AGC failures are associated with Potential Annual Impacts. When the program has evaluated all sources and nothing is highlighted, all sources pass the Appendix B DAR-1 screening analysis.

The AGCs & SGCs display summarizes the contaminants emitted from all sources in the RUN file. These contaminants are listed and sorted numerically by CAS number unless the data has been sorted differently in the SORTING MENU. The table displays the CAS number, contaminant name, AGC, how the AGC was derived (HOW), SGC, how the SGC was derived (HOW), the toxicity classification (TOX) and five additional spaces for individual contaminant codes (CODES). Eight of the columns in the table present single alphanumeric characters (HOW, HOW, TOX, C, O, D, E and S) to abbreviate supplemental information. These abbreviations are discussed below.

NOTE: In the DAR-1 AGC/SGC Tables, "W" is used to describe "Who derived" an AGC or SGC value. In this program, this same field is described by the column heading, "HOW", or "HOW the AGC or SGC was derived". Although the both column headings and descriptions are different, the information presented is identical.

1. "HOW" the AGC or SGC was derived:

A Based upon NYSDEC structure-activity Analogy (Analogy).

D Derived by NYSDEC (DEC).

E Based upon USEPA IRIS data (RfC or Unit Risk Factor).

H Derived by NYSDOH (Health).

S Listed value is a Federal or NYS Standard (Standard). When a specific compound is classified as a particulate and the PM-10 standard (50 ug/m3)is less than the preliminary AGC value, the annual PM-10 standard will be listed in place of the preliminary AGC value. When this occurs, check to make sure the contaminant is emitted as a particulate (AIRS code 1). If it is not a particulate, liquid or solid, contact the Air Toxics Section (518-402-8402).

T Derived from latest ACGIH TWA-TLV (TLV).

d AGC assigned as de minimis limit. If this compound is classified as a Low Toxicity contaminant, the AGC has been assigned equal to 1.0 æg/m3. Otherwise, the Moderate Toxicity de minimis limit (0.1 æg/m3) was assigned.

( ) There is no SGC for this contaminant (blank), although it is listed as 0.0 æg/m3. You may ignore the short-term impact from this contaminant as the listed AGC is the controlling guideline value.

SPECIAL DAR-1 SOFTWARE PROGRAM "AGC" & "SGC" ASSIGNMENTS:

s The value listed is a "DAR-1 Equivalent Air Quality Standard." This equivalent standard was derived from a Federal or State air quality standard as it was adjusted to an hourly or annual averaging time. This reference value is not an actual standard, AGC, or SGC. It is a value developed for assessing compliance with the real standard. DAR-1 Equivalent Air Quality Standards were developed expressly for the DAR-1 computer program. If a contaminant exceeds an equivalent standard, compliance should be reassessed for the real standard and the correct averaging time.

If a preliminary AGC or SGC value existed for this contaminant, it was replaced with the equivalent standard if it was smaller. Caution is advised if the assigned equivalent standard was based on the "hourly" Federal PM-10 standard (380 æg/m3, rounded to 2 decimal places). When this happens, check to make sure that the contaminant is in fact emitted as a particulate. This assumption has been made based on the assigned AIRS code of "1" for the particulate. If the equivalent PM-10 standard has been assigned as the "AGC" or "SGC" value, and the contaminant is not a solid or liquid particulate, contact the Air Toxics Section (518-402-8402) for guidance.

* No AGC has been assigned to this contaminant. However, this compound is a High Toxicity contaminant and probably a known human carcinogen. Sufficient toxicological data may not be available to develop an AGC. The "AGC" listed has been assigned a numerical value of 0.00000003 æg/m3 so that the source will fail the DAR-1 analysis. The assigned "AGC" is equal to that of the most toxic contaminant in DAR-1: 2,3,7,8 TCDD. (Note: The DAR-1 program will terminate with an error message if an AGC is assigned equal to zero.)

X Compound is EXEMPT from DAR-1 review because it is a simple asphyxiant or water. The "AGC" has been assigned equal to 9999999 æg/m3 and the "SGC" equal to 0.0 ug/m3. The annual impact will then be insignificant in relation to 9999999 ug/m3 and the short-term impact will be zero percent (0.0000 %) of the SGC. These values are not real guideline limits. The assignments have been made so that sources emitting the contaminants will pass the screening analysis.

2. DAR-1 Toxicity Classifications (TOX):

H High Toxicity Contaminant.

M Moderate Toxicity Contaminant.

L Low Toxicity Contaminant.

( ) The contaminants Toxicity Classification is unknown (blank).

3. CODES:

A ACGIH TWA-TLV handbook classifies this compound (A1) as a confirmed human carcinogen.

B ACGIH TWA-TLV handbook classifies this compound (A2) as a suspected human carcinogen.

C Assigned SGC is a Ceiling limit.

G Contaminant classified as a simple asphyxiant in the ACGIH TWA-TLV handbook.

H HAP identified by 1990 Clean Air Act Amendments.

I Refer to ACGIH TWA-TLV handbook.

K Multiple TWA-TLVs have been assigned to this contaminant in the ACGIH TWA-TLV handbook.

U AGC exposure equivalent to "one in a million" risk.

G. (7) Contaminant Emissions Summary.

This option displays an emissions summary for all of the contaminants used in the DAR-1 analysis. The summary shows the CAS number, contaminant name, number of emission points emitting the contaminant, emissions in lbs/hour and the emissions in lbs/year.

The lb/hour emission rate will be highlighted in white if it represents a possible SGC short-term impact screening failure or potential AGC annual impact screening failure. Remember, a POTENTIAL ANNUAL IMPACT is based upon continuous operation at the stated lb/hour emission rate as it assumes the source operates 8760 hours per year.

The lb/year emission rate will be highlighted in white if it represents a possible cavity annual impact failure. It will be highlighted in red if it represents an actual annual impact failure. When all sources have been considered and nothing is highlighted, all contaminants pass the Appendix B DAR-1 screening analysis.

H. (8) MENU of Selected INPUT DATA.

This sub-menu offers several choices for displaying the DAR-1 input data. It can be used to help find critical errors.

Besides the emission rate, the most important variable affecting the magnitude of a predicted maximum ambient impacts is the plume height. Short stacks with low plume heights have large impacts in relation to their emission rate, while tall stacks, have relatively small impacts. You can check for short stack heights, invalid UTM coordinates and questionable emission rates using this sub-MENU. The program highlights obviously invalid UTM coordinates, short stacks (less than 33 feet), very short stacks (less than 10 feet; flashing), hourly emissions that are greater than annual emissions (flashing), and annual emissions that are greater than hourly emission times 9736 hours per year (8760 x 110 %). These are the most critical variables in a modeling analysis.

The MENU of Selected INPUT DATA offers several choices for displaying a RUN file. These choices are briefly discussed below:

1. Display ALL input Data.

2. Display input data for a specified CAS Number.

   Display input data from all sources that emit a specific contaminant. Once chosen, the program will prompt you for the contaminant's CAS number.

3. Display EP Stack, Location & Building Parameter Data.

   Display the EMISSION POINT RECORDS for all sources.

4. Display input data for all sources within specified RADIUS or for specified YEAR and/or LOCATION/FACILITY/EMISSION POINT Source ID and/or CONTAMINANT(s) and/or EMISSION RATES and/or ENVIRONMENTAL RATINGS and/or % CONTROL and/or SIC code(s) and/or SOURCE CODE(s) and/or based upon CANCER RISKS/NO CANCER RISKS/ALL HEALTH EFFECTS and/or HAPS/NO HAPS/ALL CONTAMINANTS and/or TOXICITY CLASSIFICATIONS.

   Display all sources for the selection criteria you specify.

After a choice has been made, a table is displayed showing the selected data. For the most part, the data is printed out in the same format that appears in a RUN file. A RUN file contains two different record types, emission point records and contaminant emission records. Emission point records are shown on three separate lines. The first line of the record is displayed in blue and shows the Facility Name, Address, and City/Town/Village. The second line, also blue, shows the SIC code, Source Code, application type, UTM coordinates, UTM zone and the direction the building length faces (building orientation). The rest of the emission point record is displayed in green and described by a header line of the same color. Finally, the contaminant emission record shows the CAS number, hourly emissions, annual emissions, Environmental Rating and percent (%) control efficiency and is displayed in white.

All area source modeling parameters are displayed in red. This includes the height of area source (hA), the distance from the center of the area source to the point of impact (D) and the side length of the area source (S). The words "AREA SOURCE" will be highlighted in red and stated on the second line of the emission point record.

All of the elements of the emission point and contaminant emission records are described below as they appear on the computer screen and RUN file. The Fortran format for the RUN file is also shown.

EMISSION POINT RECORD (Record has up to 199 characters in RUN file):

Header Name	Description
Facility Name (File, County/Town)	Facility Name (1st blue line) is located in character positions 2-31 as an alphanumeric field. For Summary RUN files created by this program (PROGRAM MENU: Create New Summary RUN file), this field will contain the filename of the original summed file, or the county, town or facility name. RUN file format: (A30, positions 109-138).
Address	Facility Address (1st blue line) is located in character positions 33-62 as an alphanumeric field. RUN file format: (A30, positions 139-168).
CTV	City, Town or Village (1st blue line) is located in character positions 64-78 as an alphanumeric field. RUN file format: (A15, positions 169-183).
SIC	Standard Industrial Classification code (SIC, 2nd blue line) is located in character positions 7-10 as an integer. RUN file format: (I4, positions 105-108).
SC	Source Code (SC, 2nd blue line) is located in character positions 17-20 as an alphanumeric field. RUN file format: (A4, positions 184-187).
APP	Permit Application type (APP, 2nd blue line) is located in character positions 29-30 as an alphanumeric field. RUN file format: (A2, positions 81-82).
UTME	NY Universal Transverse Mercator Easting (UTME, meters, 2nd blue line) is located in character positions 39-46 as a real number. This is a NYTM Easting as it is zone 18 extended. RUN file format: (F8.0, positions 83-90).
UTMN	NY Universal Transverse Mercator Northing (UTMN, meters, 2nd blue line) is located in character

positions 55-62 as a real number. Note that the first digit (4) has been omitted in the old SMS database files (e.g., 4774500 entered as 774500) to keep only six significant figures. Also, for all of New York State, the "UTMN" is for zone 18, extended. RUN file format:(F8.0, positions 91-98).

UTM ZONE	PROGRAM OPTIONAL FIELD: Universal Transverse Mercator Zone (ZONE, 2nd blue line) is located in character positions 66-67 as an integer. This information is not necessary for running version 3.6 of the DAR-1 software program and the user is encouraged to assign the default value (just press Enter and the program will assign 0). This new field was added for national scale modeling applications. RUN file format: (I2, positions 198-199).
"Source Type"	PROGRAM OPTIONAL FIELD: For area sources, the words "AREA SOURCE" (red, on 2nd blue line) are displayed in character positions 68-78. If these words are not displayed, the source is a point source. In the RUN file, the source type is coded as "P" for point sources or "A" for area source. RUN file format: (A1, position 80).
BL DIR	Direction Building Length is facing (BL DIR, degrees from north, 2nd blue line) is located in character positions 73-78 as a real number. RUN file format: (F6.1, positions 99-104).
LOC	Location code (LOC, green display) is located in character positions 1-6 as an alphanumeric field. RUN file format: (A6, positions 1-6).
FAC	Facility code (FAC, green display) is located in character positions 7-10 as an alphanumeric field. RUN file format: (A4, positions 7-10).
EP	Emission Point (EP, green display) is located in character positions 11-15 as an alphanumeric field. RUN file format: (A5, positions 11-15).
DATE	Date of record creation or modification (DATE [month, day, year], green display) is displayed in character positions 16-21 as a numerical field. If the RUN file data was retrieved from an R65 file, this is the Permit issuance date. RUN file format: (3I2, positions 16-21).
HA/hA	Height Above structure (HA, feet, green display) for point sources is located in character positions 22-27 as a real number. If the number is displayed in red, it is the Height of Area source (hA, feet). RUN file format: (F6.0, positions 22-27).

hs	Stack height (hs, feet, green display) is located in character positions 28-32 as a real number. RUN file format: (F5.0, positions 28-32).
D	Stack Diameter (D, inches, green display) is located in character positions 33-37 as a real number. If a stack is rectangular, the equivalent circular diameter should be used. RUN file format: (F5.0, positions 33-37).
T	Stack exit Temperature (T, degrees Fahrenheit, green display) is located in character positions 38-43 as a real number. RUN file format: (F6.0, positions 38-43).
V	Stack exit Velocity (V, ft/sec, green display) is located in character positions 44-50 as a real number. RUN file format: (F7.2, positions 44-50).
Q	Stack exit flow rate (Q, ACFM, green display) is located in character positions 51-59 as a real number. RUN file format: (F9.2, positions 51-59).
Dpl/D	Shortest Distance from source building to Property Line (Dpl, feet, green display) for point sources is located in character positions 60-66 as a real number. If the number is displayed in red, it is an area source and represents the Distance from the center of the area source to the point of impact (D, feet). RUN file format: (F7.0, positions 60-66).
BW/S	Building Width (BW, feet, green display) of source building for point sources is located in character positions 67-71 as a real number. If the number is displayed in red, it is the Side length (S, feet) of an area source. RUN file format: (F5.0, positions 67-71).
BL	Building Length (BL, feet, green display) of source building is located in character positions 72-76 as a real number. RUN file format: (F5.0, positions 72-76).
#	Number of contaminants (#, green display) emitted from this source is located in character positions 77-79 as an integer. RUN file format: (I3, positions 77-79).
Hours/Day	PROGRAM OPTIONAL FIELD FOR DOWNLOADED DATA: The hours/day that a source operates. This data is never displayed or printed out by the DAR-1 program. It is only used for verifying the emissions from old downloaded R65 files. If the source data in a RUN file has been downloaded from an R65 file, the hours/day will be shown in character positions 188-192 of the RUN file. RUN file format: (F5.1,

positions 188-192).

Header Name	Description
Days/Year	PROGRAM OPTIONAL FIELD FOR DOWNLOADED DATA: The days/year that a source operates. This data is never displayed or printed out by the DAR-1 program. It is only used for verifying the emissions from old downloaded R65 files. If the source data in a RUN file has been downloaded from an R65 file, the days/year will be shown in character positions 193-197 of the RUN file. RUN file format: (F5.0, positions 193-197).

CONTAMINANT EMISSION RECORD (up to 109 characters):

Header Name	Description
CAS NUMBER	Chemical Abstracts Service Registry number (CAS NUMBER, white display) for a contaminant is located in character positions 1-10 as an alphanumeric field. Upper case letters and dashes must be included (xxxxx-xx-x). If the CAS number has 11 characters, the first dash should be dropped (xxxxxxxx-x). RUN file format: (A10, positions 1-10).
EMISSIONS (lb/hr)	Actual hourly emission rate (lbs/hour, white display) for source contaminant is located in character positions 11-39 (F29.15) as a real number. RUN file format: (F30.15, positions 11-40).
EMISSIONS (lb/year)	Actual annual emission rate (lbs/year, white display) for source contaminant is located in character positions 40-69 as a real number. RUN file format: (F30.15, positions 41-70).
Rat (Av Rat)	Contaminants Part 212 Environmental Rating (Rat, white display) is located in character position 71 as an alpha field. The rating will be blank unless the source data was downloaded from the Source Management System. For Summary RUN files (option 8, DAR-1 PROGRAM MENU), this field will contain the average Environmental Rating for all sources emitting the specified contaminant. RUN file format: (A1, position 71).
%Ctrl (Av %Ctrl)	Percent Control efficiency (%Ctrl, white display) is located in character position 72-79 as a real number. The number will always be equal to 0.0000 unless the source data was downloaded from the Source Management System. For Summary RUN files (OPTION 8, DAR-1PROGRAM MENU), this field will contain the average percent control efficiency for all sources emitting the specified contaminant. RUN file format: (F8.4, positions 72-79).

Contaminant Name — PROGRAM OPTIONAL FIELD FOR SUMMARY RUN FILES: The name of a chemical emitted from a source(s). Contaminant name(s) are shown in character positions 80-99 of a Summary RUN file (option 8, DAR-1 PROGRAM MENU). They can be printed out using option 5 of the DAR-1 PROGRAM MENU. RUN file format: (A20, positions 80-99).

# of Contaminant Srces — PROGRAM OPTIONAL FIELD FOR SUMMARY RUN FILES: The number of individual sources emitting a specified contaminant. The contaminant emissions from these individual sources were summed by town, county, facility or file using option eight (8)of the DAR-1 PROGRAM MENU. The number of contaminant sources is listed in character positions 100-107 of each Summary RUN file. This can be printed out using option 5 of the DAR-1 PROGRAM MENU. RUN file format: (A20, positions 80-99). RUN file format: (I8, positions 100-107).

