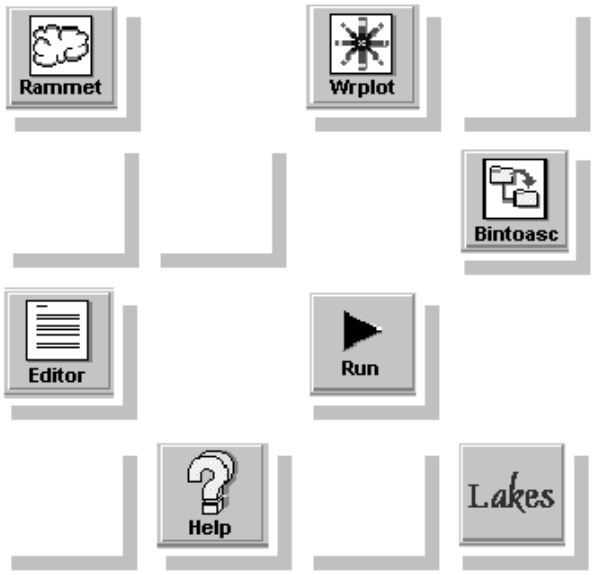
User's Guide



Rammet View

Windows Interface for the U.S. EPA PCRAMMET Program

Lakes Environmental

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Rammet View

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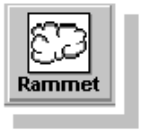
DISCLAIMER

This document and accompanying software follow the U.S. EPA PCRAMMET program and documentation to the best of our understanding. The user is responsible for checking the input data and the results for consistency.

Contents



CHAPTER 1

Introduction

Welcome to Rammet View - a Windows interface for the U.S. Environmental Protection Agency (EPA) PCRAMMET program. Thank you for choosing Rammet View. Lakes Environmental has put in a lot of effort to create the easiest to use and most stable interface on the market.

This chapter gives you a brief description of the Rammet View interface and the EPA PCRAMMET program. It will show you how to install Rammet View on your computer and introduces the basic components of Rammet View to allow a quick start into the interface.

Contents

The U.S. EPA PCRAMMET Program

The PCRAMMET program is a meteorological preprocessor which prepares National Weather Service (NWS) data for use in the various U.S. EPA short term air quality dispersion models such as: ISCST3, CRSTER, RAM, MPTER, BLP, SHORTZ, and COMPLEX1.

The operations performed by PCRAMMET include:

- Calculating hourly values for atmospheric stability from meteorological surface observations;
- Interpolating the twice daily mixing heights to hourly values;
- Optionally, calculating the parameters for dry and wet deposition processes;

- Outputting data in the standard (PCRAMMET unformatted) or ASCII format required by regulatory air quality dispersion models.

The input data requirements for PCRAMMET depend on the dispersion model and the model options for which the data is being prepared. The minimum input data requirements to PCRAMMET are:

- The twice-daily mixing heights,
- The hourly surface observations of: wind speed, wind direction, dry bulb temperature, opaque cloud cover, and ceiling height.

For dry deposition estimates, station pressure measurements are required. For wet deposition estimates, precipitation type and precipitation amount measurements for those periods where precipitation was observed are required.

The surface and upper air stations should be selected to ensure they are meteorologically representative of the general area being modeled.

The Rammet View Interface

Rammet View is a user-friendly interface for the U.S. EPA PCRAMMET program. This interface was developed specially for Microsoft Windows and runs under Windows 95/98 and Windows NT.

The files provided with Rammet View are:

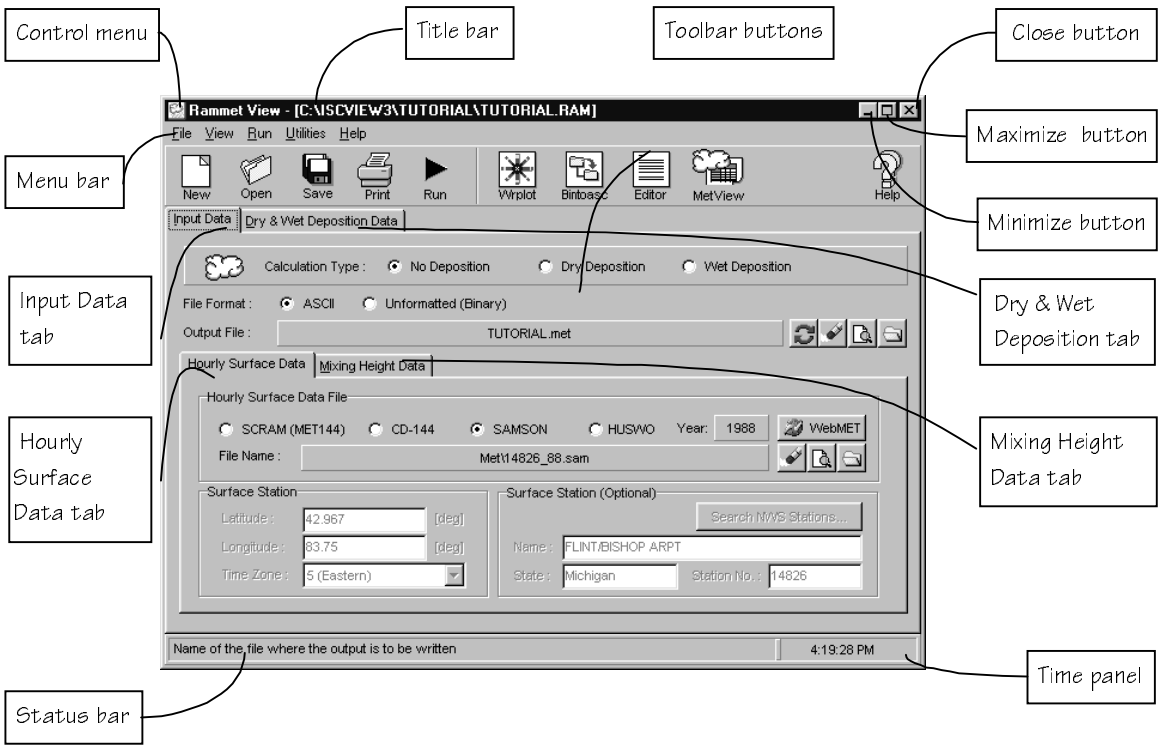
- **Ramview2.exe:** Rammet View executable.
- **MetStations.DB and MetStations.PX:** Database files containing information for surface and upper air NWS stations.
- **Ramview.hlp:** Rammet View Help file.
- **Pcrammet.exe:** U.S. EPA PCRAMMET executable (Lahey compiled).
- **BINTOASC.EXE:** U.S. EPA BINTOASC executable.
- **BINTOASC.BAT:** DOS batch file to run BINTOASC.EXE.
- **Metisc.exe:** METISC executable. This utility generates ISC met data for screening purposes. METISC was developed by the Oregon Department of Environmental Quality.
- **Metisc.bat:** DOS batch file to run METISC.EXE.
- **Wrplot.exe:** WRPLOT View executable.
- **Wrpview.hlp:** WRPLOT View help file.

- **WRPLOT.ini:** WRPLOT View INI file.
- **Stations.wr_:** File containing the list of NWS surface met stations, which contains information downloaded from EPA SCRAM Web Site.

Rammet View contains all the available options of the U.S. EPA PCRAMMET program and uses the U.S. EPA PCRAMMET.EXE executable code without any modifications.

The Rammet View Window

Rammet View's window components follow the standard Window features. For more information on standard Window commands, see your Windows documentation.



The components of the Rammet View window are:

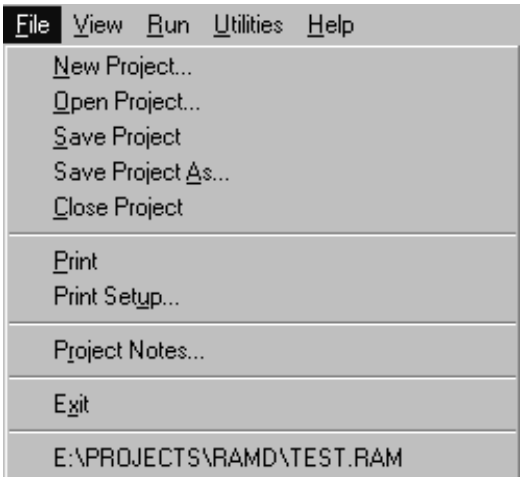
- **Control menu .....** The Control Menu box displays the sizing options, to switch to another application, or to close Rammet View.

- **Title bar**.....Displays the interface name, Rammet View, and between brackets the full path and name of the project file in use.
- **Minimize button** .....Minimizes the Rammet View window.
- **Maximize/Restore button** .....Maximizes Rammet View window, or restore to its pre-maximized size and position.
- **Close button** .....This is a button only available in Windows 95. This button will close Rammet View.
- **Menu bar**.....Displays menu names. To open a menu, move the mouse over the menu name and then press the left mouse button. A menu appears displaying a list of related commands.
- **Toolbar buttons** .....These are a series of buttons that provide a fast method of selecting a menu command.
- **Input Data tab**.....This tab contains options for the output file, the hourly surface data file, and the mixing height data file.
- **Dry & Wet Deposition tab** .....This tab contains hourly precipitation data file options and properties of the measurement and application sites. This tab applies only to Dry and Wet Deposition cases.
- **Hourly Surface Data tab**.....This tab contains hourly surface data file options and surface station options.
- **Mixing Height Data tab** .....This panel contains mixing height data file options and mixing height station options.
- **Status line**.....This area displays a description of the commands in which the mouse pointer is currently on.
- **Time panel** .....This area displays the current time.

Menu Bar

The following is the description of each menu option:

File (Alt, F)



New Project.....Displays the **New Project** dialog box, where you specify the name of the new Rammet View project file **(*.RAM)**.

Open Project.....Displays the **Open Project** dialog box, where you specify an existing Rammet View project file **(*.RAM)** to be open.

Save Project.....Saves the current Rammet View project file **(*.RAM)**.

Save Project As.....Displays the **Save Project As** dialog box, allowing you to save the current Rammet View project with a different name **(*.RAM)**.

Close Project .....Closes the current project.

Print.....Prints the contents of the Rammet View window.

Print Setup.....Displays the **Print Setup** dialog box, allowing you to specify printer, page orientation, and paper size.

Project Notes .....Displays the project notes window which allows you to attach some notes to your project.

Exit.....Closes the Rammet View interface.

View (Alt, R)

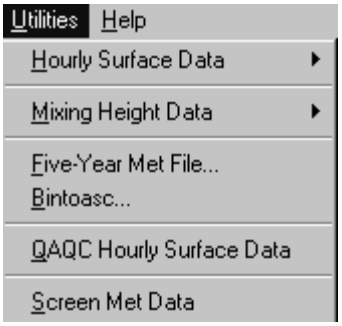
Input File ..... Opens Windows WordPad to examine the input file (*.RIN), generated by Rammet View, needed to run EPA PCRAMMET.

Output File ..... Opens Windows WordPad to examine the output file generated by EPA PCRAMMET.

Run (Alt, R)

Displays the **Project Status** dialog box, which tells you whether your project is complete or incomplete and which parts need to be completed. From the **Project Status** dialog box you can run PCRAMMET.

Utilities (Alt, U)



Hourly Surface Data ➤

➤ **File Maker** ..... This utility allows you to create an hourly surface data file.

➤ **Import From Excel** ..... This utility allows you to import an hourly surface data file from Excel 4.0.

➤ **Format Conversion** ..... This utility allows you to import an hourly surface data file which is in a different file format.

Mixing Height Data ➤

➤ **File Maker .....** This utility allows you to create a mixing height data file.

➤ **Estimate From Surface Data .....** This utility estimates one year of mixing height data from the hourly surface data file.

Five-Year Met File..... This utility combines five separate years (files) of pre-processed meteorological data into one single file which can be used in your ISC View project.

Bintoasc ..... This utility converts meteorological data, pre-processed by PCRAMMET, from binary (unformatted) file format to the ASCII file format.

QAQC Hourly Surface Data..... This program is a Quality Assurance/Quality Control program which will examine your hourly surface data file to ensure that the hours, days, months, years are all in the correct order and then it will report the results of this check back to you.

Screen Met Data..... This utility generates ISC met data for screening purposes. The program is called METISC and was developed by the Oregon Department of Environmental Quality.

Help (Alt, H)

Contents ..... Displays Rammet View Help Contents, from which you can select topics.

Search for Help on ..... Lets you search for help on a particular topic.

Help on Help ..... Displays information on “How to Use Help”.

Team ..... Displays information on the Rammet View development team.

Technical Support ..... Displays technical support options for Lakes Environmental software.

Web Links ..... Displays Web links for product upgrades, free met data, Lakes Web site, and other related links.

About ..... Displays the copyright notice and version number for Rammet View.

Toolbar Buttons

The toolbar buttons are shortcuts to some of the menu commands. The function of each one of these buttons is explained below as well as the corresponding menu bar commands.

Lets you create a new Rammet View project file.

Lets you open an existing Rammet View project file.

Lets you save the current Rammet View project file.

Lets you run the U.S. EPA PCRAMMET program.

Displays Lakes Environmental WRPLOT View. This utility generates wind rose plots for meteorological data. The wind rose shows a percentage breakdown of the direction and strength of winds in a meteorological data file.

This utility, BINTOASC, converts meteorological met data, pre-processed by PCRAMMET, from binary (unformatted) file format to the ASCII file format.

Displays Windows WordPad, which you can use to examine the input or output file for PCRAMMET.

Displays the pre-processed output file in a grid format. In this format, a description of each parameter is available for easy verification of the data.

Click here to display the Help Contents, from which you can select topics.

Using Online Help

Rammet View Help contains extensive information on the U.S. EPA PCRAMMET program requirements, how to use Rammet View, and related information collected from EPA's documentation and guidelines. Rammet View Help is a very useful tool as you learn both Rammet View and the PCRAMMET program.

You can have access to Rammet View online Help through the following ways:

- **Help Menu:** Two menu commands are available on the Help menu, the **Contents** and the **Search for Help on...**. See the description of these menu commands below.

  1. **Contents:** Select this option if you want to see Rammet View Help Contents. From there, you can jump to any topic you want.

  2. **Search for Help on ... :** This option displays the Search dialog box, so you can quickly search for a particular topic. You can also get to the search dialog box by clicking the **[Search]** button on any Help screen.

- **Help Toolbar Button:** The **[Help]** button located on the toolbar will display the Contents for the window you are currently working on.

- **Context-Sensitive Help (F1):** Many parts of the Rammet View interface support a context-sensitive help. This way you can get help without having to go through the Help menu. To get a context-sensitive help on a specific option or topic, the cursor focus should be over the item of interest (e.g., input field, option buttons, etc.).

- **Status Bar Quick Tips:** The status bar, located on the bottom part of every window, gives you quick tips on Rammet View options and inputs. As you move the mouse on the screen, the status bar message changes to indicate what a particular command does.

How this User's Guide is Organized

The Rammet View User's Guide is organized to help you learn Rammet View quickly and easily. The guide is broken into functional groupings as follows:

Chapter 1 - Introduction: This chapter presents basic information on the EPA PCRAMMET program and the Rammet View interface.

Chapter 2 - Tutorial: This chapter presents a step by step example using Rammet View.

Chapter 3 - Using Rammet View: This chapter explains how to use the Rammet View interface.

Chapter 4 - Using WRPLOT View: This chapter explains how to use WRPLOT View.

Chapter 5 - Rammet View Utilities - This chapter explains how to use the many utilities that are a part of Rammet View.

Getting Technical Support

Lakes Environmental is dedicated to providing full technical support for its software. If you need any assistance please contact the Lakes Environmental technical support staff. Our technical support hours are from 9:30 a.m. to 5:00 p.m. EST, Monday through Friday. Please have your serial number and version number ready when calling us.

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CHAPTER 2

Tutorial

Before you jump right into Rammet View, you might want to start with a simple tutorial. This tutorial will guide you through the basic steps towards processing meteorological data files for use in the EPA's various short-term air quality dispersion models.

Contents

Starting the Rammet View Interface

➤ **How to Create the Tutorial Project:**

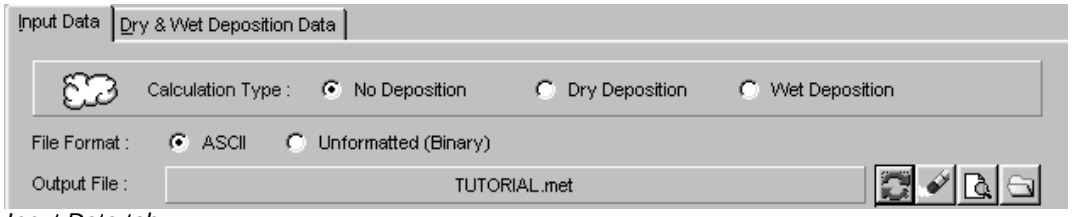
Step 1: From the Windows **Start** menu, choose **Programs > Lakes Environmental > Rammet View** or double-click on the **Rammet View** icon, if you have created a shortcut on the desktop.

Step 2: The **About** dialog box appears on the screen. Click the **OK** button and the Rammet View initial window is displayed.

Step 3: Select **File | New Project…** to display the **New Project File** dialog box.

Step 4: Select the directory and enter the file name for the tutorial project and click the **Save** button. If you only want to browse this tutorial, we have included the tutorial project file, **TUTORIAL.RAM**, in the installation directory (by default C:\ISCVIEW3\TUTORIAL).

Working on the Input Data Tab



Input Data tab

Step 5: **Calculation Type -** This is the type of output calculations you need to perform (concentration (no deposition), dry deposition, or wet deposition).

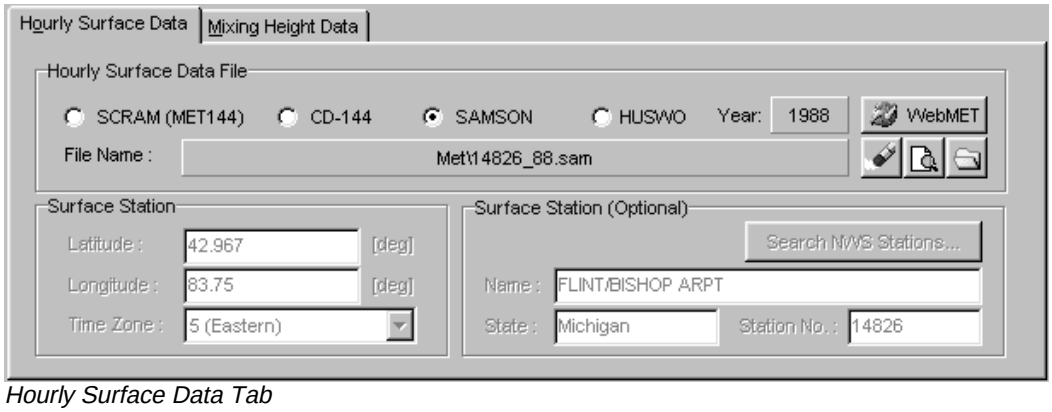
➤ *Select: No Deposition*

Step 6: **File Format –** This is the format of the Rammet View Output File you are about to select.

➤ *Select the ASCII option.*

Step 7: **Output File -** This is where you specify the name and the location of the pre-processed output file that is created after running the model. By default, Rammet View specifies the output file with the same name as your project but with extension MET (e.g., TUTORIAL.met). The location of this file is by default, in the project directory (e.g., C:\ISCView\Tutorial). Click the **Specify File** button () if you want to specify a filename and/or location different from the default. To get the default back, click on the **Default** button ().

Working on the Hourly Surface Data tab

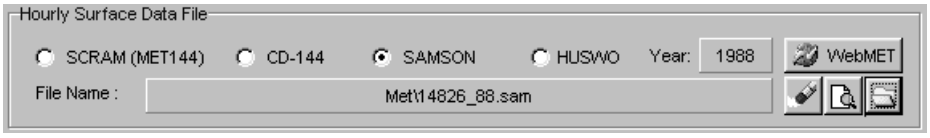


Hourly Surface Data Tab

Step 8: **Hourly Surface Data File -** This is where you select the Hourly Surface Data File. Click the **Specify File** button ( ) and specify the file name and location. The year of the met data file will appear automatically. Please make sure the hourly surface file format is correctly specified. Rammet View accepts the following file formats: SCRAM (MET144), CD-144, SAMSON, and HUSWO. You can click the **Preview** button ( ) to preview the specified file.

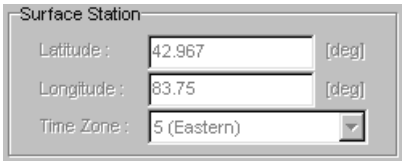
➤ *Select 14826_88.SAM as the surface data file located in your C:\ISCView3\Tutorial\Met (if this is your installation directory).*

➤ *SAMSON is the file format for the selected surface data.*



Step 9: **Surface Station –** The surface station information (Latitude, Longitude, and Time Zone) should appear automatically for NWS surface stations in the U.S. Since SAMSON data contains this information within the file, there is no need to specify this information. That's why the Surface Station fields automatically become disabled for SAMSON data.

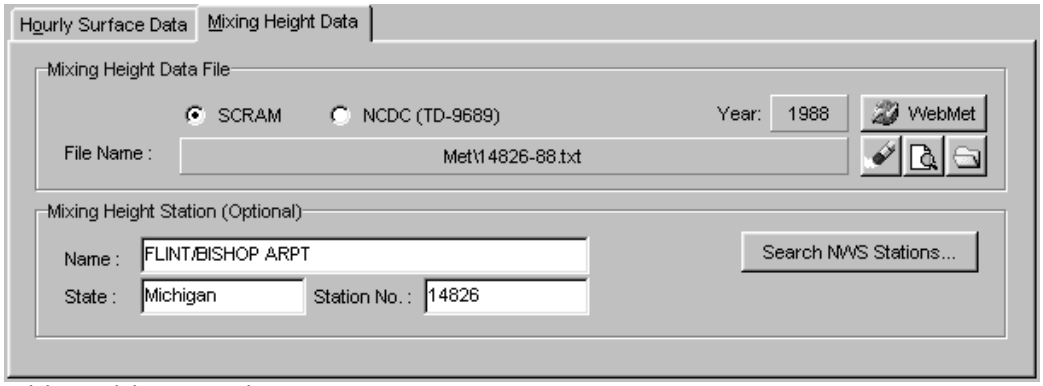
➤ *Will appear automatically in this tutorial.*



Step 10: **Surface Station (Optional) -** This information is optional and once again, should appear automatically for NWS surface stations in the U.S. This area contains the Name, State, and Station Number of the station. There is an automated method under the Search NWS Stations of searching through a list of the NWS stations. For SAMSON data, these fields are disabled.

➤ *Will appear automatically in this tutorial.*

Working on the Mixing Height Data Tab

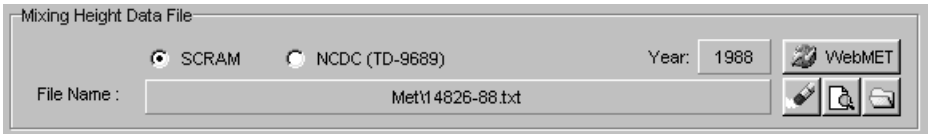


Mixing Height Data Tab

Step 11: Mixing Height Data File - This is where you select the Mixing Height Data File. Click the **Specify File** button ( ) and specify the file name and location. The year of the data file will appear automatically. Please make sure the mixing height file format is correctly specified. Two file formats are accepted: SCRAM or NCDC (TD-9689). You can click the **Preview** button ( ) to preview the specified file.

➤ *Select 14826-88.TXT as the mixing height data file located in your C:\ISCView3\Tutorial\Met (if this was your installation directory).*

➤ *SCRAM is the file format for the mixing height data file.*



Note: It is extremely important that the year for the Hourly Surface Data File and the Mixing Height Data File be the same.

Step 12: **Mixing Height Station (Optional) -** This information is optional and once again, should appear automatically for NWS surface stations in the U.S. This area contains the Name, State, and Station Number of the station. There is an automated method under the Search NWS Stations of searching through a list of the NWS stations.

➤ *Will appear automatically in this tutorial.*

Working on the Dry & Wet Deposition Data Tab

We cannot access the **Dry & Wet Deposition Data** tab because we have selected the **No Deposition** option for the Calculation Type. No Deposition means that only concentrations will be calculated when running the air dispersion model (ISCST3 and ISC-PRIME) and therefore the pre-processed meteorological data does not need to contain the extra fields necessary for deposition calculations.

Running PCRAMMET

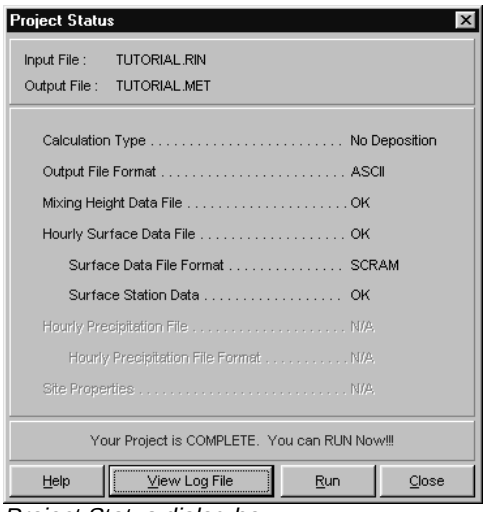
Your project should be complete by now. Before running your project, we suggest that you follow these steps:

Step 13: Check the project status to make sure your options are correct. The **Project Status** dialog box is displayed every time you press the **Run** button or the **Run** menu option.

Step 14: Check the details of your project. If any crucial piece of information is missing, it will be displayed on the **Project Status** dialog box

Step 15: When all the necessary information is supplied, you can click on the **Run** button located in the **Project Status** dialog box and Rammet View will process the meteorological data files.

Step 16: Once Rammet View has finished its run, you can view the log file from the run by selecting **View | Log File** from the menu.



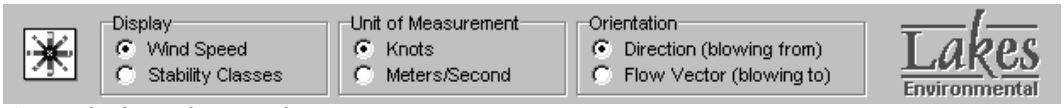
Project Status dialog box

WRPLOT View

WRPLOT View is a Windows program that generates wind rose statistics and plots for selected meteorological stations for user-specified date and time ranges. You can have access to WRPLOT View from within Rammet View by clicking on the **Wrplot** toolbar button. If you have already run your Rammet View project, then a pop-up menu is displayed with two file options. These two options are the **Preprocessed Output File** and the **Hourly Surface Data File**.

➤ *Select Preprocessed Output File*

Working on the General Information Panel



General Information Panel

Step 1: **Display -** This is where you select what WRPLOT View will display. Your choices are either **Wind Speed** or **Stability Classes** (available only for pre-processed met data).

➤ *Select Wind Speed*

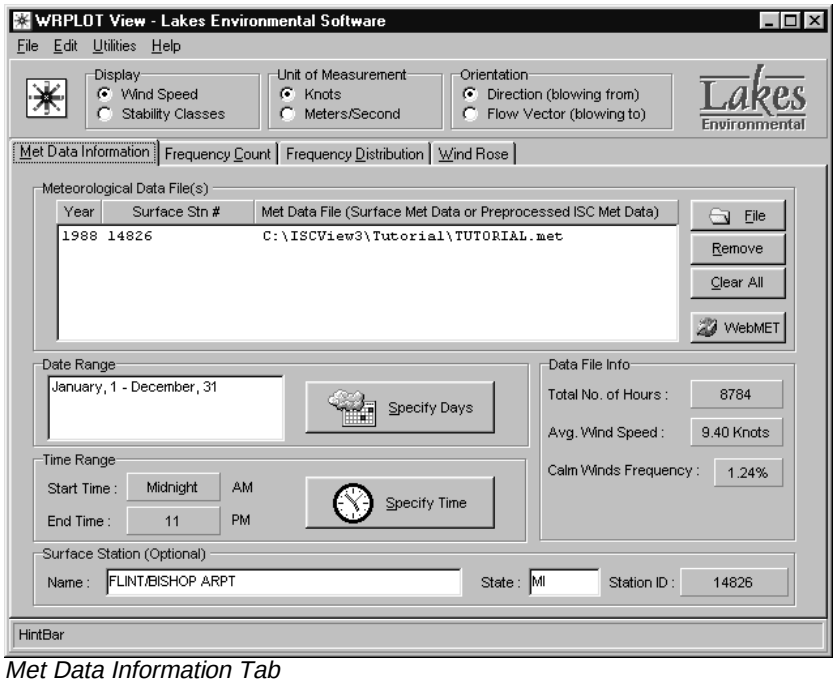
Step 2: **Unit of Measurement -** This is the unit of measurement for the wind speed. The choice is either **Knots** or **Meters/Second**.

➤ *Select Knots*

Step 4: **Orientation –** This is the Orientation of the winds. The choice is either **Direction (blowing from)** or **Flow Vector (blowing to).**

➤ *Select: Direction (blowing from)*

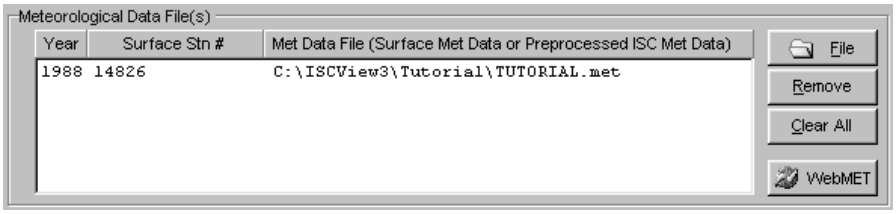
Working on the Met Data Information Tab



Met Data Information Tab

Step 5: **Meteorological Data File(s) -** This is where you select what data files WRPLOT View will use. If you are using WRPLOT View from within Rammet View, the preprocessed output file or hourly surface data file will be automatically pre-selected for you.

➤ *The Preprocessed Output File was automatically selected for you.*

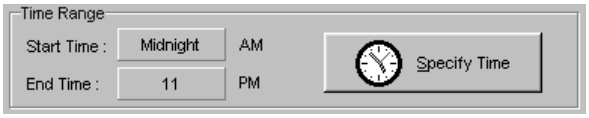


Step 6: **Date Range -** This is the date range that WRPLOT View will use data from – all other time periods will be ignored.

➤ *January 1 – December 31 was automatically selected for you when you start up WRPLOT View. You can select a different range by clicking on the Specify Days button.*

Step 7: **Time Range –** This is the time range that Rammet View will use data from – all other time periods will be ignored.

➤ *Midnight to 11 PM was automatically selected when you start up WRPLOT View. You can select a different range by clicking on the Specify Time button.*



Step 8: **Surface Station (Optional) –** This contains the Name, State, and Station ID Number. This information should appear automatically for NWS stations in the U.S. For other stations you can enter the requested information.

The Frequency Count Tab

The frequency count displays in tabular form the number of occurrences of winds in each of 16 direction sectors (N=north, NNE=north-northeast, NE=northeast, etc.) and 6 wind speed classes for a given location and time period.

Met Data Information | **Frequency Count** | Frequency Distribution | Wind Rose

WIND SPEED (Knots):

	1 - 3	4 - 6	7 - 10	11 - 16	17 - 21	> 21	Totals
N	6	98	149	116	21	0	390
NNE	10	57	120	97	7	1	292
NE	8	59	141	83	2	0	293
ENE	15	96	141	71	2	0	325
E	15	92	108	37	0	0	252
ESE	23	124	108	43	1	0	299
SE	14	81	99	76	6	0	276
SSE	20	113	145	109	8	0	395
S	49	235	306	269	39	5	903
SSW	34	255	323	228	55	6	901
SW	34	234	387	304	58	10	1027
WSW	28	190	288	272	47	8	833
W	11	143	253	284	82	9	782
WNW	19	93	227	305	75	4	723
NW	6	120	247	207	20	3	603
NNW	12	115	133	111	10	0	381
Totals	304	2105	3175	2612	433	46	

Frequency Count Tab

The Frequency Distribution Tab

This table displays the normalized frequency of occurrences of winds in each of 16 directions (N=north, NNE=north-northeast, NE=northeast, etc.) and 6 wind speed classes for a given location and time period. The normalized frequency multiplied by 100 gives you the percent frequency.

Met Data Information | Frequency Count | **Frequency Distribution** | Wind Rose

WIND SPEED (Knots):

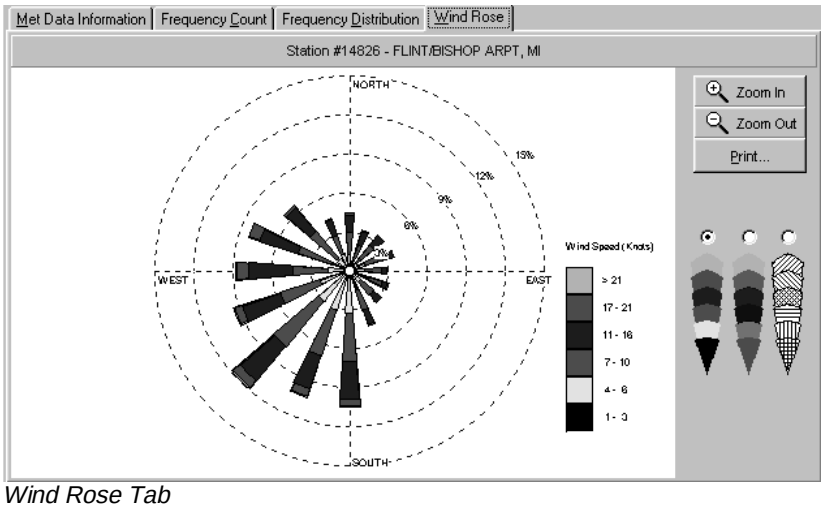
	1 - 3	4 - 6	7 - 10	11 - 16	17 - 21	> 21	Totals
N	0.000683	0.011157	0.016963	0.013206	0.002391	0.000000	0.044399
NNE	0.001138	0.006489	0.013661	0.011043	0.000797	0.000114	0.033242
NE	0.000911	0.006717	0.016052	0.009449	0.000228	0.000000	0.033356
ENE	0.001708	0.010929	0.016052	0.008083	0.000228	0.000000	0.036999
E	0.001708	0.010474	0.012295	0.004212	0.000000	0.000000	0.028689
ESE	0.002618	0.014117	0.012295	0.004895	0.000114	0.000000	0.034039
SE	0.001594	0.009221	0.011270	0.008652	0.000683	0.000000	0.031421
SSE	0.002277	0.012864	0.016507	0.012409	0.000911	0.000000	0.044968
S	0.005578	0.026753	0.034836	0.030624	0.004440	0.000569	0.102801
SSW	0.003871	0.029030	0.036771	0.025956	0.006261	0.000683	0.102573
SW	0.003871	0.026639	0.044057	0.034608	0.006603	0.001138	0.116917
WSW	0.003188	0.021630	0.032787	0.030965	0.005351	0.000911	0.094832
W	0.001252	0.016280	0.028802	0.032332	0.009335	0.001025	0.089026
WNW	0.002163	0.010587	0.025842	0.034722	0.008538	0.000455	0.082309
NW	0.000683	0.013661	0.028119	0.023566	0.002277	0.000342	0.068648
NNW	0.001366	0.013092	0.015141	0.012637	0.001138	0.000000	0.043374
Totals	0.034608	0.239640	0.361453	0.297359	0.049294	0.005237	

Frequency Distribution Tab

The Wind Rose Tab

The Wind Rose tab displays in graphics the frequency distribution of occurrences of winds in each of 16 direction sectors (N=north, NNE=north-northeast, NE=northeast, etc.) and 6 wind speed classes for the given location and time period.