AIRS Code — PROGRAM OPTIONAL FIELD FOR SUMMARY RUN FILES: The Aerometric Information Retrieval System (AIRS) code. The AIRS code is shown in character position 108 of a Summary RUN file (option 8, DAR-1 PROGRAM MENU). It can be printed out using option 5 of the DAR-1 PROGRAM MENU. RUN file format: (A1, position 109 (108 is blank)).

*NOTE: If you edit a RUN file using a text editor, remember to include decimal points on all real numbers. A decimal point takes up one character position in a numerical field. For example, a 5 character real number would contain only 4 numbers ("1234.").

I. (9) DAR-1 PRINTOUT MENU.

This sub-menu presents several choices for generating a hard copy of the DAR-1 screening analysis.

The printouts generated by these choices are very similar to the screen displays shown in the DAR-1 ANALYSIS MENU. However, the hard copy printouts show more information. Note, a printout of an entire analysis (5) can be very lengthy.

1. Print out Contaminant ASSESSMENT SUMMARY.

2. Print out Contaminant IMPACT SUMMARY.

3. Print out INDIVIDUAL SOURCE ASSESSMENTS.

4. Print out INDIVIDUAL SOURCE IMPACTS.

5. Print out entire analysis.

6. Print out AGCs & SGCs.

7. Print out Contaminant Emissions Summary.

8. Print out INPUT DATA.

J. (0) ISCLT2 ANNUAL DISPERSION MODEL MENU.

Use this option to run the DAR-1 version of USEPA's Industrial Source Complex Long Term 2 (ISCLT2) model (version 93109) for point and/or area sources. This model has been integrated into the DAR-1 computer program. It assumes no gravitational settling and all receptors are located on flat terrain. Version 3.6 also has a new option that uses pollutant half-lives to account for pollutant removal by physical or chemical means. The model will calculate annual concentrations, concentration/AGC ratios, inhalation cancer risks, and inhalation hazard indices for one or more grid receptor displays. The model does not calculate annual cavity concentrations.

When running the DAR-1 version of the ISCLT2 model, the results should be identical to USEPA's version 93109. To accomplish this, the key subroutines were integrated into the DAR-1 computer program (AG7GRID.EXE). Additionally, the software program has been enhanced so it's more user friendly and quicker for many applications. The DAR-1 program essentially generates the input data run-stream and controls the execution and output of the ISCLT2 model. This input data run-stream is created through prompting done by the computer program. You can select one of several meteorological data files, the RURAL or URBAN mode, the decay half-life modeling option, the contaminants and/or emission points to be evaluated, actual annual or potential annual emissions, and indirectly define how building downwash is handled. The details of the building downwash method (DAR-1 ISCLT2 WORST CASE CROSSWIND BUILDING WIDTH (hw) ASSIGNMENT METHOD) are discussed in the technical reference mentioned in the Introduction. On output, you can select the modeling grid receptors for single or multiple grids, an auto-zooming feature to find the maximum value, and/or select a file dumping option to allow for later retrieval into mapping programs like SURFER or GIS.

The software program lets you run the DAR-1 ISCLT2 model for sources screened using the enhanced Appendix B methods. This lets you resolve potential compliance problems using a more refined approach. This is a very powerful combination because you can jump back and forth between the screening and refined methods. You can use the screening results as a "road map" to identify the critical sources and contaminants at a facility. Then, the DAR-1 ISCLT2 model can be run for those critical sources and contaminants to refine the impact estimates. Another powerful feature of the DAR-1 ISCLT2 model allows reiterative executions for different receptor grids. You can rerun the model for other grid receptors by instructing the program to move north, south, east, west, or to zoom in/out on the maximum value. Additionally, the program will display the top one-hundred sources (TOP100) at the highlighted point of maximum predicted concentration, concentration/AGC ratio, cancer risk or hazard index for the presented modeling grid display.

1. Selecting the ISCLT2 Modeling Output

The ISCLT2 (93109) ANNUAL DISPERSION MODEL MENU presents several choices for displaying a refined modeling analysis. These choices are briefly discussed below. With the exception of choice (0), where different meteorological data files can be assigned, each selection only controls the values displayed: concentrations, concentration/AGC ratios, inhalation cancer risks, or inhalation hazard indices. These values are presented in one or more 13 x 8 modeling grid displays surrounding the location of the selected source(s).

a. (0) Reassign METEOROLOGICAL file: xxxxx.MET

Select this choice to reassign the meteorological data file. The current selection will be listed as "xxxxx.MET". Once selected, the program will display a directory of available files. You can assign or scan any of these files by following the system prompts. The scan feature lets you read the applicable areas and view a summary of each set of meteorological data.

b. (1) Display CONCENTRATIONS for Contaminant (æg/m3).

Displays the modeled concentrations for the selected contaminant. Impacts exceeding the AGC will be highlighted in red if annual emissions were modeled. They will be highlighted in white if potential annual emissions were modeled.

c. (2) Display CONCENTRATION/AGC Ratios for Contaminant(s).

Displays concentration/AGC ratios for the contaminant(s) selected. Ratios exceeding 1 will be highlighted in red if annual emissions were modeled. They will be highlighted in white if potential annual emissions were modeled.

d. (3) Display inhalation CANCER RISKS (risk per million) for Contaminant(s).

Displays inhalation cancer risks for the contaminant(s) selected. Potential cancer risks greater than "one in a million" will be highlighted in red if annual emissions were modeled. They will be highlighted in white if potential annual emissions were modeled.

e. (4) Display inhalation HAZARD INDEX for Contaminant(s).

Displays the inhalation hazard indices for the contaminant(s) selected. Hazard indices exceeding 1 will be highlighted in red if annual emissions were modeled. They will be highlighted in white if potential annual emissions were modeled.

A hazard index is a relative indicator of the non-carcinogenic effects associated with exposure to one or more contaminants at a specific receptor. The DAR-1 program calculates a hazard index by summing the CONCENTRATION/AGC ratios for all non-carcinogenic contaminants. This summation excludes the potential non-carcinogenic effects associated with exposure to carcinogenic contaminants. Also excluded are the potential non-carcinogenic effects associated with exposure to the contaminants without AGC values (de minimis values or 9999999 ug/m3).

The hazard index approach assumes that dose additivity is most properly applied to compounds that induce the same effect by the same mechanism of action. Application of the hazard index equation to a number of compounds that are not expected to induce the same type of effects or that do not act by the same mechanism is appropriate as a screening level approach, but could overestimate the potential for effects. If a hazard index is greater than unity as a consequence of summing several hazard quotients of similar value, it would be appropriate to segregate the compounds by effect and by mechanism of action and to derive separate hazard indices for each group. This can be accomplished with the help of the Air Toxics staff.

For special applications, a true hazard index can be calculated by modifying the AG7CAS.DAT file (see Section V.A) to create a separate "AGC/SGC/standards" file based upon non-carcinogenic effects.

f. (X) EXIT and return to ANALYSIS MENU.

To exit the ISCLT2 (93109) ANNUAL DISPERSION MODEL MENU, type "X" and then press Enter. You will then exit and return to the DAR-1 ANALYSIS MENU.

To terminate the DAR-1 program from any location, hold down the "Ctrl" key and then press "Break".

2. Selecting the ISCLT2 Model Options

After the modeling output has been selected, the program asks you to "SELECT THE MODEL OPTIONS" and provide the following information. The default values can be entered by pressing the Enter key.

a. ENTER the RUN MODE, "R" for RURAL or "U" for URBAN (Default = RURAL):

Enter the run mode based on the area classification. Note that the default value (rural) is not always conservative. The selection of Urban vs. Rural is discussed in Section IV.H of DAR-1 Appendix B and reprinted below. When the urban or rural classification is in doubt, run the model twice and pick the outcome with the highest impact. Otherwise, contact the Impact Analysis & Meteorology Section (518-402-8402) for assistance.

"The dispersion over cities and other built-up areas is enhanced due to increased surface roughness and heating relative to those over flat and open (rural) terrain. This enhanced dispersion is characterized by a set of urban dispersion curves developed from a synthesis of several studies, and used in regulatory models such as ISC2. EPA has developed certain criteria to determine whether these urban curves should be used for specific source applications. The most common procedure is the land use method whereby a 3 km area around a source is classified according to land cover. If 50% or more of this classification is of compact industrial, commercial or residential type, then the urban curves should be used. Thus, all metropolitan areas and city centers should be modeled with the urban dispersion parameters. In addition, the heat generated at large industrial facilities enhances the thermal dispersion to such a degree that the urban curves are appropriate. Thus, large facilities like Kodak Park and Bethlehem Steel should also be modeled with the urban curves."

b. Want to model with decay HALF-LIVES (Default = NO)? (Y/N):

This option lets you model with decay half-lives. The ISCLT2 model uses half-lives to account for pollutant removal by physical or chemical processes. For most contaminants, this removal process begins to take place downwind of the point of maximum predicted concentration.

You may use the half-lives contained in the DAR-1 database file (AG1CHEM.TXT) or use this program to assign and save your own values in the YOURCHEM.TXT file. Almost all of the half-lives contained in the DAR-1 database file were taken from EPA source documents and are considered generally conservative. Therefore, with the exception of the sulfur dioxide half-life (use only for urban settings), you may use the AG1CHEM.TXT values without review. All half-lives assigned by you, and contained in the YOURCHEM.TXT database file, must be supported with documentation and acceptable to the Department for regulatory modeling applications.

NOTE: For almost all of the near-field modeling applications of DAR-1, modeling with half-lives will not significantly reduce the maximum predicted ambient impacts from a facility. Additionally, modeling with half-lives can slow down the speed of the DAR-1 ISCLT2 program.

c. ENTER the CAS NUMBER (Default = ALL CAS NUMBERS) :

Enter the CAS number for the source(s) you want to model. This alphanumeric field must be 10 characters long (xxxxx-xx-x) unless the default value (blank) is assigned. All alpha characters must be capitalized and dashes must be included. Note, if a CAS number has 11 characters, the first dash should be dropped (xxxxxxxx-x).

d. Want to INPUT all sources within a RADIUS
(Default = NO) ? (Y/N) :

This option lets you input all sources within a radius of specified UTM coordinates. When you select a radius, the program skips the SOURCE ID Code selection option.

1. Enter the CENTER of the RADIUS, UTME (meters) :

2. Enter the CENTER of the RADIUS, UTMN (meters) :

3. Enter the RADIUS (meters) :

e. ENTER the 2,4,10 or 15 char. SOURCE ID Code
(Default = All) :

Enter the 2 or 4 character SWIS location code, the 10 character facility code, or the 15 character emission point code for the source(s) to be modeled. For example, by just entering a 2 character location code, the program will exclude all sources except those in the county specified. Use the default value to select all sources by just pressing Enter.

f. ENTER the emission type, "A" for ACTUAL ANNUAL EMISSIONS or "P" for POTENTIAL ANNUAL EMISSIONS
(Default = ACTUAL) :

Type "A" or "P" to model actual or potential annual emissions.

g. Have the correct BUILDING HEIGHTS (hb), or HEIGHT ABOVE STRUCTURES (HA), (hb = hs - HA) been assigned to every source (Default = NO) ? (Y/N):

Answer "no" and the program will temporarily reassign all building heights (hb) and crosswind building widths (hw) equal to the stack height (hb=hw=hs) for all 16 wind sectors. These worst case values will produce the greatest downwash impacts. The software program then skips the rest of the building configuration questions. For less conservative results, you should assign the correct building dimensions and rerun the model.

When the correct building heights have been assigned to each source, the program will ask the second question below to further define the downwash effects.

h. Have the correct BUILDING DIMENSIONS (building width (BW) and length (BL)) been assigned to every emission point
(Default = NO) ? (Y/N):

The second criteria for determining building downwash effects is the crosswind building width (hw). If the building dimensions are unknown, the DAR-1 WORST CASE CROSSWIND BUILDING WIDTH (hw) ASSIGNMENT METHOD (see technical support document) will assign the most conservative building width to all 16 wind sectors. The software program will then skip the building orientation question.

When the correct building dimensions have been assigned to every emission point, the program will ask the final question for determining building downwash effects.

i. Have the correct BUILDING ORIENTATIONS (DIRECTION BUILDING LENGTHS FACE) been assigned to every emission point (Default = NO) ? *(Y/N):

The last criteria for determining building downwash effects is the building orientation, or the direction the building length faces. When the correct building height, width, length and orientation have been assigned to every emission point, the program calculates the horizontal crosswind building widths (hw) for each of the 16 wind sectors. To make this calculation, it is assumed that each building is rectangular and faces (is orientated towards) the specified direction.

j. Want to select the AREA to be MODELED (Default = NO) ? (Y/N) :

When you select the AREA to be modeled, the program lets you assign the size, center, and grid spacing for the modeling area. The default option does this automatically. Use this option to assign one or more modeling grids for a specified area. The program internally selects multiple grids (AUTOSCAN) based on the size of the modeling area and the receptor grid spacing selected. When the size of the assigned modeling area is so large that a single 13 x 8 modeling grid can not cover the entire area for the selected grid spacing, the program will automatically select the multiple grid option. The program then tells you how many smaller intermediate grids will be created to cover the entire modeling area and asks: "ARE YOU SURE YOU WANT TO DO THIS (Y/N)." If you respond "YES", the most northwestern intermediate grid is presented first. Others follow like a typewriter, west to east (left to right) and then north to south (top to bottom). Intermediate grids are identified by their row and column for the entire modeling area: AUTOSCAN (row,column). The most southeastern grid is the last grid displayed unless the AUTOZOOM option is additionally selected. Most likely, this most southeastern grid won't contain the overall maximum value for the entire modeling area. To find the overall maximum value, you must use the replay option and pick from the individual maximum values calculated for each of the intermediate grids. Else, you must import the GRID.DAT file (if DUMPED) into a program like SURFER or GIS to display the grid receptor values for the entire modeling area. NOTE, it is recommended that you use AUTOZOOM in conjunction with AUTOSCAN. The program will then select the highest modeled value from all of the intermediate grid displays and then zoom-in on the maximum value.

If you don't specify the AREA to be modeled (default), the DAR-1 program will automatically select the size, location and receptor grid spacing. The assigned grid will be centered in the middle of all the selected source(s) and large enough to ensure that the maximum impact from all sources falls within the chosen modeling grid.

When you choose to select the area to be modeled, the program asks for the size, center and receptor grid spacing for the modeling area as described below:

1. Want to assign the size of the MODELING AREA (Default = NO) ? (Y/N) :

   Select this option to assign the minimum size of the area you want to model. When you don't specify a size, the program assigns it based on the grid spacing selected. Further, when the modeling area and grid spacing are both unspecified, the program automatically assigns both values so that the maximum impact from all sources falls within a single grid display.

   a. Enter the EAST-WEST DISTANCE (meters) :

      Enter the minimum east-west distance of the area you want to model.

   b. Enter the NORTH-SOUTH DISTANCE (meters) :

      Enter the minimum north-south distance of the area you want to model.

2. Want to assign the center of the MODELING AREA (Default = NO) ? (Y/N) :

   Use the default option to center the grid in the middle of all the selected sources. Otherwise, use this option to center the modeling grid around the coordinates you assign.

   a. Enter the center of the GRID, UTME (meters) :

      Enter the UTME coordinate for the center of the area to be modeled.

   b. Enter the center of the GRID, UTMN (meters) :

      Enter the UTMN coordinate for the center of the area to be modeled.

3. Want to assign the RECEPTOR GRID SPACING (Default = NO) ? (Y/N) :

Select this option to assign the grid spacing for one or more 13 x 8 receptor grids. When you don't assign the spacing, one grid is automatically selected and the program assigns the spacing based on the size of the modeling area specified. If more than one grid is needed to cover the selected modeling area for the specified grid spacing, the program creates multiple intermediate grids (AUTOSCAN) to cover the entire modeling area.

a. Enter the GRID SPACING (meters) :

Enter the grid spacing for the area you want to model.

k. Want to AUTOZOOM (or debug=*) and find MAX. VALUE (Default = NO) ? (Y/N) :

The DAR-1 version of the ISCLT2 model has a special auto-zooming feature that finds the exact point of maximum impact from single or multiple sources. This option may be selected from the above prompt or after the modeled grid values are displayed. To find the overall maximum value, the program identifies the location of the highest modeled value, re-centers the grid around that maximum value, divides the grid spacing in half and then reruns the model. The program continues to re-execute the model until the grid spacing is 1 meter and the location of maximum concentration is centered in the middle of the 13 by 8 receptor grid.