Try to change the options under the **General Information Panel** and see how the wind rose plot changes. For preprocessed met data, you can choose to have the wind rose plotted for stability classes. Press the Print button to print the wind rose plot.



Wind Rose Tab

CHAPTER 3

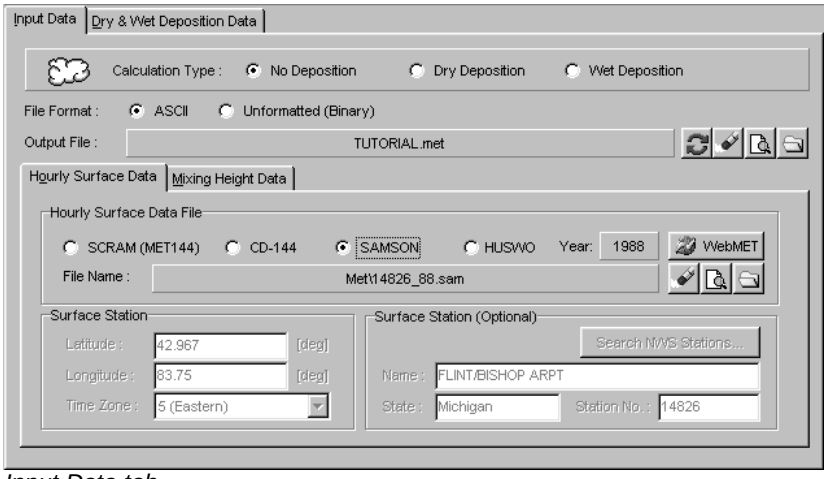
Using Rammet View

This chapter explains how to use Rammet View. To accomplish this we will examine the four main tabs that make up Rammet View: the Input Data tab, the Hourly Surface Data tab, the Mixing Height Data tab, and the Dry & Wet Deposition tab. The contents of these three tabs will be explained in detail in the sections that follow.

Contents

The Input Data Tab

The **Input Data** tab is the first tab displayed on your screen after you have pressed the **OK** button on the **About** dialog box.



Input Data tab

You should start inputting data first on this tab, since most of the information requested here will be needed to complete other tabs. In the **Input Data** tab, you define the **Calculation Type** and the **Output File Options**. See the description of each one of these options below:

Calculation Type

This is where the user specifies for which output type (concentration, dry deposition, or wet deposition) the preprocessed meteorological data will be used. The following are the options available:

- **No Deposition:** should be selected when the meteorological data is to be used as input to an air quality model only to estimate concentration.
- **Dry Deposition:** should be selected when the meteorological data is to be used as input to estimate dry deposition estimates in ISCST3.
- **Wet Deposition:** should be selected when the meteorological data is to be used as input to estimate wet deposition estimates in ISCST3.

Output File Options

This is where you specify the name, location, and file format for the pre-processed meteorological data file to be generated by Rammet View. The output file is a meteorological data file created for input into the ISCST3 and ISC-PRIME models.

Rammet View will automatically specify a default output file name on the panel which has the same name of your Rammet View project file but with extension ***.MET**. To specify a different name and location, click on the **Specify File** button () and enter the name and location of the output file.

Two output file formats are available: **ASCII** or **Unformatted (Binary)**.

- **ASCII:** this file format option is available for **No Deposition**, **Dry Deposition**, **and Wet Deposition** calculations. The formatted ASCII file has the advantage that is independent of the compiler and computing platform on which it is created.
- **Unformatted (Binary):** This option is only available for **No Deposition** calculations. If an unformatted file is created, a formatted ASCII file can be obtained from the unformatted file by using the **Bintoasc** utility.

The following buttons are available:

Get Default: Press this button to get the default output file name (*projectname.met*)

Clear: Press this button to clear the filename panel.

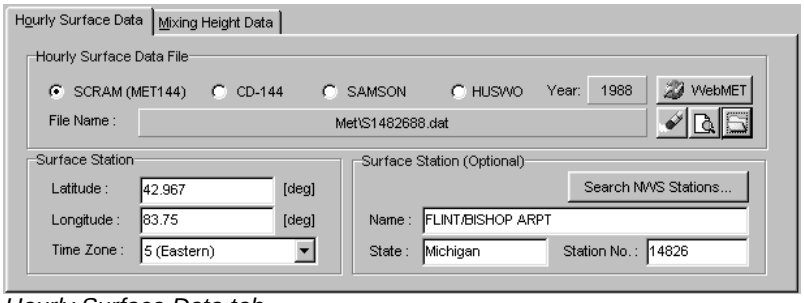
Preview: Press this button to preview the specified file, if exists.

Specify File: Press this button to specify the filename and location for the Output File.

Note: Note that if the filename panel shows only the filename then the path for the output file is the same as the project path.

The Hourly Surface Data Tab

In the **Hourly Surface Data** tab you define the **Hourly Surface Data File Options**, the **Surface Station Properties**, and **Optional Surface Station Properties**. See the description of each one of these options below:



Hourly Surface Data tab

Hourly Surface Data File Options

This is where you specify the name, location, and format of the Hourly Surface Data File. To specify the name and location, click on the **Specify File** button () and enter the name and location of the hourly surface data file. The following file formats are supported: SCRAM (MET144), CD-144, or SAMSON, and HUSWO.

You can download FREE met data from **www.WebMET.com**.

- **SCRAM (MET144):** this is a reduced version, fewer weather variables, of the CD-144 data. This data is available from the Support Center for Regulatory Air Models (SCRAM) section on EPA's Office of Air Quality Planning and Standards (OAQPS) Technology Transfer

Network (TTN) bulletin board system (BBS) or from the SCRAM Website: *www.epa.gov/scram001*.

- **CD-144:** this is the traditional format processed by PCRAMMET available from National Climatic Data Center (NCDC) in Asheville, North Carolina.

- **SAMSON:** this is the data that NCDC has made available on a set of three CD-ROMs. These CDs contain solar and meteorological data for the first order stations in the United States for the period 1961-1990. You must run the software provided with the SAMSON data to retrieve the data into an ASCII file to be used with PCRAMMET

- **HUSWO:** this is the data available on the HUSWO CD which contains the first order stations in the United States for the period 1990-1995, overlapping the SAMSON CD for 1990. You must run the software provided with the HUSWO data to retrieve the data into an ASCII file to be used with PCRAMMET. PCRAMMET expects a maximum of one year of data in the data file retrieved from the HUSWO CD. Data must be retrieved in English units.

Note 1: It is extremely important that the year for the Hourly Surface Data File and the Mixing Height Data File be the same.

CD144 FORMAT

The CD-144 format refers to the "Card Deck 144 format" available from the NCDC. This is the standard format processed by PCRAMMET. The file is composed of one record per hour, with all weather elements reported in an 80-column card image. The format of these records is described in the Card Deck 144 WBAN Hourly Surface Observations Reference Manual (NOAA, 1970), also available from the NCDC.

Data in the CD-144 format file that is checked or used by PCRAMMET includes:

Element	Columns
Surface Station Number	1- 5
Year	6- 7
Month	8- 9
Day	10-11
Hour	12-13
Ceiling Height (Hundreds of Feet)	14-16
Wind Direction (Tens of Degrees)	39-40
Wind Speed (Knots)	41-42
Dry Bulb Temperature (° Fahrenheit)	47-49
Opaque Cloud Cover	79

The surface data files downloaded from the SCRAM BBS contain these five weather elements in a compressed format. The weather variables not required in the computations are omitted and the blank fields removed to create a 28-character record. The SCRAM format can be processed directly by PCRAMMET or the data may be expanded to the 80-character records for input into PCRAMMET.

The variables used by PCRAMMET from the CD-144 record include the following:

- **Surface Station Number -** The WBAN number identifying the NWS surface observation station for which hourly meteorological data are input to the PCRAMMET program.

- **Year, Month and Day of Record -** Identifies the year, month and day during which the meteorological data were observed. Only the last two digits of the year are reported.

- **Hour -** Identifies the hour of the meteorological data observation. Hour is based on the 24-hour clock and is recorded as 00 through 23. Times are Local Standard Time (LST) and are adjusted in PCRAMMET to the 01 - 24 clock in which hour 24 is the same as hour 00 of the next day.

- **Ceiling Height -** The height of the cloud base above local terrain and is coded in hundreds of feet.

- **Wind Direction -** The direction from which the wind is blowing, based on the 36 point compass, e.g. 09=East, 18=South, 27=West, 36=North, 00=Calm.

- **Wind Speed -** The wind speed measured in knots (00=Calm).

- **Dry Bulb Temperature -** The ambient temperature measured in whole degrees Fahrenheit.

- **Cloud Cover -** There are two cloud cover parameters, opaque cloud cover and total cloud cover in the CD-144 and SCRAM meteorological data files. Both parameters identify the amount of cloud cover measured in tens of percent, e.g., 0 = clear or less than 10%, 4 = 40-49%, '-' = overcast or 100%. PCRAMMET reads the field for opaque cloud cover.

SCRAM (MET144) FORMAT

This is a reduced version, with fewer weather variables, of the CD-144 data and is available for download on the SCRAM BBS or SCRAM Website: *www.epa.gov/scram001*.

Element	Columns
Surface Station Number	1- 5
Year	6- 7
Month	8- 9
Day	10-11
Hour	12-13
Ceiling Height (Hundreds of Feet)	14-16
Wind Direction (Tens of Degrees)	17-18
Wind Speed (Knots)	19-21
Dry Bulb Temperature (º Fahrenheit)	22-24
Total Cloud Cover	25-26
Opaque Cloud Cover	27-28

The CD-144 format refers to the "Card Deck 144 format" available from the NCDC. The file is composed of one record per hour, with all weather elements reported in an 80-column card image. The format of these records is described in the Card Deck 144 WBAN Hourly Surface Observations Reference Manual (NOAA, 1970), also available from the NCDC.

Data in the CD-144 format file that are checked or used by PCRAMMET includes:

- station number,
- year, month, day,
- hour,
- cloud ceiling height,
- wind direction,
- wind speed,
- dry bulb temperature, and
- opaque cloud cover.

The surface data files downloaded from the SCRAM BBS or SCRAM Website contain these five weather elements in a compressed format. The weather variables not required in the computations are omitted and the blank fields removed to create a 28-character record. The SCRAM format can be processed directly by PCRAMMET or the data may be expanded to the 80-character records for input into PCRAMMET.

The variables used by PCRAMMET from the CD-144 record include the following:

- **Surface Station Number -** The WBAN number identifying the NWS surface observation station for which hourly meteorological data are input to the PCRAMMET program.

- **Year, Month and Day of Record -** Identifies the year, month and day during which the meteorological data were observed. Only the last two digits of the year are reported.

- **Hour -** Identifies the hour of the meteorological data observation. Hour is based on the 24-hour clock and is recorded as 00 through 23. Times are Local Standard Time (LST) and are adjusted in PCRAMMET to the 01 - 24 clock in which hour 24 is the same as hour 00 of the next day.

- **Ceiling Height -** The height of the cloud base above local terrain and is coded in hundreds of feet.

- **Wind Direction -** The direction from which the wind is blowing, based on the 36 point compass, e.g. 09=East, 18=South, 27=West, 36=North, 00=Calm.

- **Wind Speed -** The wind speed measured in knots (00=Calm).

- **Dry Bulb Temperature -** The ambient temperature measured in whole degrees Fahrenheit.

- **Cloud Cover -** There are two cloud cover parameters, opaque cloud cover and total cloud cover in the CD-144 and SCRAM meteorological data files. Both parameters identify the amount of cloud cover measured in tens of percent, e.g., 0 = clear or less than 10%, 4 = 40-49%, '-' = overcast or 100%. PCRAMMET reads the field for opaque cloud cover.

SAMSON Format

With the advent of CD-ROM for the personal computer, large amounts of data can be stored in small amounts of space. NCDC has made available solar and meteorological data for the first order stations in the United States for the period 1961-1990 on a set of three CD-ROMs, referred to as the SAMSON data. PCRAMMET processes the data retrieved from these CD-ROMs.

PCRAMMET cannot access the data directly from a SAMSON CD-ROM. Rather, the user must run the software provided with the data to retrieve the station(s), period(s) of time and variables for the site and period to be modeled. The software is a DOS-based, interactive graphical interface and is user-friendly in its usage. The output files are written in an ASCII file on the user's local drive.

The software used to extract data from the CD-ROMs can retrieve multiple years of data for a single station and save it in the same file. However, PCRAMMET expects a maximum of one year of data in a data file retrieved from CD-ROM. The reason for this restriction is explained below.

Retrieving data from the CD-ROM is completely under the control of the user. When data are retrieved from the CD-ROMs, the user has the option to specify which variables to retrieve from a list of 21 variables stored for each station. At a minimum, the ceiling height, wind direction and speed, dry bulb temperature and opaque cloud cover should be retrieved (to be compatible with the data in the files on SCRAM). These variables are sufficient for most of the models listed in Section 1, and results in an ASCII file of about 400 Kb for one year of data. However, if dry deposition and/or wet deposition estimates are to be made with ISCST3, then several additional variables should be retrieved. These are: station pressure for dry deposition (resulting in a file size of about 445 Kb), and present weather and hourly precipitation amount for wet deposition (resulting in a file size of about 537 Kb). If all of the variables are retrieved, then a file size of about 1.2 Mb is created. When precipitation data are retrieved, the size will vary because precipitation amount is the last field and is filled only if there was precipitation for the hour, making some records longer than others.

When the data are retrieved from the CD-ROM, two records are written at the beginning of the file that identify the station (first record) and the variables retrieved (second record). PCRAMMET processes both of these records to obtain information about the station (e.g., latitude and longitude) and to determine how to process the data that follow. It is imperative that the user not alter or delete these records. These two records begin with the tilde character (~). If more than one year of data are retrieved from the CD-ROMs, these two records appear before each year in the file. If more than one year of data are in the file, the program will terminate with a compiler-issued error when PCRAMMET encounters the second set of header records. The program expects an integer value (the year), but encounters a character value (the tilde). However, the output for the previous year will be complete and intact. It is recommended that the user restrict data retrieved from CD-ROM to one station and one year per file.

PCRAMMET examines the second record to determine if the variables retrieved from the CD-ROM are sufficient to process the entire file according to the user's responses on how the output is expected to be used. If there are insufficient data, then PCRAMMET writes an error message and stops processing. The user must either select a different processing option, or

return to the CD-ROMs and retrieve the data once again, making sure to retrieve all of the necessary variables to generate the meteorological data output file.

The header records are followed by the data records. There is one record for each hour of the time period the user retrieved. Unlike the CD-144 format which reports the hour on the 00 – 23 clock, the hour is reported on the 01 - 24 clock. Hour 24 of a day retrieved from SAMSON corresponds to hour 00 of the next day for CD-144 data, i.e., the time adjustment that PCRAMMET must go through for CD-144 data is not necessary with SAMSON. Data stored in the SAMSON format are in different units than found in the CD-144 data. For the output to be identical from both input formats, PCRAMMET converts the SAMSON data to the units that are in the CD-144 data.

The first record in the file retrieved from the SAMSON CD-ROMs contains station data. The format of this record is:

Columns	Element	Definition
001	Indicator	~ to indicate a header record
002-006	WBAN Number	Station number identifier
008-029	City	City where station is located
031-032	State	State where station is located
033-036	Time Zone	The number of hours by which the local standard time lags or leads Universal Time.
039-044	Latitude	Station latitude
039		N = North of equator
040-041		Degrees
043-044		Minutes
047-053	Longitude	Station longitude
047		W = West, E = East
048-050		Degrees
052-053		Minutes
056-059	Elevation	Elevation of the station in meters above sea level.

The FORTRAN format of this record is:

(1X,A5,1X,A22,1X,A2,1X,I3,2X,A1,I2,1X,I2,2X,A1,I3,1X,I2,2X,I4)

Each variable is represented by a position number. This position number always corresponds to that variable, no matter how many or how few variables are retrieved. The second record contains the list of variables (by a position number) that appear in the data file. There is no particular format; the variable number appears above the column of data it represents with at least one space (and usually many more) between the position numbers. The third and subsequent records contain the weather elements retrieved from the SAMSON CD-ROMs. The data are free format, i.e., there is at least one space between each element in the record. The year, month, day, hour and observation indicators always appear on each record. These are followed by the variables retrieved by the user. If all the variables were retrieved, they would appear in the following order:

Position	Description
	Year, month, day, hour (LST), observation indicator
1	Extraterrestrial horizontal radiation
2	Extraterrestrial direct normal radiation
3	Global horizontal radiation
4	Direct normal radiation
5	Diffuse horizontal radiation
6	Total cloud cover
7	Opaque cloud cover
8	Dry bulb temperature
9	Dew point temperature
10	Relative humidity
11	Station pressure
12	Wind direction
13	Wind speed
14	Visibility
15	Ceiling height
16	Present weather
17	Precipitable water
18	Broadband aerosol optical depth
19	Snow depth
20	Days since last snowfall
21	Hourly precipitation amount and flag

The online help that accompanies the CD-ROMs contains a complete discussion of these variables, including the units, missing value indicators and any special considerations or comments.

HUSWO Format

The first record in the file retrieved from the HUSWO CD contains the list of variables, represented by a position number, that appear in the data file. There is no particular format; the variable number appears above the column of data it represents with at least one space between the position numbers. The second and subsequent records contain the weather elements retrieved from the HUSWO CD.

If all the variables were retrieved from the HUSWO CD, They would appear in the following order:

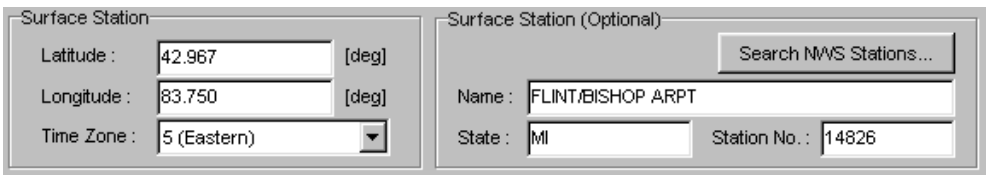
Position #	Description
1	Station ID
	ASOS flag
2	Year (4-digit)
	Month
	Day
	Hour (LST)
3	Global horizontal radiation
4	Direct normal radiation
5	Total cloud cover
6	Opaque cloud cover
7	Dry bulb temperature
	Dry bulb interpolation flag
8	Dew point temperature
9	Relative humidity
10	Station pressure
	Station pressure interpolation flag
11	Wind direction
12	Wind speed
13	Visibility
14	Ceiling height
15	Present weather
16	ASOS cloud layer 1
17	ASOS cloud layer 2
18	ASOS cloud layer 3
19	Hourly precipitation amount
	Precipitation flag
20	Snow depth

The online help that accompanies the CDs contains a complete discussion of these variables, including the units, missing value indicators and any special considerations or comments.

Important Notes: Data from the HUSWO CD must be retrieved in English units. Retrieve only a maximum of one year of data in the data file.

Surface Station Properties

The inputs in the **Surface Station** frame are only needed if the surface data format selected is **SCRAM (MET144)**, **CD-144**, or **HUSWO**. If using **SAMSON** format, the **Surface Station** frame will become disabled.



Surface Station Properties

For the location of the surface station, where the hourly surface observations were taken, the user needs to specify the following:

- **Latitude:** This is the latitude of the surface station in decimal degrees. Positive for stations NORTH of the equator.

- **Longitude:** This is the longitude of the surface station in decimal degrees. Positive for stations WEST of Greenwich.

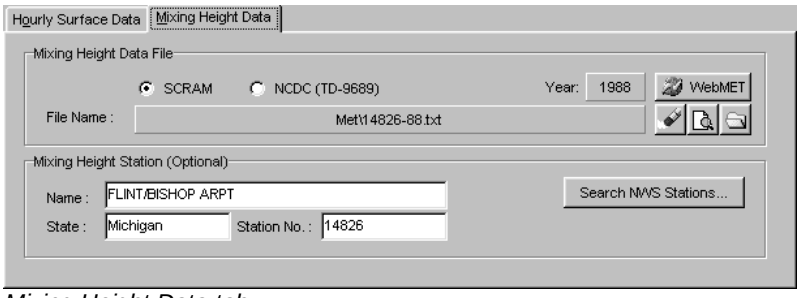
- **Time Zone:** This is the time zone of the surface station. Positive for stations WEST of Greenwich. Rammet View supplies a list of all the time zones (-12 to 12). To select the time zone, click on the down arrow and select the time zone from the list.

The values for **Latitude**, **Longitude** and **Time Zone** can be automatically set up by selecting one of the NWS surface met stations from the Search NWS Stations dialog box. To display this dialog box, click the **Search NWS Stations...** button. The **Search NWS Stations** dialog box with a list of the NWS surface met stations is displayed. Highlight the station where the hourly surface observations were taken and then double-click or press the **Select** button. The selected station information will be set up automatically. The list of NWS surface stations, provided by Rammet View, was downloaded from the EPA SCRAM BBS.

If selecting the **Latitude**, **Longitude**, and **Time Zone** from the list, then Rammet View will place the **Station Name**, **Station State**, and **Station No.** on the panels automatically for your reference. This information is not used to run EPA's PCRAMMET. If you input the Latitude, Longitude and **Time Zone** in the text boxes, then the **Station Name**, **Station State**, and **Station No.** panels will be blank.

The Mixing Height Data Tab

In this tab, you define the **Mixing Height Data File Options** and the **Mixing Height Station Properties** (Optional). See the description of each one of these options below:



Mixing Height Data tab

Mixing Height Data File Options

The user must enter the mixing height data file information for **No Deposition**, **Dry Deposition**, and **Wet Deposition** calculations. To specify the name and location, clicks on the **Specify File**

button () and enter the name and location of the mixing height data file. To specify the mixing height file format, select one of the two options: **SCRAM**, or **NCDC (TD-9689).**

- **SCRAM:** The mixing height data can also be downloaded from the SCRAM BBS or from the SCRAM Website: *www.epa.gov/scram001*.

- **NCDC (TD-9689):** The mixing height data can be purchased from the NCDC (TD-9689 format) in either diskette or tabular form by specifying 'twice daily mixing heights' for specific year(s) and station(s) (see Note below).

Note 1: The field position of the afternoon mixing height in the NCDC file is not the same as the position in the files from the SCRAM BBS or SCRAM Website. The NCDC format has the afternoon mixing height in columns 25-28 and the PCRAMMET format has the afternoon mixing height in columns 32-35. Therefore, the user should reformat the NCDC file to conform to the data format available on SCRAM.

Note 2: The mixing height records input to PCRAMMET must contain the morning and afternoon mixing heights for the day being processed.

Note 3: It is extremely important that the year for the Hourly Surface Data File and the Mixing Height Data File be the same.

Mixing Height File Format

The initialization record (first record of the file) used in previous versions of PCRAMMET is no longer required. However, PCRAMMET can read mixing height files that contain this record. This initialization record, if present, contains the following:

- Station Number of the NWS Meteorological Surface Station
- Year of Surface Data,
- Latitude of the Surface Station,
- Longitude of the Surface Station, and
- Time Zone of the Surface Station.

The format of the mixing height data corresponds to the format of the data that are available on the SCRAM BBS or SCRAM Website. See figure below for the proper format.

MIXING HEIGHT DATA RECORDS (SCRAM/PCRAMMET FORMAT)

```
139968712311  97510.4 6.7    1  975 9.5 7.4
139968801011  515 4.2 2.0    1  899 5.7 3.3
139968801021  113 0.9 0.9    1 134010.4 7.7
139968801031  744 8.5 3.7    1  516 5.2 5.4
139968801041  484 6.0 3.9    1  109 8.2 8.2
```

1-5 6-7 8-9 10-11 14-17 32-35

Columns	Element
1-5	Upper Air (Mixing) Station Number
6-7	Year
8-9	Month
10-11	Day
14-17	AM Mixing Value (Nocturnal Urban Mixing Height)
32-35	PM Mixing Value

Note 1: Each record also contains additional information on wind speed and general weather conditions that are not processed by PCRAMMET.

Note 2: Note that the field position of the afternoon mixing height in the NCDC file (columns 25-28) is not the same as the position in the files from the SCRAM BBS or SCRAM Website (columns 32-35). Therefore, the user should reformat the NCDC file to conform to the data format available on SCRAM.

Note 3: The mixing height records input to PCRAMMET must contain the morning and afternoon mixing heights for the day being processed. Quality checks are not performed on mixing height data input to PCRAMMET, and so it is recommended that the user review these data for completeness. A blank in a mixing height field is interpreted as a zero, i.e., the mixing height is assumed to be at the surface.

See below the description of each element in the mixing height data file:

- **Upper Air Station Number -** The Weather Bureau Army Navy (WBAN) station identification number identifying the NWS upper air observation station used to calculate mixing heights. The List of Upper Air Stations available from NCDC tabulates such WBAN numbers. The station must be representative of the site to be modeled.

- **Year -** The last two digits of the year of record for the mixing height data.

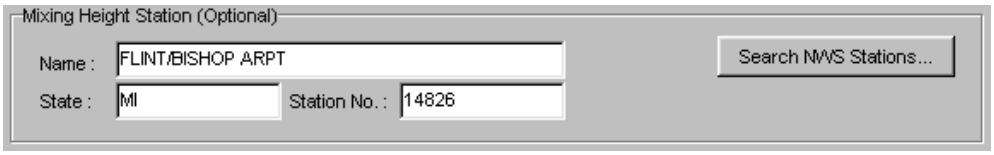
- **Month -** The month number corresponding to a given set of mixing heights.
- **Day -** The calendar day number corresponding to a given set of mixing heights.
- **Nocturnal Urban Mixing Height -** The minimum mixing height for a given day calculated from the 1200 GMT upper air sounding on that day, using morning surface temperature augmented by 5°C to account for urban heating.
- **Afternoon Mixing Height -** The maximum mixing height for a given day calculated from the afternoon surface temperatures and the 1200 GMT upper air sounding for that day.

Each record of the mixing height data file corresponds to the following:

- Mixing height record for December 31 of the year preceding the year of record
- Mixing height record for January 1 of the year of record
- Mixing height record for January 2 of the year of record
- Mixing height record for December 30 of the year of record
- Mixing height record for December 31 of the year of record
- Mixing height record for January 1 of the year following the year of record (or duplicate of the December 31 record with year, month, day changed).

Mixing Height Station Properties (Optional)

This information is not used to run EPA's PCRAMMET and as such its input is optional. For the location of the station where the mixing height observations were taken, you can specify the Name of the station, the State it is located in, and the Station No.



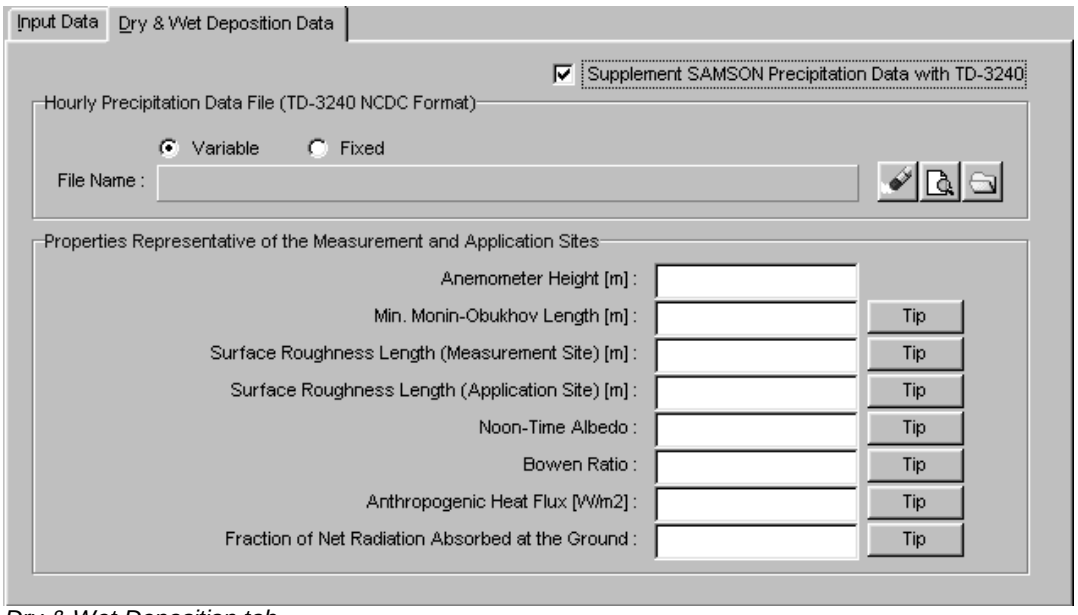
Mixing Height Station Properties

The values for the **Name**, **State**, and **Station No.** can be automatically set up by selecting one of the NWS Mixing Height stations from the **Search NWS Stations** dialog box. To display this dialog box, click the **Search NWS Stations...** button. The **Search NWS Stations** dialog box with a list of the NWS Mixing Height stations is displayed. Highlight the station where the mixing height observations were taken and then double-click or press the Select button. The selected station information will be set up automatically. The list of NWS mixing height stations, provided by Rammet View, was downloaded from the EPA SCRAM BBS or SCRAM Website.

The Dry & Wet Deposition Data Tab

The **Dry & Wet Deposition Data** tab can only be accessed if the user has selected **Dry Deposition** or **Wet Deposition** option on the **Input Data** tab. In this tab, you define the **Hourly**

Precipitation Data File Options, and the **Properties Representative of the Measurement and Application Sites**. See the description of each one of these options below:



Dry & Wet Deposition tab

Hourly Precipitation Data File Options

The Hourly Precipitation Data File, in the TD-3240 NCDC format, is required for **Wet Deposition Calculations** if:

1. The surface met data is in the CD-144 file format.

2. The surface met data in in the SAMSON format, and the SAMSON precipitation data is either not available or needs to be supplemented.

3. The surface met data in in the HUSWO format, and the HUSWO precipitation data is either not available or needs to be supplemented.

The user needs to specify the name, location, and format of **Hourly Precipitation Data File**. To specify the name and location, click on the **Specify File** button ( ) and enter the name and location of the hourly precipitation file. The TD-3240 format can be in two formats: **Variable** or **Fixed**.

- **Variable:** In the variable format, precipitation data for the entire day is stored on one record, and only for those hours during which precipitation was reported. The TD-3240 data as received from NCDC are usually in a variable-length format. For variable-length formats, the preprocessor converts the data to a fixed-length format, writes the results to a scratch file and uses the scratch file for processing. The scratch file is deleted at the end of the run.

- **Fixed:** In the fixed-length format, one record contains the precipitation amount for one hour. As with variable-length files, data are stored only for those days and hours for which precipitation was reported.

Precipitation data are reported only for those hours during which precipitation occurred. Variable-length blocks contain a station's precipitation record for one day in a physical record. The format of the precipitation data for variable-length blocks is as follows:

TD-3240 (Variable Format)

Precipitation data are reported only for those hours during which precipitation occurred. Variable-length blocks contain a station's precipitation record for one day on a physical record. The format of the precipitation data for variable-length blocks is as follows:

Field	Columns	Description
001	001-003	Record type
002	004-011	Station identifier
003	012-015	Meteorological element type
004	016-017	Measurement units
005	018-021	Year
006	022-023	Month
007	024-027	Day (right justified, zero filled)
008	028-030	Number of data groups to follow
009	031-034	Hour (left justified, zero filled)
010	035-040	Value of meteorological element
011	041	Measurement flag #1
012	042	Quality flag #2 (not used, blank)

Data groups in the same form as fields 009-012 are repeated as many times as necessary to contain one day of values in one record. These data would occupy fields 013 through 108, the maximum number of fields.

Fixed-length blocks contain a station's precipitation record for one hour on a physical record. The structure is identical to the variable-length blocks, except that only one hour of data appears in the record, i.e. fields 001 through 012.

The National Climatic Data Center (NCDC) publication TD-3240 Hourly Precipitation (NCDC, 1990) contains a complete discussion of the format, definitions and remarks for each of the fields presented above.