It should be noted, that in some instances, the auto-zoom feature may not always find the point of maximum predicted impact. This can happen when there is significant source separation and the maximum impact from the dominant source falls between the modeled grid impacts. Most likely, this will occur when the dominant source has a short stack and severe building down-wash. A simple way to verify the predicted worst case impact from multiple sources is to use AUTOSCAN in conjunction with AUTOZOOM. Do this by assigning the EAST-WEST and NORTH-SOUTH dimensions of the area to be modeled and assign a small RECEPTOR GRID SPACING (e.g., 30 meters). The program will then generate enough smaller intermediate grids to cover the entire modeling area, pick the highest value from those intermediate grids, and then use AUTOZOOM to find the overall maximum value.

Another way to verify the predicted worst case impact from multiple sources is to first identify the individual sources with the worst case screening impacts and then model each of those individual sources using the DAR-1 ISCLT2 model. As a GENERAL RULE, the predicted ISCLT2 worst case impact from the combined sources will occur at the same location, as the worst case impact from one of the dominant individual sources. Therefore; (1) Find the location of maximum concentration from one of the most dominant sources by modeling that individual source with the auto-zoom feature, (2) Model all sources with the auto-zoom feature and centered around the point of maximum concentration from that dominant individual source, and (3) Repeat the process for any other sources you think may be significant. Although the worst case impact from all of the sources combined will probably occur at exactly the same location as the worst case impact from one of the most dominant individual sources, it is suggested that you select an initial grid spacing of about 1000 meters (instead of 1 meter) when all the sources are rerun with AUTOZOOM. That way, it is fairly certain that the software program will find the overall point of maximum predicted concentration.

The DAR-1 version of the ISCLT2 also has a DEBUG option to print out plume heights, sigmas, etc., for each concentration calculation made for each wind speed, wind direction and stability class for a single set of user specified UTM coordinates. When this option is chosen (Type "*" instead of Y/N above), the program will automatically reset the grid display to include the selected receptor. Then, after the grid impacts are displayed, exit the program and check the AG1DEBUG.DAT file. This option should be used for troubleshooting the program and verifying the results against USEPA's ISCLT2 (version 93109) or ISCLT3 model. The output, dumped to the above file, is directly comparable to DEBUG data from these models. When running the DEBUG option, model a single source as the output can be very large for multiple sources.

l. Want to COPY (DUMP) modeling data to "GRID.DAT" (Default = NO) ? (Y/N) :

The DAR-1 program has an option that copies unadjusted modeling grid data (UTME, UTME, (concentration in ug/m3, conc./AGC, cancer risk, or hazard index)) into an ASCII file (GRID.DAT). Once the copying option (DUMP)is turned on, the program keeps copying data into this file through the successive screen displays until the option is turned off or new input criteria selected. The file may be imported into programs like SURFER or GIS to generate isopleth maps.

3. ISCLT2 Modeling Output

After the grid dumping option has been selected, the DAR-1 software program looks for invalid UTM coordinates and selects the modeling grid. The message, "WAIT: Selecting Modeling Grid ..." is then displayed. If source(s) are located outside the modeling area, the program will print out a WARNING message. This can only occur if the user has overridden the default option and assigned the East-West and North-South dimensions of the area to be modeled. If you ignore the warning message, and maximum impact from all source(s) occurs outside the modeling area, the program will not find the maximum impact. However, if you also selected AUTOZOOM, the program may creep toward the maximum impact a few meters at a time. If this occurs, press "Ctrl Break" and try again.

After the modeling grid has been selected, the program calculates the receptor impacts from each source. Receptor impacts are presented in scientific notation, where the coefficients are presented in a 13 x 8 modeling grid and the exponential power of ten is shown in the title of the display. This exponential power of ten applies all 104 coefficients and is continually adjusted for each new grid receptor display.

Industrial property will appear as a solid brown area in the receptor grid display. The program defines this area by the minimum property line distance reported for each emission point source. Any receptor that is closer to a source than the minimum property line distance is considered located on industrial property.

Receptor impacts too close to a source are not calculated by the DAR-1 ISCLT2 model. These impacts are in the cavity region and are shown as zeros in the grid displays. The minimum distance for calculating an impact is three times the building height (3hb) for a squat building and three times the building width (3hw)for a tall building. Refer to the discussion in the ISCLT2 and ISCLT3 user manuals.

After the last 13 by 8 modeling grid is displayed, you can remodel the sources to calculate the impacts for different areas without reentering the input selection criteria. You can instruct the program to move the grid east, west, north or south a specified number of meters. You can use the zoom feature to re-center the grid around the point of maximum concentration for a desired grid spacing or else use auto-zoom to find the maximum value. In addition, you can turn on/off the GRID.DAT dumping option (DUMP), re-display the previously presented grids (REPLAY), present the contribution from the top one-hundred sources (TOP100), request modeling information (INFO), request HELP, or exit the screen display and re-select the input model criteria.

The new TOP100 feature lets you view the top 100 contributing sources impacting the predicted maximum concentration, maximum impact to AGC ratio, maximum cancer risk or maximum hazard index for each 13 x 8 modeling grid. To view this information, type "T" and then press Enter. When multiple contaminants are selected, the program will display the Emission Point ID, Facility Name, CAS number, predicted value and the percentage of the overall maximum value. For a single contaminant, the program also displays the direction of the source and the distance from that source to the point of maximum predicted concentration for the top 100 contributors.

K. (S) SORTING MENU.

A new sorting menu has been added to the DAR-1 ANALYSIS MENU. This addition lets the user sort, or unsort, the DAR-1 analysis by the highest AGC/SGC exceedance ratio or the highest ambient impact. When the DAR-1 analysis is sorted, it is done for all the menu selections in the analysis menu. For example, when you sort by the highest ambient impact, those contaminants with the highest impacts will appear on top of the AGCs & SGCs display (Menu option 6).

L. (X) EXIT and Return to PROGRAM MENU

To exit the DAR-1 ANALYSIS MENU, type "X" and then press Enter. The program will then exit this menu and return to the DAR-1 PROGRAM MENU.

V. SPECIAL TOPICS

A. Editing the AGC, SGC & Standards file

The DAR-1 computer program accesses a file containing all AGCs, SGCs and air quality standards, either included, or incorporated by reference, in the DAR-1 AGC/SGC Tables (formerly Appendix C of the Air Guide-1/DAR-1 document). This reference file may be updated or modified for your own purposes.

All the AGC/SGC guideline values, federal and state air quality standards, and DAR-1 equivalent air quality standards, are contained in two files: AG7CAS.DAT and AG7CAS.ACC. Both are identical, although they have different file structures and access methods. The AG7CAS.ACC file can't be edited because it is unformatted and direct access. This is the actual file the program reads when executing the program. To modify it, you must edit the formatted, sequential file, AG7CAS.DAT and then delete the old AG7CAS.ACC file. A new modified version will be created the next time the DAR-1 program is run. Before these files are updated, it is strongly suggested that you create a backup copy of the original AG7CAS.DAT file. The AG7CAS.DAT file may be modified to contain one or thousands of contaminant guideline values (AGCs or SGCs). These values may be added, deleted, or changed using a text editor. Any modified file must be in the format specified below and the CAS numbers must be in alphanumeric sequential order. If the CAS numbers are out of order, the program won't be able to find the assigned guideline values.

In certain instances you may want to create a special guideline reference file for an inhalation health risk assessment or for another application. For example, a separate version of the file could be created to include all AGCs based on USEPA unit risk factors and a "one in a million" risk. Another could contain USEPA guideline values for non-carcinogenic effects. Remember, all carcinogens also have non-carcinogenic effects.

The format of the AG7CAS.DAT file is described below:

FORMAT FOR AG7CAS.DAT FILE:

Access: Sequential

Form: Formatted
Record length: 71 characters

RECORD DESCRIPTION (see DAR-1 ANALYSIS MENU, AGCs & SGCs):

Field Name	Description
CAS Number	Chemical Abstract Service (CAS) Registry number is an alphanumeric value located in character positions 1-10. Fortran format is A10.
Contaminant Name	Source Management System short contaminant name is located in character positions 11-30. Fortran format is A20.
SGC	Short-term Guideline Concentration (SGC) is a real number with a decimal point, and located in character positions 31-45. Fortran format is F15.5.
How SGC Assigned	Field describing the source of the SGC assignment is is located in character position 46. Fortran format is A1.
AGC	Annual Guideline Concentration (AGC) is a real number with a decimal point, and located in character positions 47-64. Fortran format is F18.9.
How AGC Assigned	Field describing the source of the AGC assignment is located in character position 65. Fortran format is A1.
TOX	DAR-1 Toxicity Classification (TOX) is located in character position 66. Fortran format is A1.
CODES	Five single character fields are located in positions 67-71 describing the AGC or SGC. Fortran format is 5A1.

* NOTE: All records must be listed in alphanumeric sequential order by CAS number.

B. Downloaded Data from the Source Management System (DEC staff only)

This section is nearly obsolete as data can no longer be downloaded from the Department's database. It is provided to outline the structure of the old database files already downloaded from the now defunct Source Management System (SMS). Prior to 9/25/96, source contaminant data could be downloaded from the SMS using /JOB65 and /REPORT65. /JOB65 retrieved the data while /REPORT65 dumped the data to the terminal. A single emission point, or all emission points from an entire facility, could be downloaded for user specified contaminants. Summary files could also be downloaded: totaling emissions by county, town or facility. When a summary file is imported into the DAR-1 program, you may assign the DAR-1 default parameters to predict a worst case impact estimate.

Sometimes data transmission errors occurred when /REPORT65 files were downloaded from the SMS. These errors are still flagged by the DAR-1 program when you try to create a new RUN file from the retrieved R65 file data. The DAR-1 program will print out bad data records when this occurs and they may be edited with a text editor if you adhere to the format specified below.

Source Management System R65 files can be read by the DAR-1 SMSREAD.EXE program. The program looks for the header record "******BEGIN DATA****** VER 2.0" and then starts reading all data records until the "******END   DATA*******" message is found. The program reads each record as 132 individual alphanumeric characters, considers the record type (character position 16) and counts the number of commas. It then extracts the data field between each set of commas, translates the data field into a numerical value (if appropriate) and checks to see if the number appears valid. Critical in this process is the number of commas found by the program as the record type is validated by the number of commas found. When data transmission errors occurred, parts of a record may have been lost.

To correct an R65 file with a data transmission error one should edit the file with a text editor. The file can't be corrected using the DAR-1 software program. Find the bad line of data and correct it according to the file format shown below. If you don't know what information should go in the field, leave the field blank and just correct the number of commas. The program can provide the DAR-1 default values if you need them.

FORMAT FOR "R65" DATA FILE:

Access: Sequential
Form: Free Formatted, each data field separated by commas
Record length: variable, but 5 basic record types (A,B,C,K,Z)

RECORD DESCRIPTIONS:

RECORD TYPE "A", 5 fields of data (5 commas)

Field 1: Emission point number (positions 1-15), record type (position 16), SMS unit code (positions 17-19).
Field 2: Facility name.
Field 3: Facility address.
Field 4: City, Town or Village where facility is located.
Field 5: Standard Industrial Classification (SIC) Code.

RECORD TYPE "B", 11 fields of data (11 commas)

Field 1: Emission point number (positions 1-15), record type (position 16), SMS unit code (positions 17-19).
Field 2: PC or CO.
Field 3: PC/CO issuance date (mm/dd/yr).
Field 4: Ground elevation (feet). Not used by program.
Field 5: Height above structure (feet).
Field 6: Stack Height (feet).
Field 7: Inside Dimension (inches). If a rectangular stack is coded, the DAR-1 program will ask for the equivalent stack diameter.
Field 8: Rectangular stack dimensions if coded. Not used by program.
Field 9: Stack Temperature (degrees Fahrenheit).
Field 10: Exit velocity (feet/second).
Field 11: Exit flow rate (ACFM).

RECORD TYPE "C", 13 fields of data (13 commas)

Field 1: Emission point number (positions 1-15), record type (position 16), SMS unit code (positions 17-19).
Field 2: Future space for building name. Not used by program.
Field 3: Future space for distance to property line. Not currently retrieved by program.
Field 4: Future space for building width. Not currently retrieved by program.
Field 5: Future space for building length. Not currently retrieved by program.
Field 6: NYTM Easting (kilometers).
Field 7: NYTM Northing (kilometers), leading "4" has been dropped.
Field 8: Hours/day source operates.
Field 9: Days/year source operates.
Field 10: Percent operation by season. Not used by program.
Field 11: Source Code.
Field 12: Applicable rule number 1. Not used by program.
Field 13: Applicable rule number 2. Not used by program.

RECORD TYPE "K", 9 fields of data (9 commas)

Field 1: Emission point number (positions 1-15), record type (position 16), SMS unit code (positions 17-19).
Field 2: CAS number.
Field 3: 6 NYCRR Part 212 Environmental Rating.
Field 4: Hourly Emission Rate Potential (ERP). Not used.
Field 5: Emission in lbs/hr.
Field 6: Percent control efficiency.
Field 7: Hourly permissible emissions in lbs/hr. Not used.
Field 8: Emissions in lbs/year.
Field 9: Annual permissible emissions in lbs/year. Not used.

RECORD TYPE "Z", 6 fields of data (6 commas)

Field 1: Emission point summary code (positions 1-15), record type (position 16), SMS unit code (positions 17-19).

Field 2: CAS number.
Field 3: NYTM Easting average coordinate (kilometers).
Field 4: NYTM Northing average coordinate (kilometers), leading "4" has been dropped.
Field 5: Total summary emissions in lbs/hour.
Field 6: Total summary emissions in lbs/year.

C. Mass Screening Approach for all Sources in New York State

The following is a mass screening approach for assessing the ambient impacts from all sources of all contaminants in New York State using the DAR-1 software program. You can make this assessment with a summary file; either created by this program or downloaded from the Source Management System. If desired, you may include SARA Title III and mobile emissions inventory data as well. At present, the mobile emissions inventory data is not available. However, to truly understand the relative impacts from all sources, it is essential that a toxic mobile emissions inventory be created by Traffic Analysis Zone (TAZ). This can then be aggregated into larger area source groups for the mass screening approach of the DAR-1 software program.

The AGCs and SGCs referenced by this software program are guideline values that define acceptable or "safe" exposure levels. They do not individually define a "safe/unsafe" threshold exposure concentration, as each individual person may have a different chemical susceptibility. The guideline values were derived using conservative assumptions that reflect uncertainty in the field of toxics assessment. Basically, they fall into two categories; those based on carcinogenic risk and those based on non-carcinogenic effects.

AGCs representing carcinogenic risk are based on conservative assumptions and a potential "one in a million" inhalation cancer risk. These risks are relative because the risk level to the exposed individual is directly proportional to the magnitude of the exposure concentration. The word potential is used because it does not consider the number of people exposed to the inhalation cancer risk.

AGCs and SGCs representing non-carcinogenic effects are also based upon conservative assumptions, but additionally they include built in safety factors to reflect scientific uncertainty. They do not precisely define a "safe/unsafe" exposure level. Thus, the values are relative as the greater the impact/(AGC or SGC) ratio, the more likely it is for the non-carcinogenic effect to occur.

The words "guideline", "potential" and "relative" are stressed because some of our AGCs and SGCs are difficult to meet. Therefore, we must consider the relative nature of these guideline values when we make the difficult control decisions. How does one balance a potential health concern against a potentially unaffordable cost of control? The proper way to do this is in a relative manner. Since our AGCs and SGCs represent relative guideline values, we must understand the scale of importance of each contributing source in order to make appropriate control decisions.

Why the pressing concern? Almost all the AGCs and SGCs were lowered in the 1991 draft edition of Air Guide-1. The AGCs were lowered by a factor of 1.4 (420/300 or 42/30), and the SGCs, by a factor of 4.2 or 10. Additionally, some extremely small, cancer risk based AGCs have been adopted in recent years. Couple this with the conservative revisions to the Appendix B screening methods and one recognizes the need for a mass screening approach to assess the ambient impacts from all sources of all contaminants in New York State.

We must model all source contaminants for ambient impacts, inhalation cancer risks, and hazard indices to understand the relative importance of each source category. Once this is done, we will have a sound basis for selectively implementing broad control strategies. Of secondary importance is that we can use this evaluation to determine when, and if, a comprehensive multiple exposure pathway Health Risk Assessment (HRA) should be performed.