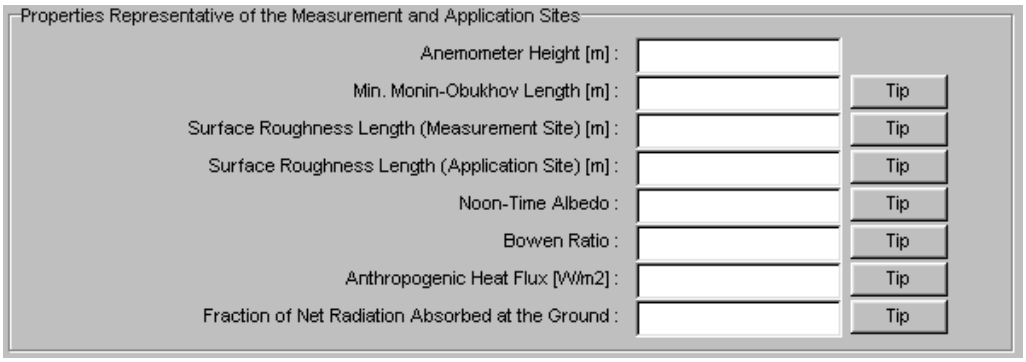
Note 1: For **Wet Deposition** estimates, the dispersion model requires the amount of precipitation as well as the precipitation type (liquid or frozen). The precipitation type is obtained from the present weather fields in the hourly surface observation files (CD-144, SAMSON, or HUSWO) and converted to a precipitation code that the dispersion model interprets. The precipitation amount is not reported with the standard CD-144 data. Therefore, another file of precipitation amount is required for Wet Deposition processes.

Note 2: The TD-3240 data format from NCDC contains the necessary precipitation amount. In addition to supplying the precipitation data when CD-144 data are processed, these data can be used to supplement the SAMSON and the HUSWO precipitation data in the event there is little or no precipitation data for a station (there are about 20 such stations which are noted in the SAMSON online help), or if precipitation was not retrieved from the CD-ROMs.

Note 3: Precipitation is reported in inches and hundredths of an inch in the TD-3240 format. These units are converted to millimeters for use in the ISCST3 dispersion model.

Properties Representative of the Measurement and Application Sites

The user is required to specify the site properties required for estimating the dispersion parameters for **Dry Deposition** and **Wet Deposition** modeling. See the sections below for guidance on how to specify these site properties.

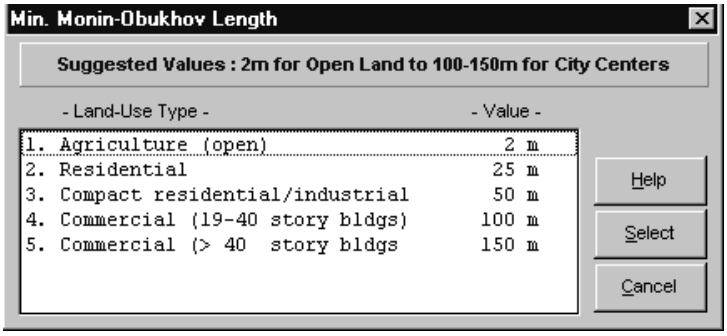


Anemometer Height

This is the height at which the winds were measured. For data observed at airports, this value can range from about 6 meters (20 feet) to 9 meters (30 feet). The user must determine the anemometer height. A good source is the set of Local Climatological Data Annual Summaries, available from NCDC. These summaries contain information about the instrumentation at the end of each station's data entry for the entire period of record.

Minimum Monin-Obukhov Length - Stable Conditions

The Monin-Obukhov length is a measure of atmospheric stability. It is negative during the day when surface heating results in an unstable atmosphere and positive at night when the surface cools (stable atmosphere). Values near zero indicate very unstable or stable conditions (depending on the sign). In urban areas during stable conditions, the estimated value of L may not adequately reflect the less stable boundary layer. Hanna and Chang (1991) point out that mechanical turbulence generated by obstacles (buildings) in urban areas will tend to produce a "more neutral" surface layer than that over an unobstructed site. They suggest that a minimum value of L be set for stable hours in order to simulate this effect. Using an approximate relation between obstacle height and the zone of flow affected by an obstacle, they suggest the following minimum values for several urban land use classifications:



Surface Roughness Length - Measurement Site & Application Site

The surface roughness length is a measure of the height of obstacles to the wind flow. It is not equal to the physical dimensions of the obstacles, but is generally proportional to them. Typical values for a range of land-use types as a function of season are listed in Table 3-1.

- **Measurement Site:** The user must enter a value representative of the site where the winds were measured, e.g., an airport.

- **Application Site:** The user must enter a value representative of the site where the meteorological output is to be applied.

Table 3-1 - Surface Roughness Length, in Meters, for Land-Use Types and Seasons (from Sheih et al., 1979).

Land-Use Type	Spring	Summer	Autumn	Winter
1. Water Surface	0.0001	0.0001	0.0001	0.0001
2. Deciduous Forest	1.00	1.30	0.80	0.50
3. Coniferous Forest	1.30	1.30	1.30	1.30
4. Swamp	0.20	0.20	0.20	0.05
5. Cultivated Land	0.03	0.20	0.05	0.01
6. Grassland	0.05	0.10	0.01	0.001
7. Urban	1.00	1.00	1.00	1.00
8. Desert Shrubland	0.30	0.30	0.30	0.15

Noon-Time Albedo

Noon-time albedo is defined as the fraction of the incoming solar radiation that is reflected from the ground when the sun is directly overhead. Adjustments are made automatically within PCRAMMET for the variation in the albedo with solar elevation angle. A range of values is given in Table B-2 as a function of several land-use types and season.

Table 3-2 – Albedo (1) of Natural Ground Covers for Land-Use Types and Seasons (from Iqbal, 1983).

Land-Use Type	Spring	Summer	Autumn	Winter
1. Water Surface	0.12	0.10	0.14	0.20
2. Deciduous Forest	0.12	0.12	0.12	0.50
3. Coniferous Forest	0.12	0.12	0.12	0.35
4. Swamp	0.12	0.14	0.16	0.30
5. Cultivated Land	0.14	0.20	0.18	0.60
6. Grassland	0.18	0.18	0.20	0.60
7. Urban	0.14	0.16	0.18	0.35
8. Desert Shrubland	0.30	0.28	0.28	0.45

(1) See also Iqbal (1983) for specific crops or ground covers.
(2) Winter albedo depends upon whether a snow cover is present continuously, intermittently, or seldom. Albedo ranges from about 0.30 for bare snow cover to about 0.65 for continuous cover.

Definitions of Seasons:

Spring: Periods when vegetation is emerging or partially green. This is a transitional situation that applies for 1-2 months after the last killing frost in spring.

Summer: Periods when vegetation is lush and healthy, typical of mid-summer, but also of other seasons where frost is less common.

Autumn: Periods when freezing conditions are common, deciduous trees are leafless, crops are not yet planted or are already harvested (bare soil exposed), grass Surfaces are brown, and no snow is present.

Winter: Periods when surfaces were covered by snow, and when temperatures are sub-freezing.

Bowen Ratio

The Bowen ratio is a measure of the amount of moisture at the surface. The presence of moisture at the earth's surface alters the energy balance, which in turn alters the sensible heat flux and Monin-Obukhov length. A range of values is given in Tables 3-3a, 3b and 3c as a function of land-use types, seasons and moisture conditions.

TABLE 3-3a - Daytime Bowen Ratio by Land Use and Season - **Dry Conditions** (from Paine, 1987).

Land-Use Type	Spring	Summer	Autumn	Winter [1]
1. Water (fresh & sea)	0.1	0.1	0.1	2.0 [2]
2. Deciduous Forest	1.5	0.6	2.0	2.0
3. Coniferous Forest	1.5	0.6	1.5	2.0
4. Swamp	0.2	0.2	0.2	2.0
5. Cultivated Land	1.0	1.5	2.0	2.0
6. Grassland	1.0	2.0	2.0	2.0
7. Urban	2.0	4.0	4.0	2.0
8. Desert Shrubland	5.0	6.0	10.0	10.0

TABLE 3-3b - Daytime Bowen Ratio by Land-Use and Season - **Average Conditions** (from Paine, 1987).

Land-Use Type	Spring	Summer	Autumn	Winter
1. Water (fresh & sea)	0.1	0.1	0.1	1.5
2. Deciduous Forest	0.7	0.3	1.0	1.5
3. Coniferous Forest	0.7	0.3	0.8	1.5
4. Swamp	0.1	0.1	0.1	1.5
5. Cultivated Land	0.3	0.5	0.7	1.5
6. Grassland	0.4	0.8	1.0	1.5
7. Urban	1.0	2.0	2.0	1.5
8. Desert Shrubland	3.0	4.0	6.0	6.0

TABLE 3-3c - Daytime Bowen Ratio by Land-Use and Season - **Wet Conditions** (from Paine, 1987).

Land-Use Type	Spring	Summer	Autumn	Winter
1. Water (fresh & sea)	0.1	0.1	0.1	0.3
2. Deciduous Forest	0.3	0.2	0.4	0.5
3. Coniferous Forest	0.3	0.2	0.3	0.3
4. Swamp	0.1	0.1	0.1	0.5
5. Cultivated Land	0.2	0.3	0.4	0.5
6. Grassland	0.3	0.4	0.5	0.5
7. Urban	0.5	1.0	1.0	0.5
8. Desert Shrubland	1.0	5.0	2.0	2.0

Anthropogenic Heat Flux

The anthropogenic heat flux can usually be neglected (set equal to zero) in areas outside highly urbanized locations. However, in areas with high population densities or high energy use, this flux may not always be negligible. Oke (1978) presents estimates of population density and per capita energy use for 10 cities and obtains a heat flux for each. Summertime values are typically 50% of the mean, while wintertime values are about 150% of the mean in the colder climates. Table 3-4 provides guidance for several urban areas.

Table 3-4 - Average Anthropogenic Heat Flux (Qf) and Net Radiation (Q*) for Several Urban Areas (from Oke, 1978).

Urban Area/ Latitude/ Period	Population (x 10^6)	Population density (persons/km^2)	Per capita energy usage (MJx10^3/yr)	Qf (W/m^2)	Q* (W/m^2)
Manhattan (40°N)					
annual	1.7	28,810	128	117	93
summer				40	
winter				198	
Montreal (45°N)					
annual	1.1	14,102	221	99	52
summer				57	92
winter				153	13
Budapest (47°N)					
annual	1.3	11,500	118	43	46
summer				32	100
winter				51	-8
Sheffield (53°N)					
annual	0.5	10,420	58	19	56
West Berlin (52°N)					
annual	2.3	9,830	67	21	57
Vancouver (49°N)					
annual	0.6	5,360	112	19	57
summer				15	107
winter				23	6
Hong Kong (22°N)					
annual	3.9	3,730	34	4	~110
Singapore (1°N)					
annual	2.1	3,700	25	3	~110
Los Angeles (34°N)					
annual	7.0	2,000	331	21	108
Fairbanks (64°N)					
annual	0.03	810	740	19	18

Fraction of Net Radiation Absorbed at the Ground

The flow of heat into the ground during the daytime is a fraction of the total radiation. Values suggested by Oke (1982) are:

rural	0.15
suburban	0.22
urban	0.27

Note 1: The Tips button will display a dialog box which contains a list of values for guidance on specifying the site properties. From the dialog box, you can select a value from the list and then press the Select button. The value you selected will be automatically displayed on the appropriate field.

Running the U.S. EPA PCRAMMET Program

The Project Status Dialog Box

The **Project Status** dialog box provides you with a concise way of viewing all the options selected in your project. To display the **Project Status** dialog box, do the following:

1. Click the **Run** menu toolbar button 

or

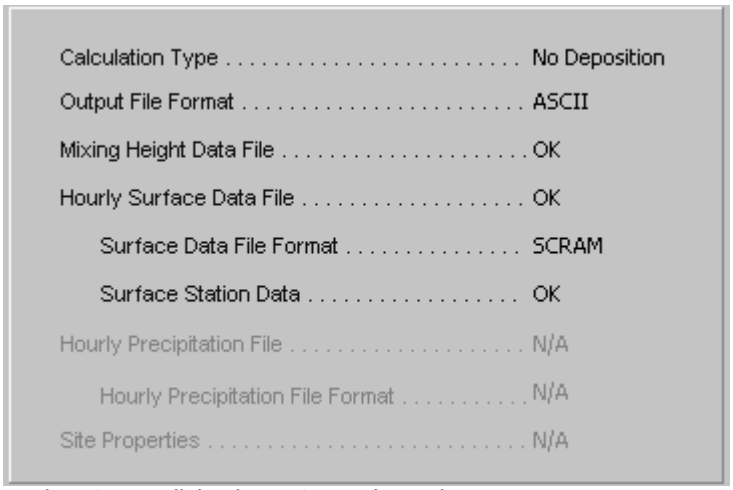
2. Select **Run** from the menu.

The **Project Status** dialog box contains a summary of the inputs and options selected for the current project.

On the top panel of the **Project Status** dialog box, the name and path of the input file and the output file, for the current Rammet View project are displayed.

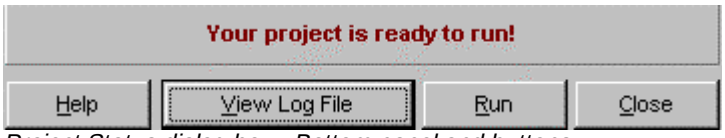
Project Status dialog box - Top panel

The second panel from the top displays the options you have defined for the current project.



Project Status dialog box - Second panel

On the bottom panel of the **Project Status** dialog box, a message identifies if your project is complete or not. Also a series of buttons are placed on the bottom of the dialog box. The function of each one of these buttons is explained below:



Project Status dialog box - Bottom panel and buttons

Help ..... Click here to get help on the **Project Status** dialog box.

View Log File ..... Click here to review PCRAMMET log file (PCRAM.LOG) which gives you a summary of the data input for the current run and the warning messages written by PCRAMMET.

Run ..... Click here to run the U.S. EPA PCRAMMET program.

Close ..... Click here to close the **Project Status** dialog box.

Running PCRAMMET

When the data input for your project is complete, you can run EPA's PCRAMMET. To run PCRAMMET, do the following:

1. Click the **Run** menu toolbar button (Run) to display the **Project Status** dialog box, and then click on the **Run** button

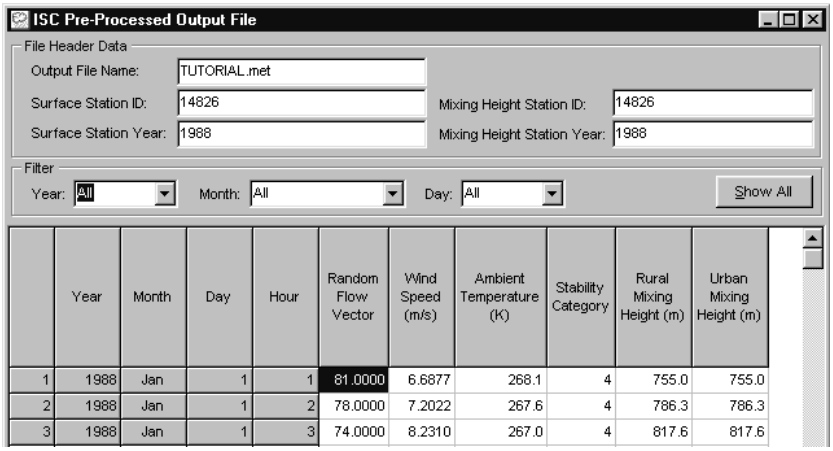
2. After you have clicked the **Run** button, a window appears on your screen, to provide status information about the simulation. When the execution of PCRAMMET is completed, a message will be displayed requesting you to press any key to continue.

3. Click the **View Log File** button to review the contents of the PCRAMMET log file. This file gives you a summary of the data input for the current run and displays all the warning messages written by PCRAMMET.

4. You can review the contents of the PCRAMMET output file by selecting **View | Output File** from the menu, or pressing the **Preview** button ( ) located on the right hand side of the **Output File** panel.

5. You can also review the contents of the pre-processed output file using **MetView**. MetView is a utility that displays the pre-processed output file in a grid format. A short description of each parameter of the output file is also given. Press the **MetView** menu toolbar button to have access to this utility.

MetView menu toolbar button



	Year	Month	Day	Hour	Random Flow Vector	Wind Speed (m/s)	Ambient Temperature (K)	Stability Category	Rural Mixing Height (m)	Urban Mixing Height (m)
1	1988	Jan	1	1	81.0000	6.6877	268.1	4	755.0	755.0
2	1988	Jan	1	2	78.0000	7.2022	267.6	4	786.3	786.3
3	1988	Jan	1	3	74.0000	8.2310	267.0	4	817.6	817.6

Runtime Error Messages

There are several conditions under which PCRAMMET may write warning and error messages. Warning messages are written to the log file and PCRAMMET continues processing the data. On the other hand, error conditions are fatal, they stop the PCRAMMET processing run, and a single error message is written to the log file.

For a detailed description of the warning and error messages generated by PCRAMMET, see the online help in Rammet View.

The PCRAMMET Output File

The output data file format depends on the final processing option specified by the user. If the meteorological output are to be used in an air quality model for concentration estimates without deposition effects, then an unformatted file can be written. However, the user has the option to write an ASCII file directly, allowing the user to view the results without first translating the unformatted file to an ASCII file. The formatted ASCII file has the advantage that it is independent of the compiler and computing platform on which it is created. If an unformatted file is created, a formatted ASCII file can be obtained from the unformatted file by using the **Bintoasc** utility. You have access to this program by selecting **Utilities | Bintoasc** from the menu or by pressing the **Bintoasc** menu toolbar button.

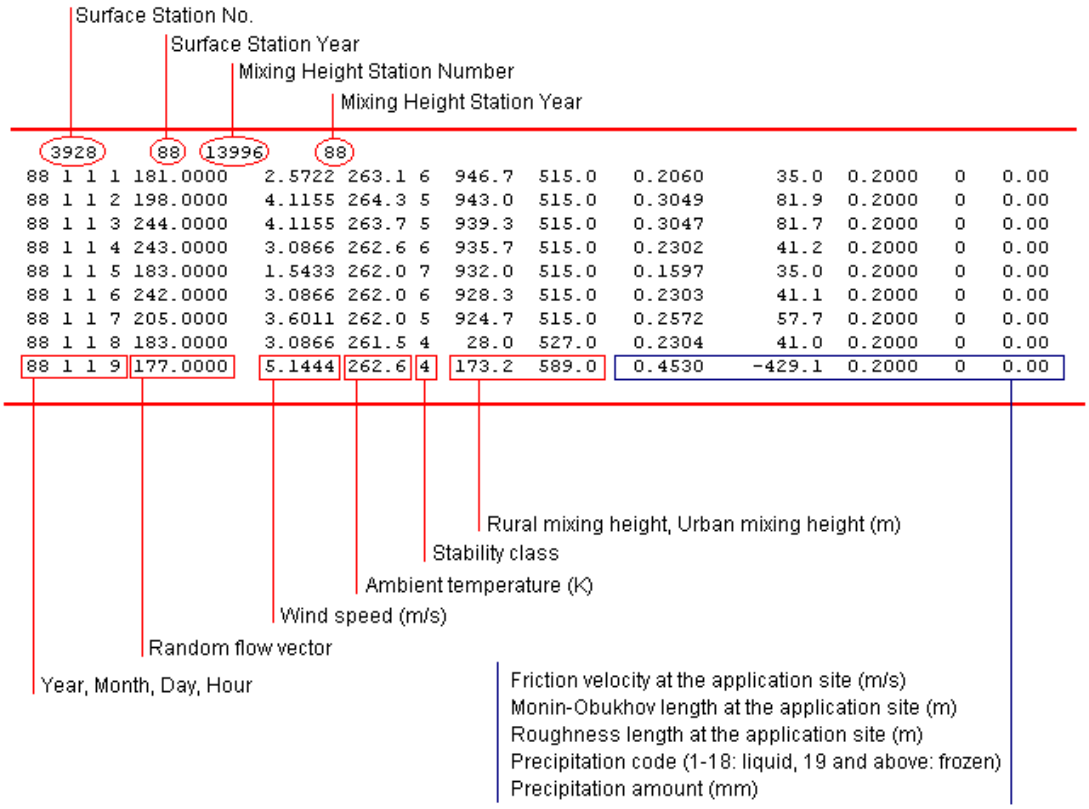
For dry and wet deposition processing in ISCST3, there is no option to write an unformatted file. The output will always be an ASCII file.

The first record in the output file contains a file identification record followed by one record for each day in the year. The file identification record contains the year of record for the surface

meteorological data, the surface station identification number, the year of record for the mixing height data, and the upper air station identification number.

If the user specifies that **No Deposition** estimates are to be performed with the output data set, then the user has the option of creating an unformatted (binary) or ASCII output file. The binary output from PCRAMMET consists of one record with the year, month, and the Julian day followed by 24 values of stability class, wind speed, temperature, flow vector, randomized flow vector, and rural and urban mixing heights. The ASCII file contains the same information except that each hour is written as a separate record.

The four values on the file identification record and the year, month, Julian day and stability class record are written as FORTRAN integer variables. All other values on the daily records are FORTRAN real number variables. See Output File (Unformatted) and Output File (ASCII Format) for a description of the arrangement of the variables on each of the daily records.



Output file in ASCII Format for Wet Deposition

If an unformatted file is written, all records on the output file are written with an unformatted FORTRAN write statement. Thus, the resulting output file structure will be dependent upon the FORTRAN compiler used to create the PCRAMMET executable. As a result, to maintain compatibility with the unformatted file, the models requiring its use must also have been created using the same compiler. Most executables on the SCRAM BBS or SCRAM Website requiring the use of the PCRAMMET unformatted output file have been created using the Microsoft or Lahey FORTRAN compiler.

For **Dry Deposition** estimates, three additional fields are written to the output file (the output file is in ASCII only):

- Surface friction velocity (u*),
- Monin-Obukhov length (L), and
- Surface roughness length (z0).

For **Wet Deposition**, the three parameters for **Dry Deposition** plus two additional parameters are written (the output is in ASCII only):

- Precipitation type (which is based on the present weather codes in the hourly surface observation file) and
- Precipitation amount.

Note 1: You can also review the contents of the pre-processed output file using **MetView**. Press the **MetView** menu toolbar button to have access to this utility.

CHAPTER 4

Using WRPLOT View

WRPLOT View is a Windows program that generates wind rose statistics and plots for selected meteorological stations for user-specified date and time ranges. A wind rose depicts the frequency of occurrence of winds in each of 16 direction sectors (every 22.5 degrees) and 6 wind speed classes for a given location and time period.

Wind roses can sometimes be used to depict graphically the dominant transport direction of the winds for an area. Due to the influences of local terrain, possible coastal effects, the exposure of the instruments, and the temporal variability of the wind, the wind rose statistics may not always be representative of true transport for an area. Other meteorological conditions may also be important for determining the formation and transport of certain atmospheric contaminants, particularly for reactive pollutants. The results of this program should therefore be used with caution.

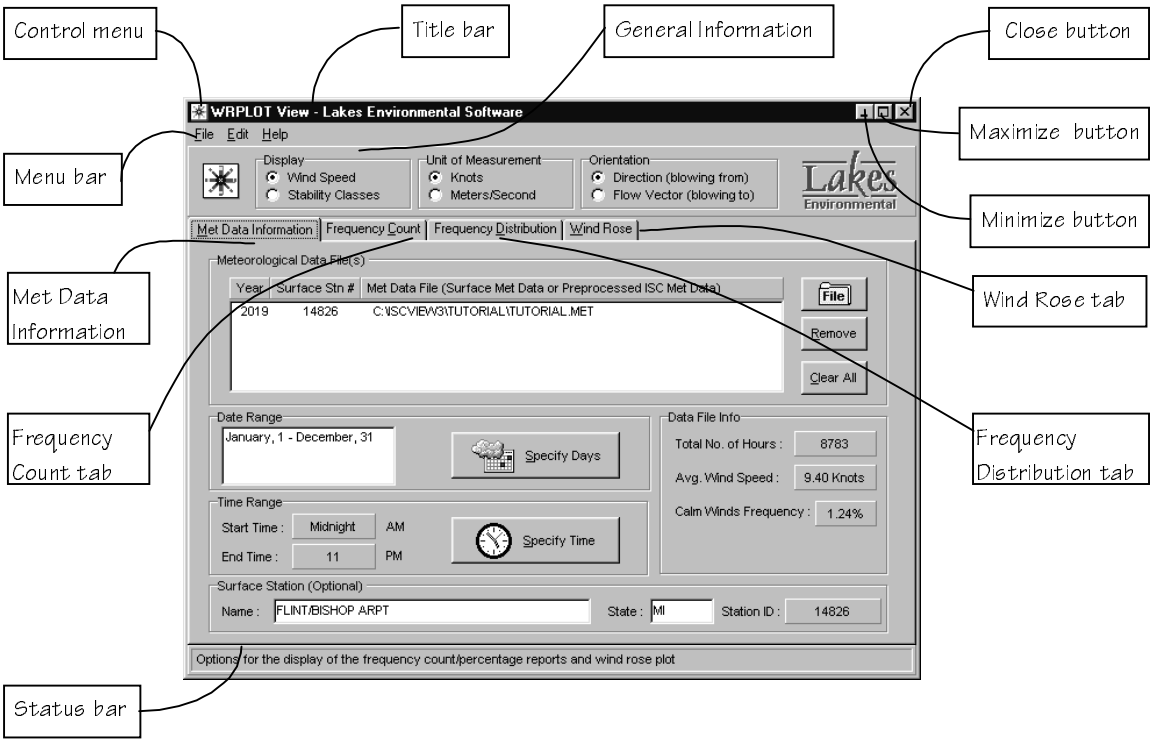
This chapter will explain how to use WRPLOT View. To accomplish this we will examine the five main sections that make up WRPLOT View: the General Information panel, the Met Data Information tab, the Frequency Count tab, the Frequency Distribution tab, and the Wind Rose tab. The contents of these five main sections will be explained in detail in the sections that follow.

Contents

The WRPLOT View Window

The components of the WRPLOT View window are:

- **Control menu .....** The Control Menu box displays the sizing options, to switch to another application, or to close WRPLOT View.
- **Title bar.....** Displays the following caption, WRPLOT View - Lakes Environmental Software.
- **Minimize button .....** Minimizes the WRPLOT View window.
- **Maximize/Restore button.....** Maximizes WRPLOT View window, or restore to its pre-maximized size and position.
- **Close button.....** This is a button only available in Windows 95. This button will close WRPLOT View.



- **Menu bar.....** Displays menu names. To open a menu, move the mouse over the menu name and then press the left mouse button. A menu appears displaying a list of related commands.
- **General Information panel.....** This panel contains options for setting: what to display, the unit of measurement, and the orientation.

- **Met Data Information tab .....** This tab contains options to set the meteorological data files the wind rose will use as well as their date and time range to display.

- **Frequency Count tab .....** This tab will display a chart containing a count of the number of occurrences of wind speeds and wind directions.

- **Frequency Distribution tab.....** This tab will display a chart containing statistical percentages of the occurrences of wind speeds and wind directions

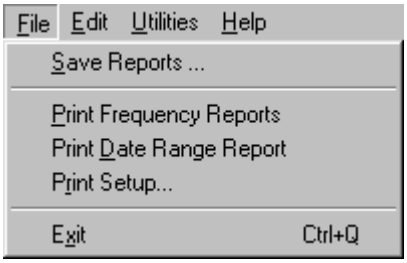
- **Wind Rose tab .....** This tab contains the Wind Rose graphical representation of the distribution of wind velocity and direction.

- **Status bar .....** This area displays a description of the commands in which the mouse pointer is currently on.

Menu Bar

The following is the description of each menu option:

File (Alt, F)



Save Reports ..... This saves the current WRPLOT View frequency report file. This file contains the Frequency Count and Frequency Distribution charts.

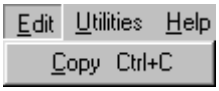
Print Frequency Reports..... This prints the current WRPLOT View frequency report file. This file contains the Frequency Count and Frequency Distribution charts.

Print Date Range Report ..... This prints the date range report based on the current selection of days specified in the **Specify Days to Process** dialog box.

Print Setup..... Displays the Print Setup dialog box, allowing you to specify printer, page orientation, and paper size.

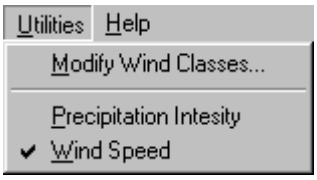
Exit..... Closes WRPLOT View.

Edit (Alt, E)



Copy (Ctrl+C)..... Copies the wind rose plot to the clipboard, so you can paste to any Windows application that supports pasting from the clipboard. As a Windows Metafile image, the clipboard image can be re-sized to accommodate your needs and preferences.

Utilities (Alt, U)



Modify Wind Classes..... Allows you to change the default wind speed classes. You can specify up to 6 wind speed classes and set the lower limits of each class.

Precipitation Intensity..... Allows you to display the frequency count, the frequency distribution, and the rose plot (rain rose) in terms of precipitation intensity. This option is only available for data that contains data for hourly precipitation amount (e.g., SAMSON, HUSWO). The option that is currently being used will be indicated by a check mark.

Wind Speed ..... Allows you to display the frequency count, the frequency distribution, and the rose plot (wind rose) in terms of wind speed. The option that is currently being used will be indicated by a check mark.

Help (Alt, H)

Contents ..... Displays WRPLOT View Help Contents, from which you can select topics.

Search for Help on ..... Lets you search for help on a particular topic.

Help on Help ..... Displays information on "How to Use Help".

Team ..... Displays information on the WRPLOT View development team

Technical Support ..... Displays technical support options for Lakes Environmental software.

Web Links ..... Displays Web links for product upgrades, free met data, Lakes Web site, and other related links.

About ..... Displays the copyright notice and version number for WRPLOT View.

The General Information Panel

The **General Information** panel is always displayed on your screen after you have pressed the OK button on the **About** dialog box and it is located on the top part of the WRPLOT View main window.

General Information Panel

You can select options for the display of the frequency reports and wind rose graph. These options will depend on the type of meteorological data being used. You can select to display the distribution reports and wind rose in terms of wind speed (knots or m/s) or in terms of stability classes. You can also specify the orientation of the wind display (blowing from or blowing to). See more information below:

Display

Two options are available:

- **Wind Speed:** This option is available for the MET144, SAMSON, and preprocessed ISC met data file formats. If this option is selected, then the display of the frequency count, frequency percentage, and wind rose graph are in terms of wind speed.

- **Stability Class:** This option is only available for preprocessed ISC met data files. If this option is selected, then the display of the frequency count, frequency percentage, and wind rose graph are in terms of stability classes (A, B, C, D, E, and F).

Unit of Measurement

The **Unit of Measurement** option refers to the wind speed unit being used for the display of the frequency reports and wind rose graph. Two options are available:

- Knots
- Meters/Second

Orientation

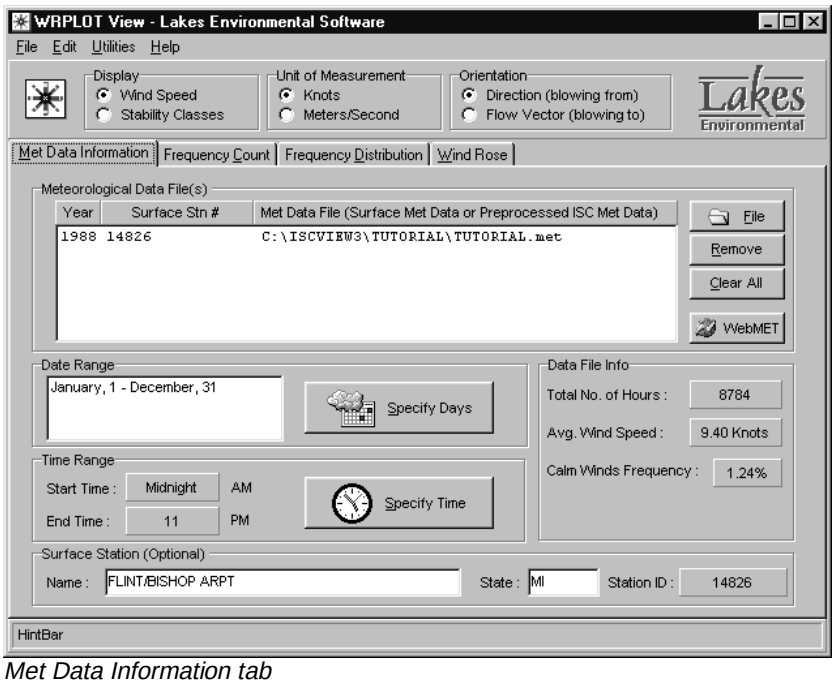
The **Orientation** option refers to the wind speed unit being used for the display of the frequency reports and wind rose graph. Two options are available:

- **Direction (blowing from):** Indicates that the frequencies shown are related to winds blowing from an angle. For example, zero degree is actually wind blowing from north.

- **Flow Vector (blowing to):** Indicates that the frequencies shown are related to winds blowing to an angle. For example, zero degree is actually wind blowing to north.

The Met Data Information Tab

The **Met Data Information** tab is the first tab displayed on your screen after you have pressed the OK button on the **About** dialog box. It makes up the middle to bottom portion of the screen.



Met Data Information tab

In the **Met Data Information** tab, you can select one or more meteorological data files to be plotted, select the date range and time range, and optionally set some additional surface station information. See more information below:

Meteorological Data File(s)

Click the **File** button (

) and select the surface meteorological data file or the preprocessed meteorological data file for which wind rose statistics are to be produced. You can specify more than one met data file in the following file formats:

1. **Surface Meteorological Data Files –** SCRAM (MET144), CD144, SAMSON, and HUSWO file formats for hourly surface meteorological data files.

   - **MET144 format (SCRAM format):** Surface meteorological data files for National Weather Service (NWS) stations available on the SCRAM BBS of the OAQPS Technology Transfer Network or on the SCRAM Website.

   - **CD144 format:** Refers to the "Card Deck 144 format" available from the National Climatic Data Center (NCDC). The file is composed of one record per hour, with all weather elements reported in an 80-column card image.

   - **SAMSON format:** The SAMSON 3-volume CD-ROM contains hourly solar radiation data along with selected meteorological elements for the period 1961-1990. It encompasses 237 NWS stations in the United States, plus offices in Guam and Puerto Rico.

   - **HUSWO format:** This is the data available on the HUSWO CD which contains the first order stations in the United States for the period 1990-1995, overlapping the SAMSON

CD for 1990. You must run the software provided with the HUSWO data to retrieve the data into an ASCII file to be used with PCRAMMET. WRPLOT View expects the data to be retrieved in English units.