The following mass screening approach is offered to evaluate and prioritize the impacts from all sources of all contaminants in New York State. This same approach could be used by a Region to determine control priorities (DAR-1 Appendix A, Section VII.A). The process involves running DAR-1 with summary files (statewide, county, town and facility) to reduce computation time. Lastly, although the ISCST3 model is not yet integrated into the DAR-1 software program, refined short-term impacts may be calculated by independently running the ISCST3 model for steps 4 and 5.

(1) Run the DAR-1 software program with a summary file containing all sources of all contaminants in New York State. Include SARA Title III and mobile emissions data, if available. Assume 1 stack at a single location is emitting all these contaminants and assign the DAR-1 Appendix B default values to this stack (done automatically). Scan this data with the program to find errors in the reported emission rates and correct them if significant. Continue with the next step for all contaminants that fail DAR-1 or run all contaminants.

(2) Run the DAR-1 software program with a summary file containing all sources of all contaminants in each county that failed the initial New York State screening. Include SARA Title III and mobile emissions data, if available. Enter the UTM coordinates for the center of each county and assume 1 stack, with DAR-1 default values, is emitting all the county contaminants (done automatically). Scan the source data to find emission errors. Fugitive and mobile sources can be modeled as area sources if desired. Continue for failures or run all Counties and contaminants.

(3) Run the DAR-1 software program with a summary file containing all sources of all contaminants in each individual town of every county that failed the county screening. Include SARA Title III and mobile emissions data, if available. Enter the UTM coordinates for the center of each town and assume 1 stack, with DAR-1 default values, is emitting all the town contaminants (done automatically). Scan the source data to

find the emission errors. Continue for failures or run all towns and all contaminants.

(4) Run the DAR-1 software program with a summary file containing all sources of all contaminants at each facility in every town of a specific county that failed the town screening. Include SARA Title III and mobile emissions data, if available. Enter the UTM coordinates for the center of each facility and assume 1 stack, with DAR-1 default values, is emitting all the facility contaminants (done automatically). If the emissions from a town are relatively insignificant, you don't have to break down that town by facility. Scan the source data to find emission errors. Continue for failures or run all facilities and contaminants.

(5) Run /JOB 65 and download the emissions from each individual source at every facility in every town of a specific county that failed the facility screening. Include SARA Title III and mobile emissions data, if available. Enter the UTM coordinates for the exact location of each source and run the DAR-1 ISCLT2 model. If the emissions from a facility or town are relatively insignificant, it's unnecessary to break down the facility or town by individual source. Should any contaminant fail, verify the emissions, exact UTM coordinates, building dimensions, stack height and other source parameters.

****
** APPENDIX B of AIR GUIDE-1, AMBIENT AIR QUALITY IMPACT SCREENING ANALYSES ***
****

APPENDIX B of AIR GUIDE-1, AMBIENT AIR QUALITY IMPACT SCREENING ANALYSES

1995 EDITION

By: Leon Sedefian & Eric Wade
Bureau of Application Review and Permitting
Division of Air Resources
N.Y.S. Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-3254

October 16, 1995

IMPORTANT NOTICE:

The procedures outlined below for calculating area source impacts do not conform to the latest revisions to the EPA Guidelines on Air Quality Models (Supplement C; August 9, 1995). This version of Appendix B could underestimate impacts at close-in distances from area sources by a factor of up to three. Thus, in those instances where the impacts are problematic (i.e., approach the SGC or AGC within the factor of three) or a better estimate is desired, the EPA SCREEN3 and ISCST3/ISCLT3 models should be used. To convert the 1 hour SCREEN3 impacts to annual impacts, a 0.1 factor is recommended.

I. INTRODUCTION

Air Guide-1 requires an ambient air quality impact analysis for all new or modified sources of air contaminants regulated under 6NYCRR Part 212. The analysis requires the evaluation of both annual and short-term air quality impacts. This appendix outlines the procedures for conducting a screening level analysis.

NOTE: This screening procedure presents a major modification to the previous version of the standard point source method. The new method will assure that conservative impacts are calculated under all source conditions, including the source environment: rural or urban (see Section IV.H). The need for and the derivations of the new formulations are detailed in a November 1, 1993 paper "Modifications to the Air Guide-1 Appendix B Screening Analysis Methods" by Leon Sedefian and Eric Wade of BARP. The new procedures may result in higher impacts than the previous point source equation by up to a factor of ten. Some of the basic assumptions and considerations which are associated with the screening methods are described in Section IV of this Appendix. These should be reviewed prior to the use of the methods.

In addition to this document, a refined version of these screening procedures is contained in an AG-1 computer program formulated by Eric Wade. These extended procedures can significantly reduce the conservativeness of the hand calculation methods. The computer program contains revised short-term methods to emulate more closely the SCREEN2 model. In addition, the program's refined annual impact procedure includes use of the ISCLT2 model. The software program is a very powerful and versatile tool which can simulate a number of situations, which are either not addressed or roughly approximated by the procedures in this document. Some of the major advantages of the AG-1 software package are:

1) The program is "user friendly" and "smart". The program assigns default, worst-case stack, building, and modeling parameters whenever unknown.

2) It allows access to a file containing all AGC's, SGC's and standards as contained, or incorporated by reference, in Appendix C of AG-1.

3) It can import downloaded source files from the Source Management System.

4) The program can calculate annual impacts using both screening and refined methods. This allows the user to quickly assess contaminant impacts from one or more facilities using the screening methods and then to refine the assessment the ISCLT2 model.

5) The short-term method incorporates revisions to the point and area source screening methods. The point source procedure utilizes several regression curves and credits a linear reduction factor for stack height to building height ratios greater than 1.2 and less than 2.5. The cavity method closely simulates SCREEN2 model results. Also, the area source method allows the calculation of impacts at user specified downwind distances.

6) An enhanced version of the ISCLT2 model has been integrated into the AG-1 software program. This model is less conservative than the screening methods and has several enhancements to improve its performance. The enhanced ISCLT2 model improves upon the annual impact screening estimates in the following ways:

a) It allows for the calculation of more realistic individual source impacts other than the worst case conditions simulated by the screening methods.

b) It provides a better estimation of building downwash effects by considering building orientation. The program has the option for calculating the crosswind building width for each wind direction to better define building downwash. This may greatly reduce downwash impacts for a given wind direction. Generally this occurs when a building is tall rather than squat.

c) Simulates cumulative source impacts by separating sources properly, instead of adding the maxima from each source.

d) Incorporates regional meteorological data sets for more site specific analyses.

e) Provides impacts at a grid of receptors surrounding the facility, down to a very fine resolution. The user can then control reiterative model executions for different grid displays while looking at the modeling output.

f) It can download modeled impacts which can be imported into other programs to generate modeled isopleths.

g) It can predict impacts, impact/AGC ratio's, inhalation cancer risks and hazard indices.

Thus, it is strongly recommended that the AG-1 computer program be used as the primary tool to implement the necessary ambient impact analyses. Furthermore, any inquiries to Central Office on AGC and SGC exceedances should be done only after the AG-1 software program has been used.

Appendix B has four major sections, including this introduction. Section II addresses building cavity impacts. These impacts occur when a source has poor dispersion characteristics and should be evaluated as part of this screening analysis. Following that evaluation, the user should conduct the ambient air quality impact assessment outlined in Section III. Section III is the main component of the method. It outlines several procedures for calculating the maximum annual and short-term impacts from all sources of a contaminant. The assumptions, qualifications and further considerations relating to this appendix are discussed in Section IV. It should be consulted for guidance on some of the more common issues of concern.

It should be noted that terrain effects and elevated receptors are not considered in the Section III methodologies. Thus, if there are significant terrain features above the height of the stack, within one-half mile of a source, care should be taken when interpreting the screening model results. When significant terrain features (e.g., hills and mountains) are nearby, the screening procedures may underestimate the maximum ambient impacts. This same concern for underestimating impacts applies to urban areas, like New York City, where the elevated receptors may be man-made. These man-made receptors may represent multi-story apartment dwellings or ventilation system air intakes. Elevated receptors should also be considered when evaluating the impacts from infectious waste incinerators as specified in Air Program Memo 93-AIR-28.

Any questions concerning the methodology presented in this appendix should be directed to the DEC Bureau of Application Review and Permitting (BARP), Impact Analysis Section (IAS: (518)-457-7688). It's staff is responsible for all modeling procedures contained in this appendix. The basic procedures were derived from "Screening Procedures for Determining Ambient Impacts of Toxic Contaminants," June 1979 by Leon Sedefian of BARP. The procedures were then modified or supplemented by Leon Sedefian and Eric Wade (BARP) in the above mentioned 1993 Paper to derive the revised screening methodology presented in this appendix.

II. CAVITY IMPACT EVALUATION PROCEDURE

The first phase of the Appendix B screening analysis requires an evaluation of building cavity impacts. Cavity impacts occur when stack emissions have poor dispersion characteristics. They do not occur when a stack is designed using Good Engineering Practice (GEP). These poor dispersion characteristics are generally associated with "short" stacks or vents that have little plume rise. The stacks are "short" in relation to the recommended GEP stack height, which is defined as the building height (hb) plus 1.5 times, the smaller of the building height or the horizontal dimensions. When the plume rise is not sufficient to escape a building's aerodynamic effects, the cavity impact occurs if the pollutant becomes entrained into the cavity region that develops downwind of the source building. The extent of that cavity region is defined by the building dimensions. When the cavity region is confined on-site and there is no public access to that area, it is not necessary to calculate cavity impacts. However, when it extends beyond a facility's property line, the cavity impacts must be calculated.

Cavity impacts should be evaluated for each building separately when using these screening procedures. The contribution from other facility and industrial sources should be ignored in this section. They are addressed in Section III. Sources tall enough to escape a building's aerodynamic effects do not have cavity impacts. Those with release heights (he or hs) less than the cavity height (hc) have cavity impacts, as the emissions become entrained into the cavity region. These impacts should be summed to determine each building's annual and short-term cavity impacts. Alternately, the building's total emissions may be summed and applied directly to the impact calculation equations in Sections II.A. and II.B. as an initial screening technique.

Two separate methods are presented below for calculating building cavity impacts: the Basic Cavity Impact Method (II.A.) and the Refined Cavity Impact Method (II.B.). Either method may be used, although the second method is "more refined" and generally less conservative. Once calculated, the impacts should be evaluated using the Cavity Impact Evaluation Method presented in Section II.C.

II.A. BASIC CAVITY IMPACT METHOD

II.A.1. Define the horizontal extent of the cavity as 3hb, where hb is the building height. Then, define the shortest distance from the building to the property line (all directions) as Dpl. If Dpl is greater than 3hb, then cavity impacts (if they occur) are confined to on-site receptors, and this building's cavity impacts do not need to be calculated. Otherwise, continue with the next step.

II.A.2. Define the building cavity height, hc, as hc = 1.5 hb. If the physical stack height (hs) is greater than hc, no annual or short-term cavity impacts occur from this source. If the stack height is below hc, continue with the next step.

II.A.3. Calculate the worst case Annual Cavity Impact, CC, from the equation:

$$CC(ug/m3) = \frac{1.72 \quad Qa}{hb^{2}}$$

where Qa is the annual emission rate in lbs/year and hb, the building height, in feet.

II.A.4. Calculate the worst case Short-Term Cavity Impact, CCST, from the equation:

$$CCST(ug/m3) = \frac{904000.\ Q}{hb^2}$$

where Q is the reported hourly emission rate in lbs/hour and hb, the building height, in feet.

II.B. REFINED CAVITY IMPACT METHOD

II.B.1. Define the horizontal extent of the cavity as 3hb, where hb is the building height. Then, define the shortest distance from the building to the property line (all directions) as Dpl. If Dpl is greater than 3hb, then cavity impacts (if they occur) are confined to on-site receptors, and this building's cavity impacts do not need to be calculated. Otherwise, continue with the next step.

II.B.2. Determine the length (Lmax) and width (Lmin) of the source building. If the largest building dimension, Lmax, is less than hb, then redefine the horizontal extent of the cavity as 3Lmax. If Dpl is greater than 3Lmax, the cavity impacts are confined to on-site receptors and, this building's cavity impacts do not need to be calculated. Otherwise, continue with the next step.

II.B.3. Define the building cavity height, hc, as hc = 1.5 hb. If the physical stack height (hs) is greater than hc, no annual or short-term cavity impacts occur from this source. If the stack height is below hc, continue with the next step.

II.B.4. Redefine the building cavity height, hc, for short squat buildings. That is, if hb is less than 1/2 Lmin then, hc = hb. Otherwise, hc = 1.5hb.

NOTE: The AG-1 software program uses a more precise formula for calculating the building cavity height, hc. This same formula is used in the SCREEN2 model for evaluating short-term cavity impacts, although the AG-1 program limits the maximum cavity height to 1.5hb. The computer program defines hc as shown below:

$$hc\ (feet) = hb(1+1.6*e^{(-1.3Lmin\ /hb)})$$

If hc > 1.5hb, set hc = 1.5hb

II.B.4.a. If hs is now greater than hc, no annual or short-term cavity impacts occur for this source.

II.B.4.b. If hs is still less than or equal to hc, continue with the next step to consider plume rise.

II.B.5. Plume Height with Momentum Flux - NOTE: The consideration of momentum plume rise is valid only for emissions from vertically oriented discharges, but not for capped stacks or "goose necks".

II.B.5.a. Calculate the Momentum Flux (Fm) from:

$$Fm\ (ft4/sec2) = \frac{Ta}{T} V^2 R^2$$

Where: English Units

T = exit temperature (øR), (Box 34+460øR)
V = exit velocity (ft/sec), from Box 35
R = stack outlet radius (ft), (Box 33)/24
Ta= ambient temperature (= 510øR, assumption)

II.B.5.b. Calculate the effective stack height (he) from:

$$he\ (feet) = hs + 0.25\ (Fm\ hb)^{1/3}$$

If he is greater than hc (see II.B.4.), the plume is assumed to escape the cavity region and no annual or short-term cavity impacts occur for this source. Otherwise, continue with the next step.

II.B.6. Calculate the building's minimum vertical cross-sectional area (A) for all wind directions from:

$$A\ (ft2) = hb \times Lmin$$

where hb is the building height in feet and Lmin, the smaller of the horizontal building dimensions (feet).

II.B.6.a. If Lmin exceeds 5hb, then recalculate A as, $A = 5hb^2$.

II.B.7. Calculate the worst case Annual Cavity Impact, CC, from the equation:

$$CC(ug/m3) = \frac{1.72\ Qa}{A}$$

where Qa is the annual emission rate in lbs/year and A, the minimum vertical cross-sectional building area (ft2).

II.B.8. Calculate the worst case Short-Term (1 hour) Cavity Impact, CCST, from the equation:

$$CCST(ug/m3) = \frac{904000.\quad Q}{A}$$

where Q is the reported or maximum hourly emission rate in lbs/hour and A, the minimum vertical cross-sectional building area (ft2).

II.C. CAVITY IMPACT EVALUATION METHOD

Building cavity impacts must be considered when using the Appendix B screening procedures. For a permit application to be acceptable, both the annual and short-term building cavity impacts must be less than the appropriate air quality standards or guideline concentrations. To calculate a building impact, the individual source cavity impacts must be summed. Alternately, and more conservatively, the building's impacts may be calculated by summing the emissions and applying them in the impact calculation equations.

When a building cavity impact exceeds a standard or guideline concentration, the cavity impacts should be reevaluated using the AG-1 computer program followed, if necessary, by the SCREEN3 model. These models use a less conservative approach for determining whether cavity impacts will occur beyond a facility's property line. Additionally, both models utilize less conservative methods for calculating short-term impacts. Thus, when the Appendix B screening procedures indicate that cavity impacts will occur off-site, this assertion should be verified using the other models if the impacts are critical (e.g., when the SGCs are exceeded).

NOTE: The SCREEN3 model is generally less conservative than the AG-1 software program. However, the SCREEN3 model cannot calculate annual cavity impacts. The method for calculating these annual impacts in the computer program is identical to the Refined Cavity Impact Method (II.B.). Therefore, with this exception, the SCREEN3 model should be used as the last step in the analysis procedure, as there are no refined dispersion models for assessing building cavity impacts.

II.C.1. GEP Stack Height Considerations.