2. **Preprocessed ISC Meteorological Data Files -** Meteorological data file preprocessed by PCRAMMET for input into the U.S. EPA ISCST3 model.

Note 1: If you want to view your met data file using Microsoft WordPad, select the file from the list and double-click on it.

Note 2: For an extensive discussion of the Met Data File Formats, please see the following section entitled ***The Met Data File Formats***.

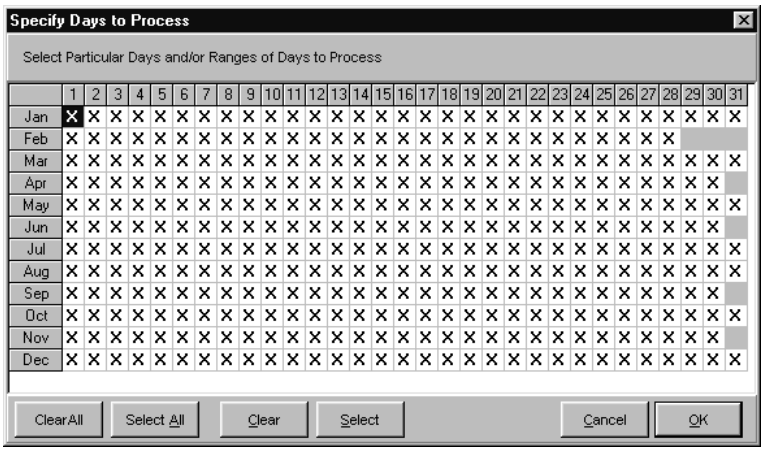
Date and Time Ranges

- **Date Range**

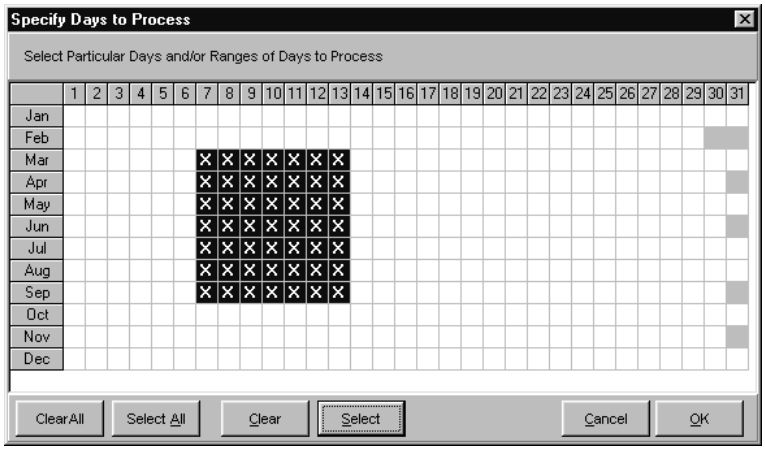
You can select date ranges for plotting. If more than one year of data is selected, then the same date range is used for each year. To specify the Date Range you must press the **Specify Days** button. From the **Specify Days** dialog box, select the range of days and press the **OK** button. Please note that every time you change the **Date Range**, your windrose plot will be regenerated.

➤ **How to Specify Particular Days and Ranges of Days to Process:**

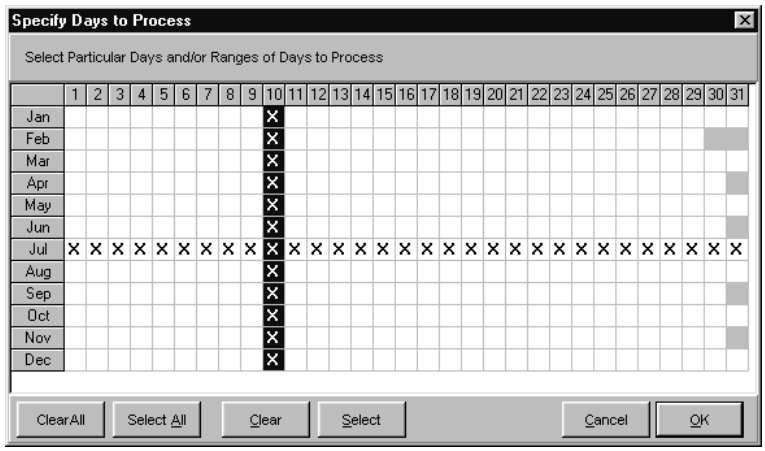
Step 1: Press the **Specify Days** button to display the **Specify Days to Process** dialog box. By default, the full year is selected (January 1 to December 31).



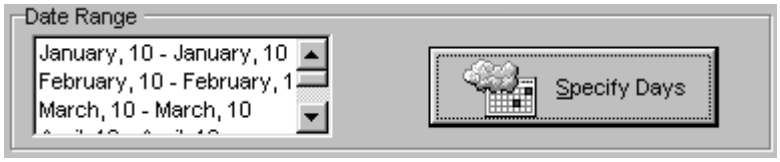
Step 2: Before making any selection, press the **Clear All** button to clear the current selection. To select a range of days, click with the left mouse button on the cell for the first day in the range and drag to select all the days in the range. Press the **Select** button to mark these cells.



Step 3: To select a full month, click on the row header. To select the same day for all months, click on the column header. After each selection, do not forget to press the **Select** button to mark your selection. Use the **Clear** button to clear marked cells that are currently selected. Use the **Clear All** button to clear all marked cells. Use the **Select All** button to mark all days of the year.

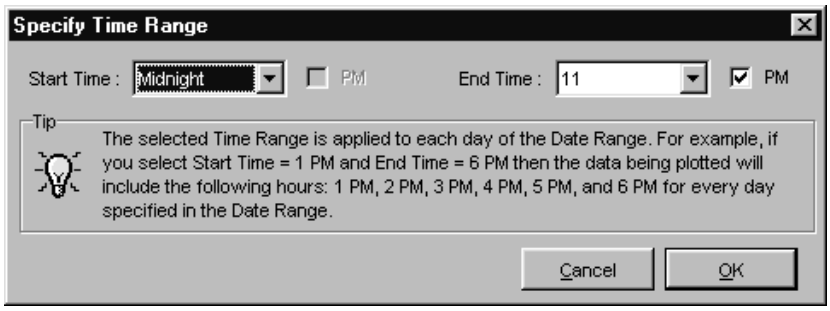


Step 4: After all selections are done, press the **OK** button to close the dialog. Note that the days and/or range of days that you selected are displayed in the list.



- **Time Range**

You can also select time ranges for plotting. You choose the start time and the end time from the drop-down list boxes. If more than one year of data is selected, then the same time range is used for each year. To specify the Time Range you must press the **Specify Time** button. From the **Specify Time** dialog box, select the **Start Time** and the **End Time** and press the **OK** button. Please note that every time you change the **Time Range**, your windrose plot will be regenerated.



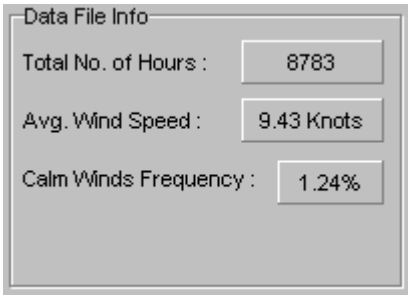
Note: The selected **Time Range** is applied to each day of the **Date Range**. For example, if you select **Start Time=1 PM** and **End Time=6 PM** then the data being plotted includes the following hours: 1 PM, 2 PM, 3 PM, 4 PM, 5 PM, and 6 PM for every day specified in the **Date Range**.

Surface Station Options

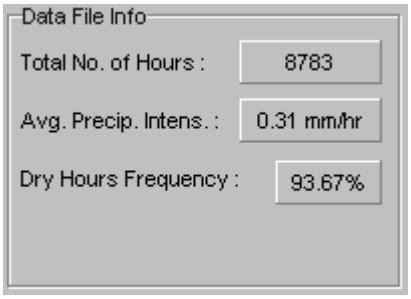
If your data file is for one of the NWS stations available on the SCRAM BBS than the **Name**, **State**, and **Station ID** fields are automatically filled with data by WRPLOT View. If your data file is not from a NWS station, then these fields will be blank for you to specify the Name and State for the surface station being used. The **Station ID** is read from your met data file. The data specified in the **Name**, **State**, and **Station ID** fields will be used as default for the wind rose title when you print your plot.

Data File Info

In the **Data File Info** frame, WRPLOT View provides you with relevant information on the meteorological data file(s) for which a wind rose plot or a rain plot are being generated. The information is the following:



For Wind Speed



For Precipitation Intensity

- **Total No. of Hours:** this field displays the total number of hours for all the files specified in the Meteorological Data File(s) list.
- **Avg. Wind Speed:** this is the average wind speed for the selected met data files.
- **Calm Winds Frequency:** this field displays the percent frequency of calm winds. Calm is defined by a wind speed less than the threshold of the wind instrument, and coded as a zero wind speed and direction.
- **Avg. Precip. Intens.:** this is the average precipitationintensity for the selected met data files.
- **Dry Hours Frequency:** this field displays the percent frequency of dry hours.

The Met Data File Formats

SURFACE DATA RECORD (28 BYTE RECORD – SCRAM/MET144 Format)

Element	Columns
NWS Surface Station Number	1- 5
Year	6- 7
Month	8- 9
Day	10-11
Hour	12-13
Ceiling Height (Hundreds of Feet)	*14-16
Wind Direction (Tens of Degrees)	17-18
Wind Speed (Knots)	*19-21
Dry Bulb Temperature (Degrees Fahrenheit)	*22-24
Total Cloud Cover (Tens of Percent)	*25-26
Opaque Cloud Cover (Tens of Percent)	*27-28

* These fields are not needed by WRPLOT View to generate the wind rose statistics

The variables used by WRPLOT View from the MET144 record include the following:

- **Surface Station Number:** the 5-digit WBAN number identifying the NWS surface observation station.
- **Year, Month and Day of Record:** identifies the year, month and day during which the meteorological data were observed. Only the last two digits of the year are reported.
- **Hour:** identifies the hour of the meteorological data observation. Hour is based on the 24-hour clock and is recorded as 00 through 23.
- **Wind Direction:** the direction from which the wind is blowing, based on the 36 point compass, e.g. 09=East, 18=South, 27=West, 36=North, 00=Calm.
- **Wind Speed:** the wind speed measured in knots (00=Calm).

SURFACE DATA RECORD (80 BYTE RECORD - CD144 FORMAT)

The CD-144 format refers to the "Card Deck 144 format" available from the NCDC. The file is composed of one record per hour, with all weather elements reported in an 80-column card image.

Element	Columns
Surface Station Number	1- 5
Year	6-7
Month	8-9
Day	10-11
Hour	12-13
Ceiling Height (Hundreds of Feet)	*14-15
Wind Direction (Tens of Degrees)	39-40
Wind Speed (Knots)	41-42
Dry Bulb Temperature (° Fahrenheit)	*47-49
Opaque Cloud Cover	79

* These fields are not needed by WRPLOT View to generate the wind rose statistics

The variables used by WRPLOT View from the CD-144 record include the following:

- **Surface Station Number:** the WBAN number identifying the NWS surface observation station.
- **Year, Month and Day of Record:** identifies the year, month and day during which the meteorological data were observed. Only the last two digits of the year are reported.
- **Hour:** identifies the hour of the meteorological data observation. Hour is based on the 24-hour clock and is recorded as 00 through 23. Times are Local Standard Time (LST) and are

adjusted in PCRAMMET to the 01 - 24 clock in which hour 24 is the same as hour 00 of the next day.

- **Wind Direction:** the direction from which the wind is blowing, based on the 36 point compass, e.g. 09=East, 18=South, 27=West, 36=North, 00=Calm.

- **Wind Speed:** the wind speed measured in knots (00=Calm).

SURFACE DATA - SAMSON FORMAT

The first record in the file retrieved from the SAMSON CD-ROMs contains station data. The format of this record is:

Columns	Element	Definition
001	Indicator	~ to indicate a header record
002-006	WBAN Number	Station number identifier
008-029	City	City where station is located
031-032	State	State where station is located
033-036	Time Zone	The number of hours by which the local standard time lags or leads Universal Time.
039-044	Latitude	Station latitude
039		N = north of equator
040-041		Degrees
043-044		Minutes
047-053	Longitude	Station longitude
047		W = west, E = east
048-050		Degrees
052-053		Minutes
056-059	Elevation	Elevation of the station in meters above sea level.

The FORTRAN format of this record is:

(1X,A5,1X,A22,1X,A2,1X,I3,2X,A1,I2,1X,I2,2X,A1,I3,1X,I2,2X,I4)

Each variable is represented by a position number. This position number always corresponds to that variable, no matter how many or how few variables are retrieved. The second record contains the list of variables (by a position number) that appear in the data file. There is no particular format; the variable number appears above the column of data it represents with at least one space (and usually many more) between the position numbers.

The third and subsequent records contain the weather elements retrieved from the SAMSON CD-ROMs. The data are free format, i.e., there is at least one space between each element in the record. The year, month, day, hour and observation indicator always appear on each record. These are followed by the variables retrieved by the user. If all the variables were retrieved, they would appear in the following order:

Position	Description
	Year, month, day, hour (LST), observation indicator
1	Extraterrestrial horizontal radiation
2	Extraterrestrial direct normal radiation
3	Global horizontal radiation
4	Direct normal radiation
5	Diffuse horizontal radiation
6	Total cloud cover
7	Opaque cloud cover
8	Dry bulb temperature
9	Dew point temperature
10	Relative humidity
11	Station pressure
12	Wind direction
13	Wind speed
14	Visibility
15	Ceiling height
16	Present weather
17	Precipitable water
18	Broadband aerosol optical depth
19	Snow depth
20	Days since last snowfall
21	Hourly precipitation amount and flag

The online help that accompanies the CD-ROMs contains a complete discussion of these variables, including the units, missing value indicators and any special considerations or comments.

ISC PREPROCESSED METEOROLOGICAL DATA FILE

WRPLOT View can read met data preprocessed by PCRAMMET (ASCII format) for input into ISCST3. The following is the file format for the preprocessed met data:

Header Record

The first record of the ASCII preprocessed meteorological file consists of the following four variables:

Field	Description
001	Surface Station Number
002	Surface Station Year
003	* Mixing Height Station Number
004	* Mixing Height Station Year

The variables above are written with the format: (4(I6, 1X))

* These fields are not needed by WRPLOT View to generate the wind rose statistics.

Data Records (One per Hour)

The ASCII preprocessed meteorological data file, for concentration estimates, consists of the following variables, one record for each hour of the period.

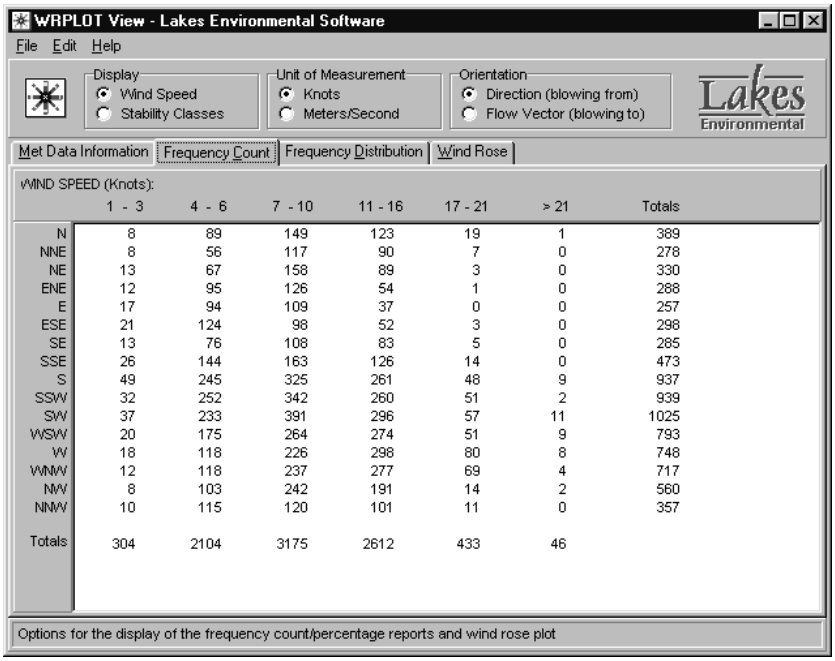
Field	Description
001	Year (2 digits)
002	Month
003	Day
004	Hour
005	Random flow vector
006	Wind speed (m/s)
007	* Ambient temperature (K)
008	Stability category
009	* Rural mixing height (m)
010	* Urban mixing height (m)

The variables listed above are written with the format: (4I2, 2F9.4, F6.1, I2, 2F7.1)

* These fields are not needed by WRPLOT View to generate the wind rose statistics

The Frequency Count Tab

The frequency count displays in tabular form the number of occurrences of winds in each of 16 direction sectors (N=North, NNE=North-Northeast, NE=Northeast, etc.) and 6 wind speed classes for a given location and time period.