In some instances a source's cavity impacts are so pronounced that additional measures must be taken to eliminate a source's poor dispersion characteristics. Under this condition, the stack height of the source should be adjusted in line with Air Program Memo 95-AIR-18 and the GEP stack height regulations. This action should be taken independent of any control requirements that may be imposed. That is, the source owner must meet the AGC, SGC, and standards in concert with any action taken to alleviate the source's poor dispersion characteristics. Under the following conditions the source owner should be required to raise the physical or effective stack height of the source to eliminate the cavity impacts:

a) When a predicted cavity short-term impact is more than two times the appropriate standard or SGC.

b) When both the annual and short-term cavity impacts exceed the appropriate standards or guideline values.

c) When both the annual cavity and maximum point source actual annual impacts (in Section III) exceed the appropriate standard or AGC.

III. POINT AND AREA SOURCE AIR QUALITY IMPACT ASSESSMENT

The second phase of the Appendix B screening analysis requires an assessment of the ambient air quality beyond the cavity region. This assessment must consider the impact from all sources of a contaminant. This includes other significant industrial sources and "background" (see Section IV.B.). Predicted worst case total annual and short-term ambient impacts should then be compared to the appropriate standard or guideline concentrations to assess the acceptability of a source's impacts.

Three different methods are presented below for assessing ambient air quality: the Standard Point Source Method (III.A.), the Area Source Method (III.B.) and the Alternate Area Source Method (III.C.). The methodologies are presented as if a single source is being evaluated. However, this generally is not the case, as most facilities have multiple sources of the same contaminant. When there are multiple sources of a contaminant, the individual source impacts should be summed to determine a worst case total ambient impact. Alternatively, an impact may be estimated by summing the emissions and assuming a single point source is discharging the contaminant. Once calculated, the impacts should be evaluated using the Ambient Impact Evaluation Method in Section III.D.

When using these screening procedures, the impact from all sources of a contaminant must be considered. However, for most permitting applications, "background" and the impact from other facility industrial sources have little contribution to the maximum impacts from the facility under review and need not be considered. This assumption is not valid if appropriate monitoring data is available to define "background", or there are sources in adjacent (contiguous) facilities that emit the contaminant under review. When such sources exist, their impact should be calculated using the Standard Point Source Method. That impact should then be added to the total impact from all sources of the facility under review. If a significant source is identified at a non-adjacent facility and there is a great separation between sources (see section IV.E), the maximum impact from all sources can be estimated using the enhanced version of the ISCLT2 model contained in the AG-1 software program.

An additional simplification can be allowed for short-term (1 hour) impacts: these impacts may be evaluated on a per building basis, similar to the cavity method. The maximum 1 hour impacts from all sources in a particular building are generally not influenced significantly by the contribution from other sources. That is, the impacts from all sources should be calculated, summed and evaluated for each building separately. In some instances, such as at large facilities, cumulative short-term impacts should be performed in a refined site specific analysis where all of the facility sources can then be appropriately modeled.

The various methodologies presented below allow the calculation of an actual annual impact, a potential (maximum) annual impact and a short-term impact. The potential annual impact should be compared to the AGC to determine if special permit conditions should be added to a permit restricting the hours per year of operation. This should be done if a source's increased hours of operation might cause an exceedance of an AGC. A source's reported hours per year of operation are only enforceable when special conditions are attached to a permit.

All impacts should be evaluated using the guidance in section III.D.

III.A. STANDARD POINT SOURCE METHOD

NOTE: The methodologies outlined below replace the previous Appendix B worst case point source equations. The revisions were necessary because the old equations underestimated impacts under severe downwash and limited plume rise situations. Additionally, the modifications assure consistancy with current EPA/DEC guidance and models.

The following standard point source method predicts impacts at the point of maximum concentration. The methodology considers possible building downwash effects and is applicable in both rural and urban settings (see Section IV.H). A point source is generally associated with a single stack emission source. However, several sources or an entire facility can be represented as a single point source if the emissions are summed and all sources have similar stack heights and emission characteristics. Even if the stack heights and emission characteristics are dissimilar, they still can be represented as a single point source by assigning the smallest stack height, stack diameter, lowest exit temperature, and exit velocity (lowest) to the aggregate source. When some or all of these data are missing, a worst case contaminant impact can be calculated by assigning the default parameters listed in Section IV.C. The software program of Air Guide-1 assigns any or all of these default values when data is missing. In general, if source specific data is known, it should be used; the more precisely a source is depicted when using the methodology described below, the more accurate are the predicted ambient impacts.

The stepwise procedure outlined below provides worst case annual impacts in either a rural or urban environment. It simulates worst case building downwash effects for either a squat (building height less than the horizontal building dimensions) or a tall structure. For cases where downwash is not so severe, or a GEP stack height exists, reduction factors are provided to calculate appropriately lower worst case impacts.

III.A.1 Allow limited plume rise for some stack height to building height ratios. Calculate hs/hb for the source.

NOTE: For horizontally released, capped or "gooseneck" stacks no plume rise should be allowed. For these sources, set the effective stack height (he) equal to the physical stack height (hs) and go to step III.A.2.

III.A.1.a. If the stack height to building height ratio (hs/hb) is less than 1.5, then assume no plume rise exists. Set he equal to hs and continue with step III.A.2.

III.A.1.b. If the ratio (hs/hb) is equal to or greater than 1.5, but less than 2.5, credit some momentum plume rise as follows:

$$he(feet) = hs + 1.1(Fm)^{1/3}$$

where Fm is from II.B.5.a. and hs is the stack height in feet. Continue with step III.A.2 to calculate the annual impact.

III.A.1.c. If the ratio (hs/hb) is equal to or greater than 2.5 (GEP stack), account for buoyancy final rise. First, determine the buoyancy flux parameter (F) from:

$$F\ (m4/sec3) = 0.276\ \frac{VR^2\ (T-510)}{T}$$

where V is the exit velocity in ft/sec, R, the stack outlet radius in feet, and T the stack exit temperature in Rankine.

III.A.1.d. Determine the effective stack height from:

$$he\ (feet) = hs + 7.0(F)^{3/4} \quad \text{for } F < 55$$

$$he\ (feet) = hs + 12.7(F)^{3/5} \quad \text{for } F > 55$$

where hs is the stack height in feet. Continue with next step to determine the annual impact.

III.A.2. Calculate the maximum Actual Annual Impact, Ca, from the point source using the effective stack height, he, and the annual emission rate, Qa, in the equation below:

$$Ca\ (ug/m3) = \frac{6.0 *\ Qa}{he^{2.25}}$$

where Qa is in lbs/year, he in feet.

III.A.3. Calculate the maximum Potential Annual Impact, Cp, from the point source using the effective stack height, he, and the reported hourly emission rate, Q, in the equation below:

$$Cp\ (ug/m3) = \frac{52500 * Q}{he^{2.25}}$$

where Q is in lbs/hour; he in feet.

This impact (Cp) assumes continuous operation of the source. Permit conditions restricting the hours per year of operation should be considered if Cp > AGC, but Ca < AGC.

III.A.4. Calculate a reduction of impacts under the following conditions:

III.A.4.a. If the stack height to building height ratio (hs/hb) is greater than 1.5, but less than 2.5, then reduce Ca and Cp from above by a factor of 0.75.

III.A.4.b. If the hs/hb ratio is equal to or greater than 2.5 (GEP stack), then multiply the original Ca and Cp values from above by a 0.4 factor.

III.A.5. Calculate the maximum Short-Term Impact, CST, from the point source using the equation below:

$$CST\ (ug/m3) = Cp*65$$

where Cp is the maximum Potential Annual Impact as adjusted in III.A.4 above.

III.B. AREA SOURCE METHOD - Read "IMPORTANT NOTICE" after front cover.

This method may be used to determine the maximum overall actual annual, potential annual, and short-term impacts from an area source. The maximum impact is predicted to occur just outside the area source at a distance 0.564S from the center, where S is the area source side length. When there are multiple area sources, the annual and short-term impacts should be summed. For short-term impacts, this may be very conservative, if all the area sources are not aligned with the dominant wind direction. The procedure was developed primarily for ground level sources meeting the general source characteristics in Section IV.F. If there is a distinct height to the area source, the predicted impacts will be conservative.

NOTE: The screening portion of the AG-1 software program allows for the calculation of maximum impacts at specified downwind distances outside an area source. Additionally, the refined ISCLT2 model considers the release height of emissions and individual source locations.

The method follows:

III.B.1. Determine the side length, S, of the area source in feet. The area source should be square. The side length, S, should be greater than 30 feet but less than 3300 feet.

III.B.2. Calculate the maximum Actual Annual Impact, Ca, from the area source using the equation below:

$$Ca\ (ug/m3) = \frac{76.6 * Qa}{S^{1.8}}$$

where Qa is the annual emission rate in lb/year, and S is the area side length in feet.

III.B.3. Calculate the maximum Potential Annual Impact, Cp, from the area source using the equation below:

$$Cp\ (ug/m3) = \frac{670600 * Q}{S^{1.8}}$$

where Q is the hourly emission rate in lb/hr, and S is as defined above.

III.B.4. Calculate the maximum Short-Term Impact, CST, from the area source using the equation below:

$$CST\ (ug/m3) = Cp*25$$

where Cp is the maximum Potential Annual Impact as defined above.

NOTE: The factor of 25 is only applicable when used with the maximum overall annual impacts from above. For specific downwind distances, the AG-1 program can provide the appropriate annual and short-term impacts.

III.C. ALTERNATE AREA SOURCE METHOD

The following alternate area source method was developed specifically for remediation projects and urban scale emissions. It has the flexibility to permit the calculation of the maximum annual concentration within an area source. However, the method has not been developed to estimate short-term impacts. Short-term area source impacts can be estimated using the equation in Section III.B.4 or the EPA SCREEN3 model. The method will perform better, the closer the source characteristics and assumptions approximate those specified in Section IV.F. The contribution from nearby area sources can be calculated by the procedure given below. Only sources located within a distance of 3S (S is the side length of the area source) from the source being analyzed need be considered. A better approach for calculating multiple source effects and impacts at specific downwind distances is to use the AG-1 software program.

The following procedures are most appropriate for ground level area sources, effectively less than 10 feet in height, with side lengths greater than 330 feet:

III.C.1. Determine the area source emission rate (QA) in units of lb/(hr-ft2) by dividing the total annual emission rate, Qa (lb/hr), by the area, A (ft2), of the source.

$$QA \frac{(lb)}{(hr\text{-}ft2)} = \frac{(emission\ rate)}{(area)} = \frac{Qa}{A}$$

III.C.2. Calculate the maximum Actual Annual Impact, Ca, within the area source as defined below:

$$Ca(ug/m3) = K^* \ QA * Cm$$

Where: K = 15 for 330 ft < S < 3300 ft
K = 30 for S > 3300 ft
Cm = 1.355 x 106, a conversion factor from lb/(hr-ft2) to ug/m2-sec).

III.C.3. If there are other area sources (ideally contiguous to the source being analyzed) within 3S distance from the source being considered, then the contribution of these sources can be determined by redefining QA in Step III.C.2. (lb/(hr-ft2) as:

$$QA = (QA0 + .32QA1 + .18QA2 + .13QA3)$$

Where QA0 represents the emissions from the source under consideration and QA1 to QA3 represent emissions from sources (if they exist) which are at upwind distances of 1S, 2S, and 3S, respectively, from the QA0 source. It must be noted that the nearby sources are assumed to be of about the same size as the source under consideration.

III.D. AMBIENT IMPACT EVALUATION METHOD

An ambient air quality impact assessment is required as part of the Appendix B screening procedure. That assessment requires a comparison of predicted worst case annual and short-term impacts with the appropriate standards or guideline values. When building cavity impacts exceed the point source method impacts, these concentrations become critical for determining the appropriate Environmental Rating under 6NYCRR Part 212.

It is important to understand that the Appendix B screening methods are generally conservative. This is especially true for the short-term impact hand calculation methods. When these screening impacts exceed the appropriate standards or guideline values, the AG-1 software program and/or SCREEN3 model should be used to perform a more precise and less conservative analysis. The SCREEN3 model should be used as the last step in the short-term impact screening procedure before a refined air quality impact analysis (III.D.1.) is required.

When there are multiple sources of a contaminant and a large separation between sources (see Section IV.E), the conservatism in the short-term methods may be pronounced. In such a case, summing short-term impacts may be unrealistically conservative. That level of conservatism increases with greater variations in stack heights and source separation. It becomes critical in cases where it is unlikely that all sources will impact the point of maximum concentration for a given wind direction. To address this concern, the screening short-term cavity and point source impacts are evaluated on a per building basis. When assessing annual impacts, the conservatism of adding maximum multiple source impacts is not as critical, because wind direction varies over a yearly period. Therefore, because the wind direction changes, all sources generally impact the point of maximum concentration in varying degrees.

The Appendix B screening analysis must demonstrate that both the annual and short-term impacts are below the appropriate standards or guideline values. When these values are exceeded using the screening methods or the AG-1 program, a refined Air Quality Analysis may be required.

III.D.1. Refined Air Quality Analysis

When the Air Guide-1 software program analysis shows that impacts are unacceptable, IAS staff should be contacted for guidance (518-457-7688) as it may be possible to reduce the conservatism in the analysis. If the level of conservatism cannot be reduced, a site specific analysis should be required if the permit is to be approved. As an initial step, the source owner should be provided with Air Guide 26 to facilitate development of a modeling protocol. Questions on the protocol should be directed to IAS staff, who will provide guidance to both the source owner and Regional Offices on the selection and execution of these models.

IV. ASSUMPTIONS, QUALIFICATIONS AND FURTHER CONSIDERATIONS CONCERNING APPENDIX B

The methodologies behind the development of the initial Appendix B screening procedures are described in the 1979 Sedefian paper. These procedures were revised by Sedefian and Wade in the November 1, 1993 paper, previously referenced. Both should be reviewed to understand most of the assumptions and qualifications associated with these stepwise procedures. The Cavity and the Standard Point Source Method equations were formulated to calculate worst case impacts under building downwash effects. These equations are consistent with EPA procedures found in the SCREEN2 and the ISC2 (Version 93109) models. The modified screening methods calculate conservative impacts under all conditions. Thus, the method will likely overestimate the point source impacts predicted by the more refined techniques found in the AG-1 software program, SCREEN3 and ISC3 models. Some of the more notable assumptions and qualifications relating to this appendix are as follows:

IV.A. Worst Case Assumptions of the Standard Point Source Method

The worst case impact method of Section III.A assumes the most conservative downwash effects under the most conservative environmental setting (RURAL or URBAN). These conditions were determined from model sensitivity runs using the SCREEN2 and ISCLT2 models.

For the annual method and no plume rise assumption, the maximum impacts occur under building downwash conditions. Specifically, when the stack height is equal to the building height (hs=hb) and the building is just squat (hw=hb, where hw is the horizontal crosswind building dimension). For this configuration, the rural and urban maximum impacts are nearly identical. Since these conditions are the bases of the worst case point source equation, there may be many instances when the screening methods will be overly conservative. For example, the screening methods may be overly conservative under the following situations: 1) when the source is in a rural setting and the hs/hb is greater than 1.5; 2) when the source has a significant plume rise (e.g. large flow and high temperature); and 3) when the source is tall, instead of squat in the predominant wind direction and hs is greater than hb. The conservatism can be reduced by using the AG-1 software program, especially in the ISCLT2 mode.

For the short-term method, the maximum impacts occur in a rural setting under the worst case downwash conditions. These occur when a source has no plume rise and the stack height to building height ratio is just greater than 1.2 for a squat building (hb=hw). In general, the short-term method can be overly conservative for the examples noted above in the annual impact method. However, the impacts calculated using the short-term method are generally more sensitive to the hw/hb ratio. The conservatism of the short-term screening methods may be reduced by using the SCREEN2 model or the AG-1 program.

IV.B. Background Concentrations

Insufficient data currently exists for establishing credible, non-industrial background concentrations for almost all the non-criteria pollutants addressed by Air Guide-1.

Therefore, in almost every instance, one may assume the background concentration is insignificant or zero for non-criteria pollutants.

The assumption that background is insignificant is valid for most contaminants in terms of relative contribution. Those that are significant will be identified through the DEC Toxic Sampling Network and/or as a result of the Clean Air Act Amendments of 1990. However, nearby industrial source impacts are not to be considered as part of the general background concentration. The contribution from these nearby industrial sources must be considered when assessing ambient air quality as required by Section III screening methods. Nearby sources, for the most part, are those located within adjacent facilities. However, there may be other significant sources in non-adjacent facilities. The significance of these other sources can be determined by using the AG-1 software program.

In situations where adequate ambient monitored data exists, it may be valid to establish a background concentration. Background concentrations should then be added to the screening model estimates. Caution is advised, because in most instances monitoring information is not of sufficient duration to be representative of long-term averages. Additionally, it is often difficult to separate background from industrial contributions. However, if annual background data exists, the background concentrations should be added to the screening model estimates.

IV.C. Air Guide-1 Default Values

When information is not available to conduct an Air Guide-1 review, any of the following Default Values may be assumed for use with these screening procedures:

Height Above Structure		=	0.	feet
Stack Height1	hs :	=	33.	feet
Inside Dimension		=	4.	inches
Stack Outlet Radius,	R :	=	.17	feet
Exit Temperature		=	51.	degrees F.
Exit Temperature,	T :	=	511.	degrees R.
Exit Velocity,	V :	=	.01	ft/sec
Exit Flow Rate		=	.05	ft3/sec
Ambient Temperature,	Ta :	=	510.	degrees R.
Building Height1	hb :	=	hs	
Building Width1	Lmin :	=	hb	
Building Length	Lmax :	=	hb	
Side Length of Area Source,	S :	=	30.	feet
Distance to Property Line2	Dpl :	=	1.	foot
Momentum Flux,	Fm :	=	0.	ft4/sec2
Effective Stack Height1	he :	=	33.	feet
Buoyancy Flux Parameter,	F :	=	0.	m4/sec3

1 For cavity concentration calculations, set hs and Lmin to 33ft as defaults. This may not always be conservative for stacks and building heights which are less than 33 feet.

2 By assuming Dpl equal to 1 foot, the method will force the calculation of a worst case cavity impact. That cavity may occur on plant property. The correct Dpl must be used to determine whether the cavity impact occurs on plant property.

IV.D. Receptor Distance and Location

The concentrations obtained by the standard point source method (Section III.A.) represent the maximum impacts at any receptor location. The area source methods (Section III.B.) will predict the maximum impacts, independent of wind direction, just outside the area source (0.564S). Impacts at specific downwind distances for both types of sources can be calculated by the AG-1 program.

IV.E. Multiple Point Source Impacts

The procedures described in Section III perform initial and conservative impact calculations followed by a source specific summation of impacts. The calculations using source specific emission parameters add the maximum impacts from each source to determine the total impact, regardless of spatial considerations. These impacts may be overly conservative under conditions such as a large separation between sources (e.g., over 100 meters), a factor of two or more variation in stack heights (especially for stacks below 30 meters) and non-alignment of all sources with the predominant wind direction for the given area. In these instances the AG-1 program or a site specific analysis may predict a significantly lower impact. Additionally, if the impact of concern is not at the point of maximum concentration, but at a location where downwind distance or wind direction frequency could influence the impact, then the AG-1 program or a site specific model may provide a more accurate and lower impact estimate. Furthermore, if it is determined that the facility source configuration is too complex for these screening procedures and the AG-1 program, a refined site specific analysis can be requested of the source owner. IAS staff should be contacted for guidance on this or any other consideration.

IV.F. Area Sources

An area source can be used to model many different types of sources including stack emissions. However, in general, stack emissions should not be modeled as area sources. Area sources best describe emissions uniformly distributed over an area, such as fugitive emissions from a coal pile or from a sewage treatment plant lagoon. For the purposes of this screening model, area sources can be used to model waste disposal sites, fugitive and primary facility-wide emissions, and urban area sources.

Two different procedures are presented in Section III to estimate the ambient impacts from area sources. Both procedures are useful, although the impact equation in the first method is preferred, simpler, and allows for the calculation of short-term impacts. The second, alternate method has the advantage of permitting the calculation of the ambient impact within the area source.
NOTE: Neither method is in accord with current EPA Modeling Guidance.

Both these methods will perform more accurately, the closer the source characteristics approximate the following conditions:

1) The emissions in the area source are uniformly distributed with variations not exceeding 25%.

2) The area source is square. If it is not square, it should be broken up into smaller square sources or, approximated by a square source with an equivalent area.

3) The emissions are continuous and not a function of meteorological conditions.

IV.G. "New York County" Source Impacts: Elevated Receptors and Elevated and/or Multiple Sources

For the County of New York (Manhattan) and similar urban areas characterized by elevated (>33ft) receptors and elevated and/or multiple sources (4 or more), the point source procedures in III.A. are not appropriate due to the constraints imposed by the possibility of large numbers of sources and elevated receptors being located in a small geographical area. A simple method to determine the acceptability of a source's impact is to compare the emission rate of the source (in lb/hr) with Qc, where Qc = AGC/200 and the AGC is defined in ug/m3 for the pollutant. If the emission rate is less than Qc, then the impact of the source is acceptable as long as the size of the source is not considerably larger than the typical sources noted below.

The above method was derived from the analysis performed for the quantification of lead in waste oil as discussed in the report "Determination of Acceptable Lead and Chlorine Content Limits for Waste Oil Based on Modeled Impact Results," 12/7/82 by L. Sedefian. This analysis indicates that the NAAQS for lead of l.5 ug/m3 will be met by a multitude of typical sources of 1 to 10 MMBtu/hr, with average burning rate of 40 gal/hr, as long as the lead content of the waste fuel is below 25 ppm. The latter corresponds to an uncontrolled emission rate of 0.008 lb/hr. The above equation results from taking the ratios of emission rates to AGCs of lead or any other pollutant. This method should not be used for sources larger than the typical sources just noted, which correspond to large apartment or commercial building boilers in New York County. Additionally, the method should not be used if only a single source of the contaminant exists in the area being considered. In this case, the cavity method of Section II and point source method in Section III.A, or a refined analysis should be used.

IV.H. Urban Versus Rural Source Impacts

The dispersion over cities and other built-up areas is enhanced due to increased surface roughness and heating relative to those over flat and open (rural) terrain. This enhanced dispersion is characterized by a set of urban dispersion curves developed from a synthesis of several studies, and used in regulatory models such as ISC2. EPA has developed certain criteria to determine whether these urban curves should be used for specific source applications.

The most common procedure is the land use method whereby a 3km area around the source is classified according to land cover. If 50% or more of this classification is of compact industrial, commercial or residential type, then the urban curves should be used. Thus, all metropolitan areas and city centers should be modeled with the urban dispersion parameters. In addition, the heat generated at large industrial facilities enhances the thermal dispersion to a degree that the urban curves are appropriate. Thus, such large facilities (e.g., Kodak Park, Bethlehem Steel) should also be modeled with the urban curves.

FIGURE B-1

GLOSSARY

Nomenclature and Variables in Appendix B:

Variable		English Units	PC/CO (76-19-3) Reference
Q	= Reported Actual Hourly Emissions	lb/hr	Box 65
Qa	= Annual Emission Rate	lb/year	Box 66
QA	= Area Source Emission Rate per Square Area	lb/(hr-ft2)	-
CC	= Annual Cavity Impact	ug/m3	-
CCST	= Short-Term Cavity Impact	ug/m3	-
Ca	= Actual Annual Impact	ug/m3	-
Cp	= Potential Annual Impact	ug/m3	-
CST	= Short-term Impact	ug/m3	-
hc	= Cavity Height	feet	-
hb	= Building Height ((Box 32) - (Box 31))	feet	-
hs	= Stack Height	feet	Box 32
he	= Effective Stack Height	feet	-
Dpl	= Distance from Building to Property Line	feet	-
Lmax	= Largest Building Dimension (length)	feet	-
Lmin	= Smallest Building Dimension (width)	feet	-
hw	= Horizontal Crosswind Building Dimension	feet	-
Fm	= Momentum Flux	ft4/sec2	-
T	= Stack Exit Temperature	Rankine	Box 34 +460
Ta	= Ambient Temperature (Assumed= 510 R)	Rankine	-
V	= Exit Velocity	ft/sec	Box 35

FIGURE B-1 (Continued)

GLOSSARY

Nomenclature and Variables in Appendix B:

Variable		English Units	PC/CO (76-19-3) Reference
e	= 2.718282		-
R	= Stack Outlet Radius	feet	(Box 33)
A	= Vertical Building Cross-Sectional Area	ft2	-
F	= Buoyancy Flux Parameter	m4/sec3	-
S	= Side Length of Area Source	feet	-
K	= Area Source Impact Factor	-	-
Cm	= Area Source Conversion Factor	-	-

****
TECHNICAL REFERENCE FOR THE SCREENING PROCEDURES OF THE AG-1 SOFTWARE PROGRAM
****

TECHNICAL REFERENCE FOR THE SCREENING PROCEDURES OF THE AG-1 SOFTWARE PROGRAM

By: Eric Wade & Leon Sedefian
Bureau of Application Review and Permitting
Division of Air Resources
N.Y.S. Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-3254

January 11, 1994

1.0 Introduction

The purpose of this paper is to identify and document the procedures used in the Air Guide-1 software program for calculating annual and short-term ambient impacts. Instructions for running the program and general procedures are described in the program's HELP menu and user guide. Table 1 shows where the software program procedures are documented. Some of these modeling procedures are documented in this paper while others are in the references specified.

The Air Guide-1 software program can calculate short-term and annual cavity, point, and area source impacts in both screening and refined modes. The short-term method can only calculate impacts in a screening mode and follows the procedures outlined in Section 2.0. However, the annual method can predict impacts in both screening and refined modes. The screening impacts are calculated using the procedures outlined in Appendix B of Air Guide-1. The methodology used to derive these procedures is described in the November 1, 1993 paper entitled "Modifications to the Air Guide-1 Appendix B Screening Analysis Methods," by Leon Sedefian and Eric Wade. Annual refined impacts are calculated using an enhanced version of the ISCLT2 model (Version 93109). These enhancements are described in Section 3.0; they control the execution of the key subroutines within the ISCLT2 program. Documentation on the ISCLT2 model can be found in the "User's Guide for the Industrial Source Complex (ISC2) Dispersion Models (May 1992)".

2.0 Air Guide-1 Software Program SHORT-TERM Method

The hand calculation procedures for determining maximum short-term impacts are contained in Appendix B of Air Guide-1 (AG-1) and documented in the above November 1, 1993 referenced paper by Sedefian and Wade. In these procedures, maximum short-term impacts are calculated by applying a simple conversion factor to the predicted annual impacts from Appendix B. The method is often very conservative, and as a result, a new enhanced procedure was developed for the AG-1 software program. This new procedure was developed exclusively for the software program as it was considered too complex for the hand calculation methods. The increased complexity of the calculations is invisible to the user in the software program.

The following details the enhanced screening procedures for determining the maximum short-term impacts from cavity, point, and area sources. The procedures emulate the SCREEN2 model in predicting the concentration at the point of maximum impact from a point or area source, under worst case meteorological conditions. For point source impacts, the method considers the maximum impacts inside and outside the cavity region. The procedures are similar in structure to the Appendix B annual impact method, although several more equations are presented to define short-term impacts more accurately.

The procedures contained in this section were developed from sensitivity runs conducted using the SCREEN2 model. These runs defined the worst case stack, building, and model parameters for the critical scenarios. That information was then used to develop the refined step-by-step procedure outlined in Figure 1. This figure highlights steps 2.1 through 2.7, discussed below:

2.1 Calculate Maximum Short-Term Impact from area source (CSTA)

Figure 2 depicts a comparison of the SCREEN2 and AG-1 software program predicted short-term area source impacts. The AG-1 software program adequately predicts the SCREEN2 model concentrations from a ground level source at user specified downwind distances. The minimum distance at which a concentration can be calculated is 0.564S, where S is the side length of a square area source. This minimum distance is measured from the center of the area source and considered just outside by the SCREEN2 and ISC2 models. The software program will not allow the user to select a downwind distance greater than 1000 meters (3300 feet), since the equation begins to underestimate impacts at and beyond this distance. Additionally, the area source side length should be greater than 30 feet, but less than 3000 feet, to insure that the results are within the model's limitations.

2.2 Calculate Maximum Short-Term Cavity Impact (CCST)

The procedures for calculating the maximum short-term cavity concentration are essentially outlined in the SCREEN2 manual. However, the AG-1 program assumes that the plume is entrapped within the cavity region, if the physical stack height is less than or equal to the cavity height. Thus, unlike SCREEN2, the method does not consider whether momentum rise causes the plume to escape the cavity or whether the critical wind speed exceeds 20 m/s. Additionally, the program limits the maximum cavity height to 1.5 building heights as described in the November 1, 1993 paper by Sedefian and Wade. A conservative one m/s wind speed is assumed, and the maximum cavity concentration is calculated for the most conservative crosswind building dimension. A flow chart of the cavity impact calculation procedures is shown in Figure 3.

2.3 Calculate Effective Stack Height (he)

In determining the effective stack height for a point source, the AG-1 software program credits a minimum buoyancy-induced plume rise for GEP stacks and a minimum momentum rise for hs/hb ratios > 1.5, but less than 2.5. These procedures are shown in Figure 4 and are identical to those used in the annual impact method as explained in Sedefian and Wade, 1993.

2.4 Calculate Maximum GEP (non-downwash) Short-Term Impact (CSTP)

Figure 1 shows that the next step is to calculate the maximum short-term impact from a GEP stack. A stack is not affected by building downwash when the stack height equals or exceeds the GEP height where, GEP = hb + 1.5L (where L is the lesser of the horizontal or vertical building dimensions). The derivation of the equations for the worst case GEP stack were based on many SCREEN2 model sensitivity runs, in both RURAL and URBAN modes, assuming no plume rise, and the worst case meteorological conditions. Those runs showed that the worst case GEP short-term impacts were predicted in the URBAN mode for stack heights less than approximately 90 meters. For GEP stack heights greater than this value and all non-GEP stacks, the worst case impacts were predicted in the RURAL mode.

Figure 5 presents the AG-1 software program worst case GEP stack equations for calculating maximum ambient impacts (CSTP). The figure also shows a comparison of the SCREEN2 maximum predicted impacts and those calculated using the AG-1 software program and Appendix B methods.

Figure 6 shows the AG-1/SCREEN2 short-term impact ratios for both the AG-1 Appendix B and software program methods. The figure reveals that the Appendix B methods overestimate the SCREEN2 impacts by a factor of 3.6, for very short stacks, and underestimate the impacts from very tall stacks greater than 550 feet. On the other hand, the AG-1 software program yields very good agreement with the SCREEN2 model, as the greatest deviation is less than 8 percent (1.077).

2.5 Calculate Maximum Downwash Short-Term Impact (CSTD)

The key to deriving both the annual and short-term impact screening procedures was to identify the worst case stack and building parameters under no plume rise and downwash conditions. For stack heights less than about 55 meters, the SCREEN2 model predicts the worst case impacts will occur in the RURAL mode when the stack height to building height ratio is just greater than 1.2 for a SQUAT (hw=hb) or SUPER SQUAT (hw > 5hb) building. When stack heights are greater than about 55 meters, the model predicts the worst case impacts will occur when the stack height to building height ratio is equal to 1.0 for the same building configurations. Although, at this stack height to building height ratio (hs/hb=1.0), the worst case impacts are less than 3 percent greater than those at the other ratio (hs/hb= 1.2). Therefore, for screening applications, the worst case impacts can be predicted for all stack heights using the SCREEN2 model in the RURAL mode when the stack height to building height ratio is just greater than 1.2 (e.g., 1.20001) for a SQUAT (hw=hb) or SUPER SQUAT (hw > 5hb) building.

Figure 7 presents the worst case short-term impact equations for the AG-1 software program. Like Figure 5, the Figure 7 graph presents a natural log-log plot showing the SCREEN2 and AG-1 predicted concentrations for stack heights less than 700 feet. The figure presents two equations for the AG-1 software program for effective stack heights less than, or greater than, 33 feet.

Figure 8 presents AG-1/SCREEN2 comparison ratios for maximum predicted short-term downwash impacts. The largest over prediction by the AG-1 software program is 16 percent greater than the SCREEN2 model predicted impacts. Additionally, the figure shows the accuracy of the AG-1 Appendix B method varies greatly for stack heights less than 200 feet.

2.6 Adjust Maximum Downwash Short-term Impact (CSTD= CSTD * RF)

Unlike the single Appendix B annual impact reduction factor for hs/hb ratios greater than 1.5, the AG-1 software program applies a linear reduction factor to the worst case short-term impact for hs/hb ratios greater than 1.2, but less than GEP (2.5). The derivation of this linear reduction factor was based on numerous modeling sensitivity runs defining the worst case building configuration for different stack height to building height ratios. Figure 9 is an example of many of these runs for 3 different stack heights. Note that with the exception of the 200 meter curve, the two other curves are nearly identical between hs/hb=1.2 and hs/hb=2.4999. The similarity of these curves is the basis for the derivation of the linear reduction factor equation.

Although not used in the AG-1 software program, Figure 9 also identifies the SCREEN2 worst case building configuration and crosswind building width for different stack height to building height ratios. As an example, for hs/hb ratios greater than about 1.3, but less than 1.5, the worst case impacts were predicted for a TALL building under Huber Snyder downwash conditions when the crosswind building width (hw) was equal to: (hw=(hs-hb)/0.5). This represents the critical width separating the Huber Snyder and Schulman Scire downwash methods.

Figure 10 presents the derivation of the linear downwash reduction factor (RF) for stack height to building height ratios greater than 1.2, but less than 2.5 (GEP stack). The reduction factor equation was developed from SCREEN2 modeling runs at the critical hs/hb ratios (1.0, 1.2, 1.5, 2.4999 & 2.5) for stack heights between 1 and 200 meters. The figure shows a single linear relationship for hs/hb ratios between 1.2 and 2.4999 for stack heights less than about 120 meters. For stack heights greater than 120 meters, the curve flattens out. This is better illustrated by the 200 meter curve in Figure 9 where the curve becomes flat for hs/hb ratios greater than 2.1. Like the ISC2 model, the SCREEN2 model insures the predicted downwash impact is never less than the GEP non-downwash impact from any source. Therefore, the reduction factor equation presented in Figure 10 applies to sources with hs/hb ratios greater than 1.2, but less than 2.5, where the adjusted downwash impact (CSTD = CSTD* RF) is not allowed to be less than the GEP non-downwash impact (CSTP).

It should be noted that the reduction factor is based on the stack height to building height ratio since it does not consider plume rise. Plume rise is only considered when calculating the worst case building downwash and GEP stack impacts using the equations in Figures 5 & 7.

2.7 Determine Maximum Short-Term Impact from point source

The AG-1 software program calculates the overall maximum short-term impact from a point or area source. The point source method also considers impacts inside and outside the cavity region. The program then selects the greatest of these values and reports it in the ANALYSIS MENU. The greatest of these impacts is evaluated in order to insure the most conservative analysis. Note that the program reports all impacts in the Step-by-Step Analysis of the AG-1 computer program).

3.0 Enhancements to the ISCLT2 model (version 93109)

Appendix B of Air Guide-1 contains procedures for conducting a screening level analysis for annual ambient air quality impacts. These procedures can be especially conservative when evaluating the impact from multiple sources or those with significant plume rise. That conservatism can be further increased when there is a significant separation between sources or a significant difference in effective stack heights. All of these issues can be addressed, and the conservatism reduced, by using the ISCLT2 model. As such, the ISCLT2 model was integrated into the Air Guide-1 software program.

3.1 Program Enhancements

One of the goals of the Air Guide-1 software program was to create a smart, user friendly program. To accomplish this, an interactive program was created to prompt the user for required data. If data is unknown, the computer will automatically provide conservative default values or HELP guidance. When this concept is applied to the screening procedures, the following basic rule applies: The software program will provide better and less conservative impact estimates in direct proportion to the amount of data supplied by the user.

These same concepts were used in developing the AG-1 version of the ISCLT2 model. The program leads the user through the ISCLT2 input selection criteria and adjusts the level of conservatism in direct proportion to the amount of data supplied by the user. It lets the user select one of several prepackaged meteorological STAR data sets and the method for evaluating impacts (concentrations, conc./AGC ratios, cancer risks, or hazard indices). The user then selects the run mode (RURAL or URBAN), contaminant(s) to be evaluated (CAS NUMBER), source(s), actual or potential emissions, answers some critical questions to determine how building downwash will be handled, and selects several output options. On output, the data is displayed in a 13 by 8 UTM grid as discussed in the user's guide.

The AG-1 program controls the ISCLT2 downwash method by assigning different crosswind building widths (hw) to each source for each wind sector. The assignment of these different values control the building downwash configuration. This configuration then determines how the ISCLT2 model handles building downwash. Complicating this process are the default building parameters that can be automatically assigned as part of the Appendix B screening procedures. These default values are conservative for the screening procedures, but not necessarily conservative for the ISCLT2 model. The software program addresses this concern by first asking the user if the assigned building parameters are accurate and then adjusts the conservativeness by assigning different crosswind building widths.

Figure 11 presents a flow chart outlining the AG-1 ISCLT2 worst case crosswind building width assignment method. This procedure was developed after first evaluating how different hs/hb and hw/hb ratios affect maximum predicted concentrations under RURAL, URBAN, plume rise and no plume rise situations. Figure 12 shows part of this evaluation for the RURAL and no plume rise case. The hs/hb ratio is the critical value affecting the magnitude of downwash impacts. Further, the ratio influences the basic relationship between maximum predicted concentrations and the crosswind building width (hw). These relationships are shown in graphs A, B, C & D of Figure 12. Although some of the graphs were created using different meteorological STAR data and based on sources with different stack heights, the basic curve shapes are independent of these variables.

Graph 12A shows a similar relationship between concentration and the hw/hb ratio for all stack height to building height ratios less than one (hs/hb < 1.0). The maximum predicted concentration occurs when the crosswind building width is equal to stack height of the source. Therefore, for hs/hb ratios less than 1.0, the worst case building configuration is for a TALL building with a crosswind building width equal to the physical stack height of the source under Schulman Scire downwash conditions. This worst case configuration (hw=hs) also holds up for URBAN cases and for sources with significant plume rise. Note, that the maximum predicted concentration under this configuration equals that predicted for the AG-1 worst case building configuration: hw=hb=hs (hb=164' curve).

Graph 12B shows the similarity of the relationship (basic curve shape) between concentration and the hw/hb ratio for all sources with hs/hb ratios greater than or equal to 1.0, but less than about 1.3 (1.0 =< hs/hb < 1.3). The graph shows the maximum predicted concentration occurs when hw=hb for a SQUAT building under Schulman Scire downwash conditions. This worst case configuration for no plume rise cases also applies to all SQUAT buildings with hw/hb ratios between 1.0 and 2.64, and all SUPER SQUAT buildings (hw/hb > 5).

Graph 12C is presented to show the basic curve shapes for sources with hs/hb ratios greater than or equal to 1.3, but less than 1.5 (1.3 =< hs/hb < 1.5). Although the graph shows only one hs/hb ratio within this range (hs/hb=1.45), the single curve is representative. It shows a critical point (hw= (hs-hb)/0.5) where the downwash method changes from Huber Snyder to Schulman Scire. This complicates the selection of the worst case downwash configuration, because sometimes it occurs under Huber Snyder conditions, while at other times, under Schulman Scire conditions. Under no plume rise situations the crossover from Schulman Scire to Huber Snyder occurs when the hs/hb is equal to about 1.3. However, when a source has significant plume rise, this crossover point approaches 1.5. The AG-1 version of the ISCLT2 model solves this problem by considering both building configurations and selecting the maximum impact.

Graph 12D shows the basic curve shape or relationship between concentration and the hw/hb ratio for sources with hs/hb ratios greater than 1.5. For these sources, maximum concentrations are predicted when hw=hb for SQUAT buildings under Huber Snyder downwash conditions. Moreover, the worst case downwash conditions occur for any SQUAT building (hw >= hb).

Figure 13 presents a summary of the worst case building downwash configurations for different stack height to building height (hs/hb) ratios and the no plume rise case. The figure also shows how the stack height to building height ratio affects the predicted worst case downwash impacts for a given stack height and RURAL or URBAN mode. The worst case downwash impacts occur when hw=hb=hs as in Appendix B of Air Guide-1. They also occur when hw=hs for hs/hb < 1.0.

The information presented in Figures 12 and 13 was used to develop the AG-1 ISCLT2 worst case crosswind building width (hw) assignment method shown in Figures 11, 14, 15, 16, and 17. The software program selects the assignment method based on a series of questions posed to the user. Its conservativeness is then reduced as the user indicates more correct information has been provided.

The method begins (Figure 11) with the computer asking the user: "Have the correct Building Heights or Height above Structures (hb=hs-(h. above)) been assigned to every emission point?" If the answer is NO (Figure 14), the computer assigns all building heights and crosswind building widths equal to the physical stack height (hb=hs & hw=hb=hs) of the source. This is not always conservative when a stack height is actually less than building height and a source has significant plume rise. Thus, a warning message is printed by the program. This situation is not considered significant since it represents an unusual case and since the building height will likely be known as it is required data on a permit application form. The hw=hb=hs assignment in Figure 14 forces the ISCLT2 model to classify each building as SQUAT and use the Schulman Scire downwash algorithms. This is the worst case stack and building configuration as noted above.

When the correct building heights have been assigned to every emission point, the program asks the user: "Have the correct Building Dimensions (Building Width (BW) and Length (BL)) been assigned to every emission point?" If the answer is NO (Figure 15), the program assigns the crosswind width based on the stack height to building height ratio (RAT= hs/hb) of each source. As shown in Figure 13 and based on Graph 12A, when RAT (hs/hb) is less than 1.0, the crosswind building width is assigned to the stack height (hw=hs). Further, as shown in Figure 13 and based on Graphs 12B & 12D, when RAT < 1.3 or RAT >= 1.5, the crosswind building width is assigned to the building height. Lastly, when 1.3 =< RAT < 1.5, the computer calculates two separate impacts to determine the maximum value, as discussed above under Graph 12C.

Figure 16 shows the assignment method when hb, BW & BL are known, but the direction which the building length faces is unknown. This method is slightly more complex, but less conservative. As shown in Graph 12A, when RAT < 1.0, the maximum impact occurs when hw=hs. Therefore, it is critical to determine if a crosswind building width (hw) could equal the stack height, realizing hw could be any width between Lmin (smaller of BW and BL) and Lmax (Lmax= (BW2 + BL2)0.5). Further, if hw can not equal hs, what is the worst case value? To make this determination, the method considers all the possible plotting positions of the two values (LRAT: Lmin/hb & LRAT2: Lmax/hb) on the curves shown in Graph 12A. Based on this assessment, the software program assigns hw=Lmin, hw=Lmax or hw=hs. For sources with other stack height to building height ratios, the program uses this same approach based on Graphs 12B, 12C, and 12D.

While Figures 14, 15 & 16 assign the same worst case crosswind building width to each and every wind direction, the ISCLT2 model has an option which allows the user to assign a separate and different value to each direction. The Air Guide-1 version of the ISCLT2 model uses this option when all building dimensions and orientations are known (KNOWN: hb, BW, BL & Dir. BL facing). This procedure is the least conservative of the downwash methods (shown in Figure 17). The Air Guide-1 program automatically assign a different crosswind building width to each of the 16 possible wind directions based on the assumption the building is rectangular and faces in the specified direction. The program then calculates a separate crosswind building width for each of the 22.5 degree wind sectors for use with the AG-1 version of the ISCLT2 model.

3.2 Technical Reference

The ISCLT2 model, reprogrammed by Roger Brode and JieFu Wang, is a large, well structured Fortran program made up of many subroutines. The restructuring of these subroutines greatly simplified the process of integrating the model into the AG-1 software program. To accomplish this task, only the key subroutines are actually used by the AG-1 Fortran program (AG7GRID.FOR). These are the subroutines that calculate the point and area source concentrations. All of these subroutines are contained in the program files: CALC1LT.FOR, CALC2LT.FOR, SIGMASLT.FOR, PRISELT.FOR and ERRHDL.FOR. Each was compiled and linked with the main AG-1 program (AG7GRID.OBJ) to produce the executable program. Note that the program does not use all the subroutines contained in the above ISCLT2 program files. In fact, the program initially CALLs only the following subroutines contained in the above files: WSADJ.FOR, ADISLT.FOR, DISTF.FOR, WAKFLG.FOR, LTXYP.FOR, PHEFF.FOR, SIGZ.FOR, BIDLT.FOR, SZENH.FOR, VERT.FOR, LTSMTH.FOR and DEBOUT.FOR. Other ISCLT2 subroutines are used, but they represent secondary CALLs from those above. These are shown in the Appendix B Module calling trees of the ISC2 User's Guide, Volume I, pages B-8 & B-9. All of the remaining critical elements of the ISCLT2 fortran subroutines were either rewritten or copied into the AG7GRID.FOR main Fortran program. This was done to control the execution of the model.

Refined impacts calculated by the AG-1 software program are identical to those calculated using the ISCLT2 model (version 93109) in the regulatory default mode. No changes were made to the code to affect concentration calculations, although some changes were made to improve program speed. Most of these involved moving sections of the code to more optimum locations. For example, the ISCLT2 model tries to calculate a source impact contribution using each piece of joint frequency data (FREQ: a function of 6 stability classes, 16 wind directions and 6 wind speeds). Some of these calculation attempts are unnecessary when it's impossible for the source to have an impact at the receptor. For example, by just considering the source and receptor locations, the AG-1 program does the following:

(1) Only calculates impacts for receptors located outside the area source (see ACALCL.FOR).

(2) Determines if a receptor is too close to a point source to calculate an impact: The minimum distance is 1 meter (see PCALCL.FOR).

Additionally, by only considering stability class and wind direction, other determinations can be made. The ISCLT2 model makes these determinations six more times for each source and receptor by considering wind speed as well. For example, the AG-1 version of the ISCLT2 model considers only stability class and wind direction to determine the following:

(1) Eliminates from consideration all receptors upwind of the source (see ACALCL.FOR and PCALCL.FOR).

(2) Only considers the point source contribution at a receptor for wind directions within 22.5 degrees (one sector) of the source-receptor direction for hs/hb ratios greater than 1.2 (see PCALCL.FOR & LTXYP.FOR). For hs/hb ratios less than 1.2, the program considers wind directions within 2.5 sectors of the source-receptor direction (AG-1 software modification, 2.5 factor derived from sensitivity runs).

(3) Only considers the area source contribution at a receptor within one sector of the source-receptor direction (see ACALCL.FOR).

(4) Eliminates from consideration all receptors upwind of the downwind edge of the effective radius of an area source (see ACALCL.FOR).

The last change to increase program speed is the most significant for the AG-1 version of the ISCLT2 model. This change addresses multiple contaminant sources. When the AG-1 program evaluates multiple contaminants from a single source (e.g., conc./AGC ratios, cancer risk and hazard indices), the program only calculates a single source-receptor impact. It then prorates the others by the relative difference in emission rates. This becomes especially important when an entire facility is modeled as a single emission point.

With the exception of the DEBOUT.FOR subroutine, none of the ISCLT2 subroutines called by the AG-1 program were actually modified. The DEBOUT.FOR subroutine was only modified to copy debugging information into a special AG-1 program file (AG7DEBUG.DAT). An INCLUDE statement was used to add the MAIN1LT.INC, MAIN2LT.INC and MAIN3LT.INC program elements to the main Fortran program (AG7GRID.FOR). Lastly, a BLOCK DATA INIT statement was used to add the initialization data from the ISCLT2.FOR file to the end of the main program.

Table 1, Modeling Procedures & Documentation for the AG-1 Software Prog.

MODELING PROCEDURE	PROCEDURES / (DOCUMENTATION)
SHORT-TERM SCREENING METHOD	
Cavity Source	AG-1 Software Program Short-term Method (see Section 2.2)
Point Source	AG-1 Software Program Short-term Method (see Sections 2.3 through 2.6)
Area Source	AG-1 Software Program Short-term Method (see Section 2.1)
ANNUAL SCREENING METHOD	
Cavity Source	AG-1 Appendix B Refined Cavity Impact Method (November 1, 1993 paper by Sedefian & Wade)
Point Source	AG-1 Appendix B Standard Point Source Method (November 1, 1993 paper by Sedefian & Wade)
Area Source	AG-1 Appendix B Area Source Method - modified to calculate impacts at specified downwind distances. (November 1, 1993 paper by Sedefian & Wade)
ANNUAL REFINED METHOD	
Cavity, Point, & Area Source	ISCLT2 model (version 93109) see: 1. User's Guide for the ISC2 Dispersion Models, USEPA, March 1992. 2. User's Guide for the Air Guide-1 Software Program, April 4, 1994. 3. Section III of this document.

****
** MODIFICATIONS TO THE SCREENING PROCEDURES FOR AIR TOXICS IMPACT ANALYSES *
****

MODIFICATIONS TO THE SCREENING PROCEDURES FOR AIR TOXICS IMPACT ANALYSES

By: Leon Sedefian & Eric Wade
Bureau of Application Review and Permitting
Division of Air Resources
N.Y.S. Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-3244

November 1, 1993

I. Introduction

The screening procedures which were developed in 1979 to allow a simplified review of toxic pollutant emissions were developed mainly to address long-term point and area source impacts. The documentation for these methods are contained in "Screening Procedures for Calculating Ambient Impacts of Toxic Contaminants", by Leon Sedefian. These procedures were modified for the cavity and area source methods in 1989 to be more in line with EPA's procedures and to produce more realistic impacts. In addition, short-term impact estimation factors were derived and all of these changes were incorporated in the 1991 edition of Air Guide-1 (AG-1).

In order to be consistent with the latest EPA Modeling Guideline (Supplement B, July, 1993) and the procedures in the ISC2 and SCREEN2 models for point source downwash effects and area source impacts, the Air Guide-1 (Appendix B) methods have been completely reformulated. There is further incentive since the previously developed simple equation for point source impacts, which simulated downwash effects, has been found not to be conservative. This is especially true for short stacks and no-plume rise cases. Underestimation of some impacts by the previous version of the SCREEN model has also been identified. These limitations are not acceptable for a screening method, which should identify all potential concerns.

Thus, the methodology has been changed to assure a degree of conservatism, yet the ability to quickly determine the source's impact is retained by keeping the procedures simple. The modifications and the rationale for the new procedures are detailed below for the point and area source methods with the 1979 document as a basis for the reformulations. Thus, familiarity with the latter is assumed. In addition, the cavity method which appeared in the 1991 edition of Air Guide l, with a slight modification, is documented in this report.

The simple screening approach described below represents the first step of an ambient impact evaluation. It relies upon a minimum set of emissions data for its calculations. This procedure can be follow-up with the more detailed screening methods of the Air Guide-1 software package. The latter is compatible with the SCREEN2 (for short term) and ISC2 (for long term) models.

The next three sections discuss the derivation of the cavity, point source and area source methods, respectively. The limitations and applicability of these procedures are also discussed.

II. Cavity Method

The derivation of the cavity screening equation in the original 1979 document still serves as the basis for most of the procedure. However, based on more recent guidance from the EPA SCREEN2 model, both the cavity height and the resultant impact equation have been modified.

The annual impact equation presented in the 1979 document incorporated conservative values for the empirical factor "K" of 1.5, a joint wind data frequency (f) of 0.1, and a central wind speed (U) of 4.5m/s. This resulted in:

$$CC(ug/m3)=K*Qm*f*10^{6}/(Am*U)=47420*Q/A$$

where Qm and Q are the emission rates in g/s and lb/hr, and Am and A are the minimum building area in square meters and square feet, respectively. The 1991 Draft edition of Air Guide-1 included modifications to the K and f factors, both of which have been carried forward in the current method. The K factor was changed to 0.67 to be consistent with the EPA cavity method. This factor is also used in the SCREEN2 model. Additionally, the annual wind frequency factor was adjusted to 0.075 which represents the average of the critical range. With these two factors, the constant in the cavity equation was reduced by a factor of three. Thus, the annual cavity equation is (in English units).

$$CC = 15069*Q/A$$

or

$$CC = 1.72*Qa/A$$

where Q is in lb/hr, and Qa is in lb/yr.

In the 1991 Draft edition of Air Guide-1 a short term (l-hour) cavity concentration equation was added to the screening method. That equation is simply the EPA cavity method with an assumed worst case wind speed of one m/s. Also, the joint frequency factor (f) for the annual impacts was removed. Thus, the new short term cavity equation is (in English Units):

$$Ccst = 904000*Q/A$$

Another adjustment to the cavity scheme deals with the calculation of cavity height (hc). Previously this was simply set as hc = 1.5hl where hl is the lesser of the building height or width. A new hc equation is available in the SCREEN2 model: hc = hb (1+ 1.6 exp (-1.3L/hb)), where L is the along wind building dimension. For our purposes L can be taken as the minimum horizontal building dimension (Lmin), and the above formula is then simplified in Appendix B as the following:

1) hc = hb for hb < 1/2 Lmin

and

2) hc = 1.5 hs for hb > Lmin

It should be noted that as the hb to Lmin ratio increases, the cavity height calculated by the SCREEN2 model approaches 2.5 hb. In previous analyses by DEC (comments by NESCAUM on proposed supplement B to the Modeling Guidelines) and NJDEP (issue paper for the 1992 EPA Modelers Workshop), this formulation was found to be unrealistic in projecting cavity heights above the original 1.5 hb value. This possibility is recognized in the SCREEN2 user's guide. Thus, in our screening method, the cavity height is not allowed to exceed 1.5hb.

The modifications to the cavity impact and cavity height equations reduce the potential for possible cavity concerns relative to the previous method. It is further noted that for multi-source cases, the cavity method is most appropriate when applied to sources from individual buildings separately. That is, cavity impacts should be evaluated and summed on a per building basis.

Since EPA does not have a procedure to calculate annual cavity impacts and the SCREEN2 model only calculates short term impacts, the above CC annual impact is judged a best estimate. On the other hand, more source specific l hour impacts can be obtained from the AG-1 software program and the SCREEN2 model.

III. Point Source Method

The original point source methodology was formulated at a time when the downwash algorithms in the ISC model were just being released. Thus, the algorithms were not rigorously evaluated when the original method was formulated. Downwash effects were only approximated by the assumption of no plume rise in CDM model sensitivity runs. This approach was checked for a number of cases in relation to the ISC model and found to provide comparable impacts.

Subsequently, the ISC model was modified to include Schulman-Scire downwash algorithms for a range of stack and building configurations. This change produced considerable differences in the predicted impacts from the AG-1 screening methods and the latest ISC2 model. These differences have necessitated the revision to the AG-1 screening procedures as the comparison has shown the screening methods were no longer conservative. In the process, refinements were made to averaging time corrections used previously(i.e. 90 day to 1 year) and the meteorological data base.

Thus, a new set of model sensitivity runs was made to develop an improved worst-case screening method. In these calculations, a new meteorological data set was used with the ISCLT2 model (Version 93109). The Albany STAR data used in the 1979 analysis has been replaced by a 1988 STAR data set generated from hourly Albany NWS data. This latter was determined to have as dominant wind frequency (16% from SSE) as any other site in the state.

In the development of the method, the effective stack heights were set to the physical stack heights (i.e. no plume rise) for simplicity. However, the screening method allows the incorporation of a minimum plume rise to be used in the derived equation. This plume rise is the same as that derived in the 1979 document for GEP stacks. The latter have been augmented by a limited momentum rise equation for downwash cases with hs/hb ratios greater than or equal to 1.5.

It is judged that these minimum rise formulas provide conservative effective stack heights for both annual and short term impacts. For the latter, this conclusion follows from the fact that even though some lower plumes might occur under stable conditions for GEP stacks, the worst case wind speed of 10 m/s incorporated in the unstable/neutral equation in Air Guide-1 assures no large differences as verified by spot checks.

The worst case predictive annual impact equation was derived by performing a set of ISCLT2 calculations with a detailed combination of stack heights (range of 1 to 200m), stack height to building height ratios (range of 0.5 to 2.5) and building height to width ratios (range of 0.2 to 5), in both rural and urban modes. Special attention was given to significant ratios of hs/hb such as 0.75, 1, 1.2, 1.5 and 2.5 where different formulations in downwash effects are possible, and also to squat (hb/hw <1) versus tall (hb/hw>1) considerations.

The stepwise process was first to plot concentrations against stack heights for a set of hs/hb ratios, in the squat case and for the rural situation. Then, impacts under the same combination were compared for the urban case and where the ratios between respective cases were higher in the urban case, these were plotted for the identification of overall maximum conditions. The same approach was carried out for the tall structure cases, with the results being compared with the squat case with the same hs/hb ratio, and for urban/rural modes. Again, only cases with higher annual impacts than the "base" squat case were plotted for review.

Specifically, Figure 1 shows the plots of concentration against stack height for a rural environment, hw=hb (squat), and hs/hb of 0.75, 1, 1.2, 1.5 and 2.5. The latter ratios represent cut-offs of distinct effects by building downwash. Also plotted is the previous equation of Air Guide 1. It is seen that the maximum impact for a given stack height occurs when hw = hb = hs (i.e. emissions from the top of a cube).

The urban results were almost identical to the rural case for the worst case conditions of hs=hw=hb. The urban results also showed that the impacts relative to the rural mode for the same case were higher at hs/hb ratios above 1.35. However, the latter depicted values were all less than the maximum in Figure 1.

The squat building cases were examined for a range of hw/hb ratios out to the super squat ratio (>5). These results showed that all the hs/hb produced maxima which were less than or equal to those in Figure 1. Thus, the case hw=hb=hs was still maximum for all squat cases.

Next, the tall building cases were analyzed in the rural and urban mode and compared with the same hs/hs ratio cases in the squat scenarios. A number of tall cases produced higher impacts than the corresponding squat case and were plotted. These plots showed that tall structures maximized for the hw=hs case, where the stack height was less than the building height. When this latter was compared with the overall maximum case for the squat buildings cases, the results were almost identical.

These results were further confirmed by plotting a larger range of ratios and scenarios. It was established that the overall maximum worst case impact can be represented by a single curve that related to the rural (and urban) squat building case with hw=hb and a stack height equal to hb. The curve is plotted in Figure 2 along with the predictions from ISCLT2. For comparison, the old Air Guide 1 equation is also plotted.

The new equation is:

$$C\ (ug/m3) = \frac{52500*Q}{he^{2.25}}$$

where he is the effective stack height in feet and Q is the emission rate in lb/hr. It is seen that the worst case impacts from the current equation can be about ten times higher than the previous equation impacts. This worst case impact occurs under worst case downwash conditions and is valid for both rural and urban areas.

Although the model sensitivity runs and the curve development were done with hs as the variable, the effective plume height (he) is incorporated into this equation. This is achieved by using a minimum likely plume rise to assure that the worst case curve in Figure 1 is still conservative. That is, shifts toward or along the top curve (i.e. worst case equation) are possible by the use of plume rise to increase the effective plume height , but the actual plume height for a source will be greater than the minimum plume rise credited. Thus, although a source's impact might decrease with the addition of plume rise, it will still be less than the worst case impact of Figure 1.

The 1979 document provides the minimum buoyancy rise formulas which have been retained in the current method for the GEP stack height cases. These formulas do not apply for downwash cases and in the previous approach no plume rise was allowed under building downwash situations. The ISC2 model calculates a momentum dominated transitional (distant-dependant) rise which has a different formulation for hs/hb above or below 1.5 (more precisely, for hs/(hb+0.5hl), but we have used hb for simplicity and conservatism.

For the Schulman-Scire cases (hs/hb < 1.5), the ISC2 reduced line source momentum rise equations result in very low plume rises and cannot easily be incorporated into the screening method. Thus, for this downwash mode, no plume rise is allowed.

For downwash cases under the Huber-Snyder mode (hs/hb > 1.5), a minimum momentum rise is allowed. The transitional rise formula under unstable/neutral conditions noted in the 1979 document for the cavity calculations was the basis for this minimum rise. The formula is:

$$hm=(3Fm*x/ b^2 U^2)^{1/3}$$

where Fm is the momentum flux, x is the downwind distance, b=(1/3+U/vs), and U is the wind speed. As in the 1979 document, it is assumed that b=0.6 and U=10m/s for conservatism. Furthermore, x is taken to be equal to 49, as defined from the ISC2 formulations (equations 1-23 and 1-24) using a nominal buoyancy of F=1. The resultant minimum rise formula is then simply:

$$hm=1.6(Fm)^{1/3} \quad \text{in the Metric system}$$

or

$$hm=1.1(Fm)^{1/3} \quad \text{in the English system}$$

The effective stack height is then calculated from he=hs+1.1(Fm)1/3 for cases where 1.5 < hs/hb < 2.5.

Next, to allow for the incorporation of less severe downwash cases in the screening method, reduction factors were developed for the cases where the stack is above cavity (hs/hb >1.5) or is GEP (hs/hb >2.5). It should be noted that the reduction factors are conservative in that these were developed and applied without incorporating any plume rise effects. The reduction factors are 0.75 and 0.4, and are plotted in figures 3 and 4, respectively. The reduction factors themselves are also conservative with respect to specific stack heights. However, for simplicity, if the stack height to building height (hs/hb) ratio is greater than 1.5, then the worst case concentration calculated from the equation above can be multiplied by 0.75 and the result still considered conservative for this case. For a stack which is at GEP (hs/hb >2.5) the factor 0.4 can be used. Both these factors are applicable in either rural or urban setting.

It should be noted that for a rural stack at GEP, the 0.4 factor can be overly conservative by a factor of three, but for simplicity a single factor has been chosen for the screening method. This simplification is also helpful in the derivation of a simple factor to calculate worst case l hour impacts from the annual values.

Once the annual worst case impact is calculated, a 1 hour maximum impact can be determined by multiplying it by 65. This factor was derived by examining the ratios of SCREEN2 model l hour maxima to the annual impacts from the equation in Figure 2. These results are plotted in Figure 5. It is seen that the factor 65 provides a good basis of deriving a worst case l hour impact under virtually all conditions (the only exception might be a GEP stack of greater than 150m in a rural setting, but it is unlikely the source review would be limited to these screening techniques in this case). It should be noted that the AG1 software program provides better estimates of case specific short term impacts by using equations fitted to the curves in Figure 5. It is also noted that the worst case SCREEN2 impact occurs essentially for hs/hb of 1.2 and squat building in a rural setting when there is no plume rise considered in the calculations.

In summary, the current equation for calculating worst case annual impacts assures that all potential problem areas will be identified for further scrutiny. Simplicity in the method has been retained. The simple plume rise formula is dependant only on stack parameters and is allowed only under certain conditions. The calculated annual and short term impacts can quickly identify the disposition of a source which if need be, can be further screened by the Air Guide 1 software program.

IV. Area Source Method

The revisions to the area source method of the ISC2 model were incorporated into the screening method by calculating maximum impacts per area size using the same meteorological data as for the point source calculations. The results of these model runs are depicted in Figure 6.

The new equation to calculate the maximum annual impact is:

$$Ca(ug/m3) = \frac{1,500,000*Q}{(D+S)^{1.8}}$$

where D is the distance to receptor (feet), S is the side length of the area (feet), and Q is the emission rate in lb/hour. This area source equation is different in form and substance from the previous equation due to changes to the area source algorithm in ISCLT2.

In Appendix B of AG-1, the above formula is simplified to estimate the overall maximum impact for a given area source regardless of downwind distance. This maximum impact is calculated by the ISCLT2 model to occur just beyond the area source, at a distance (D) equal to the effective radius, Re=0.564S, where S is the side length of the area source. With this distance, the above equation reduces to:

$$Ca(ug/m3) = \frac{670600*Q}{(S)^{1.8}}$$

In order to estimate the 1 hour worst case impact from this equation, SCREEN2 model runs were performed for the same conditions as for the annual case (except for the use of worst case l hour meteorology). These results are presented in Figure 7. Ratios of 1 hour SCREEN2 impacts to the ISCLT2 impacts, as simulated by the above equation ranged from 25 to 100. For estimating the overall maximum short term impact (at a distance of 0.564S as for the annual case) the impact ratio is roughly 25. Thus, a simple conservative factor of 25 is suggested to estimate 1 hour worst case impacts from the overall maximum annual impact equation. However, this factor is inappropriate for other downwind distances. For these specific distances (beyond 0.564S), the AG-1 software program will calculate source specific maximum annual and 1 hour impacts.

This factor was further verified by comparing results from the short-term ISC2 model (ISCST2) for the l hour versus annual impacts. Some ratios above 25 were found, but these were attributed to an unrealistically low (1m) mixing depth. When the mixing depth was corrected to a minimum of 10m, these higher ratios were no longer observed.

The alternative area source method has been changed by eliminating the downwind distance reduction factors. This method serves best in providing conservative estimates of impacts within the area source. For impacts beyond the maximum downwind distance, the AG-1 computer program should be used. It is also noted that the alternate area source method has not been extended to provide short term impacts.

V. Conclusions

Reformulations of the Air Guide-1 (Appendix B) screening techniques for the cavity, point source and area source impacts have been carried out to assure consistency with current NYSDEC and EPA modeling guidance and model revisions. The basis for the revisions are ISCLT2 model sensitivity runs which identified the worst case impacts for building downwash, GEP stack height and area source conditions using actual, yet conservative meteorological data.

The reformulations retain the simplicity of requiring a minimum number of emission parameters, while still being generally applicable. In fact, the new formulations can be used for urban as well as rural areas, in addition to providing for worst case estimates of 1 hour impacts. These equations and methods allow for the quick review of toxic emission source impacts relative to acceptable levels, such as AGCs and SGCs. Although these schemes are more likely to identify a potential problem, a versatile AG-1 software program is available to reduce the level of conservatism in the screening techniques and to extend the details of the analysis to the level of the SCREEN2 model for 1 hour and ISCLT2 model for annual impacts.