WIND SPEED (Knots):	1 - 3	4 - 6	7 - 10	11 - 16	17 - 21	> 21	Totals
N	8	89	149	123	19	1	389
NNE	8	56	117	90	7	0	278
NE	13	67	158	89	3	0	330
ENE	12	95	126	54	1	0	288
E	17	94	109	37	0	0	257
ESE	21	124	98	52	3	0	298
SE	13	76	108	83	5	0	285
SSE	26	144	163	126	14	0	473
S	49	245	325	261	48	9	937
SSW	32	252	342	260	51	2	939
SW	37	233	391	296	57	11	1025
WSW	20	175	264	274	51	9	793
W	18	118	226	298	80	8	748
WNW	12	118	237	277	69	4	717
NW	8	103	242	191	14	2	560
NNW	10	115	120	101	11	0	357
Totals	304	2104	3175	2612	433	46	

Frequency Count tab

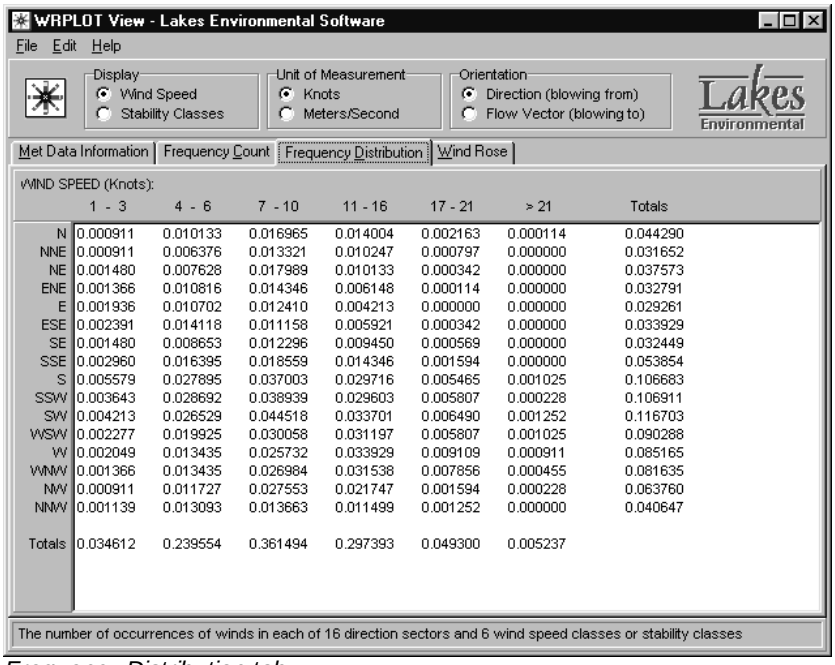
You can save and print the frequency reports by doing the following:

- **To Save:** select **File | Save Report...** from the menu. Specify the name and directory to save the frequency reports. The reports will be saved in text (*.txt) format. You can then read it with any word processor.

- **To Print:** select **File | Print Frequency Reports...** from the menu.

The Frequency Distribution Tab

This table displays the normalized frequency of occurrences of winds in each of 16 direction sectors (N=North, NNE=North-Northeast, NE=Northeast, etc.) and 6 wind speed classes for a given location and time period. The normalized frequency multiplied by 100 gives you the percent frequency.



Frequency Distribution tab

You can save and print the frequency reports by doing the following:

- **To Save:** select **File | Save Report...** from the menu. Specify the name and directory to save the frequency reports. The reports will be saved in text (*.txt) format. You can then read it with any word processor.

- **To Print:** select **File | Print Frequency Reports...** from the menu.

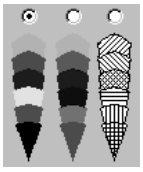
The Wind Rose Tab

The Wind Rose tab displays in graphics the frequency distribution of occurrences of winds in each of 16 direction sectors (N=North, NNE=North-Northeast, NE=Northeast, etc.) and 6 wind speed classes for the given location and time period. See below more information on this tab:

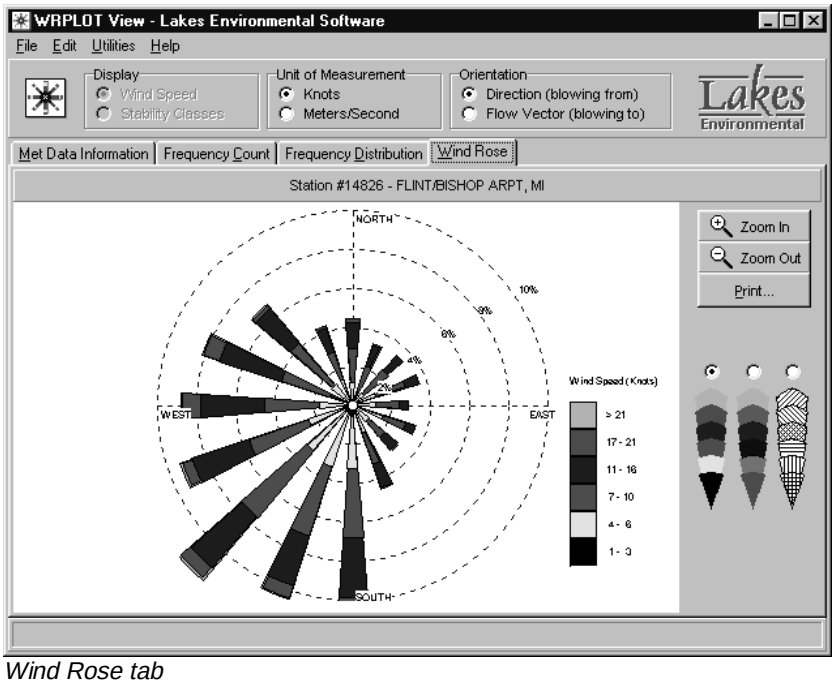
..... Click this button to expand the wind rose plot. Note that you may loose part of the graph.

..... Click this button to have a view looking further away from the center of the wind rose plot.

..... Click this button to display the **Print Preview** dialog box where you can preview and print the wind rose graph.



You have three options for the display of the wind rose graph, two in color and one in hatch.



Wind Rose tab

Print Preview

The Print Preview gives you a good representation of how your wind rose printout will look like. You can display the **Print Preview** dialog box by pressing the **Print** button located on the **Wind Rose** tab.

WRPLOT View prints the wind rose in a template. This template was designed so you can have important information automatically printed along with your plot. The following is the information contained in the template:

- **Title:** this is the title you have specified in the Print Preview dialog box. By default WRPLOT View places the information contained in the Station Name, State, and Station ID fields (Met Data Information tab) in the Title field.

- **Comments:** these are the comments you have typed in the Comments field located in the Print Preview dialog box.

- **Plot Year-Date-Time:** the first line displays the year(s) for the specified met data. The second and third lines display the date and time ranges specified in the Met Data Information tab.

- **Display:** this is the display type specified for the wind rose, which can be wind speed or stability classes.

- **Unit:** this is the unit of measurement selected for the wind speed display (knots or m/s).

- **Orientation:** this is the orientation selected for the wind rose plot.

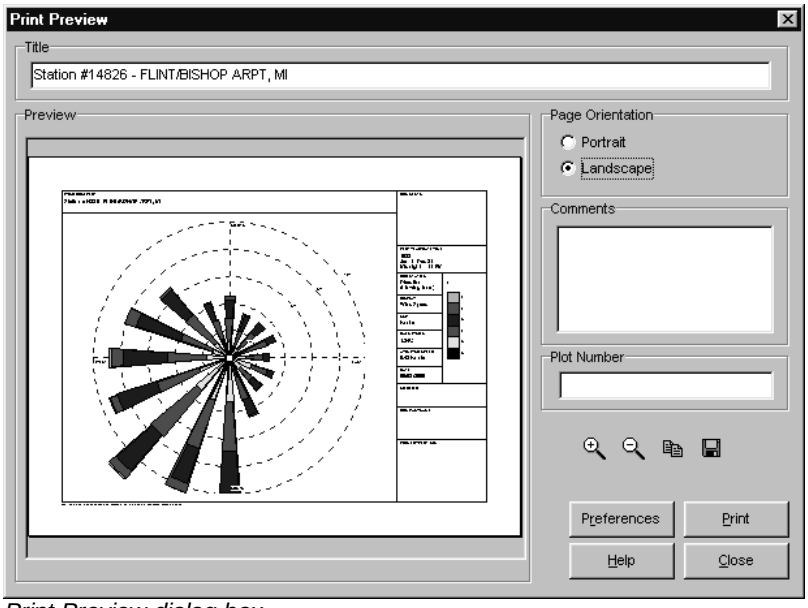
- **Calm Winds:** this field displays the percent frequency of calm winds.

- **Average Wind Speed:** this field displays the average wind speed for the wind rose plot.

- **Date:** this is the date the wind rose is being printed.

- **Modeler:** this is the modeler name you have specified in the Preferences dialog box.

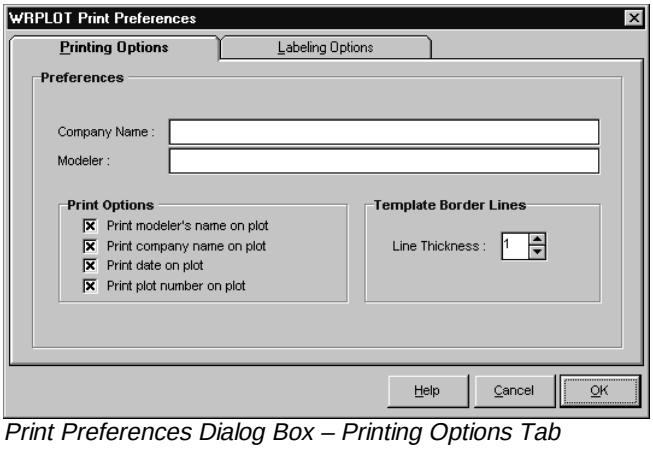
- **Company Name:** this is the company name you have specified in the Preferences dialog box.



Print Preview dialog box

Print Preferences

The **Print Preferences** dialog box affects the print settings for printing a Wind Rose. The **Print Preferences** dialog box can be accessed by clicking the **Preferences** button from the **Print Preview** dialog box. The **Print Preferences** dialog box is mad up of two tabs: The **Printing Options** tab, and the **Labeling Options** tab. The following information is contained in the **Printing Options** tab:

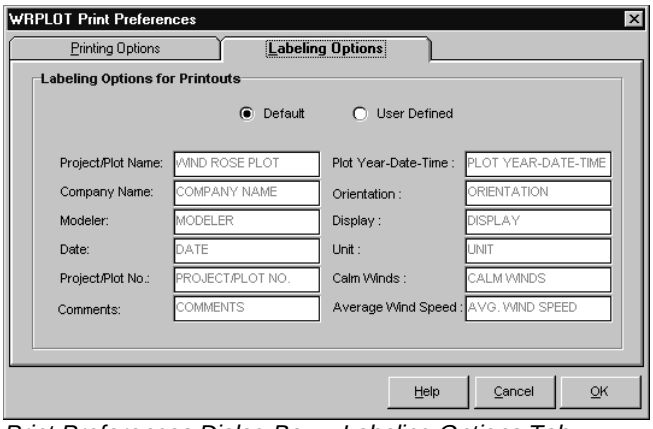


Print Preferences Dialog Box – Printing Options Tab

- **Company Name:** this is your company name that you can specify.
- **Modeler:** this is the modeler's name that you can specify.
- **Template Border Line Thickness:** this controls the thickness of the border lines on a printout of the wind rose.

- **Print Modeler's Name on Plot:** this is a checkbox that determines whether or not the modeler's name will be printed.
- **Print Company Name on Plot:** this is a checkbox that determines whether or not the company's name will be printed.
- **Print Date on Plot:** this is a checkbox that determines whether or not the date will be printed.
- **Print Plot Number on Plot:** this is a checkbox that determines whether or not the plot number will be printed.

The **Labeling Options** tab allows you to switch between using **Default** labels for the data boxes on the printouts or your own **User Defined** labels.



Print Preferences Dialog Box – Labeling Options Tab

CHAPTER 5

Rammet View Utilities

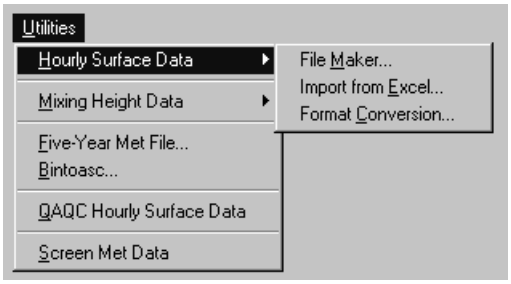
This chapter explains how to use the many utilities that come as a part of Rammet View. To accomplish this we will examine the six main utilities that are a part of Rammet View: the Hourly Surface Data utility, the Mixing Height Data utility, the Five-Year Met File utility, the Bintoasc utility, the QAQC Hourly Surface Data utility, and the Screen Met Data Utility. The contents of these six utilities will be explained in detail in the sections that follow.

Contents

The Hourly Surface Data Utility

Select **Utilities | Hourly Surface Data** from the menu and choose one of the three options:

- File Maker…
- Import From Excel…
- Format Conversion…

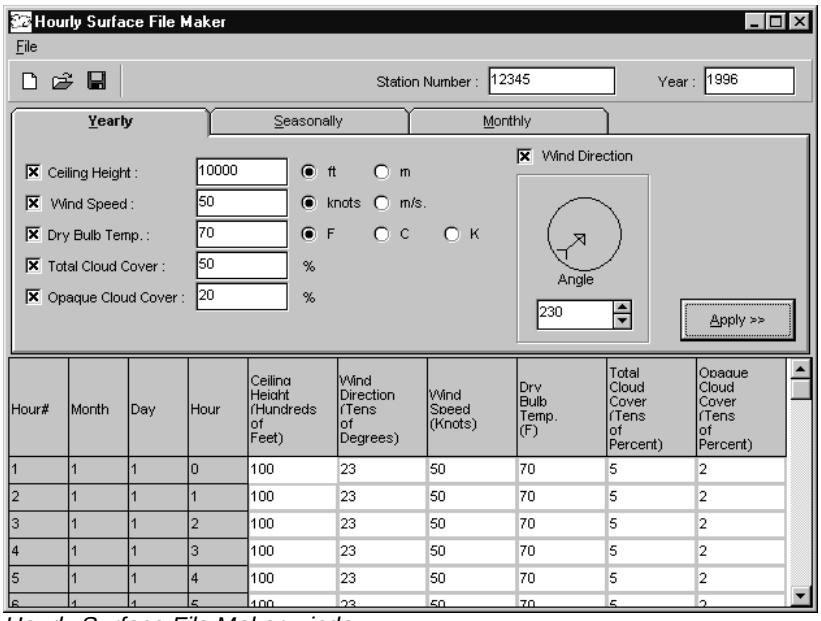


Hourly Surface File Maker

The Hourly Surface File Maker Utility generates hourly surface data files, for **Concentration** and **Dry Deposition** estimates, in the SCRAM format. For **Dry Deposition** estimates, one additional

variable is recommended, station pressure. However, this utility follows the SCRAM format and does not incorporate the station pressure into the hourly surface data file. If station pressure is missing, then PCRAMMET uses a default value of 1000 mb.

The Hourly Surface File Maker does not generate hourly surface data for **Wet Deposition** estimates. **Wet Deposition** estimates require extra variables (precipitation amount and precipitation type).



Hourly Surface File Maker window

For the hourly surface met data, the following parameters must be defined:

- **Station Number:** This is a 5-digit number that identifies the surface observation station for which hourly meteorological data are input.

- **Year:** This is the year for the surface meteorological data.

- **Ceiling Height [ft]:** This is the height, in feet, of the cloud base above local terrain. This value will be converted to hundreds of feet and placed in the table in the ceiling height column.

- **Wind Speed [knots]:** This is the wind speed measured in knots (00 = Calm). This value will be placed in the table as it is.

- **Dry Bulb Temperature [F]:** This is the ambient temperature measured in whole degrees Fahrenheit. Note that the text box field only accepts whole numbers. The dry bulb temperature you specify in this field will be placed in the table without conversions.

- **Total Cloud Cover [%]:** This is the percentage of the amount of cloud cover. This value will be placed in the table in tens of percent, e.g., 0 = clear or less than 10%, 4 = 40-49%, etc. PCRAMMET reads only the Opaque Cloud Cover field and ignores the Total Cloud Cover Field.

- **Opaque Cloud Cover [%]:** This is the percentage of the amount of cloud cover. This value will be placed in the table in tens of percent, e.g., 0 = clear or less than 10%, 4 = 40-49%, etc. PCRAMMET reads only the Opaque Cloud Cover field and ignores the Total Cloud Cover Field.

- **Wind Direction [deg]:** This is the wind direction, in degrees, from which the wind is blowing, e.g. 90 deg = East, 180 deg = South, 270 deg = West, 360 deg = North, 0 deg = Calm. Note that as you type the wind direction on the text box, the arrow moves. The wind direction value will be placed in the table using the following conversion system: 90 deg = 9, 180 deg = 18, 270 deg = 27, 360 deg = 36, 0 deg = 0.

You have three options for preparing the hourly surface met data: yearly, seasonally, and monthly. Each option is contained in a different tab.

1. **Yearly:** If you use this option, then the parameters that you specify for ceiling height, wind speed, dry bulb temperature, total cloud cover, opaque cloud cover, and wind direction, will be used throughout the year.

2. **Seasonally:** If you use this option, then you can specify different parameters for each season. Follow the steps below on how to use the seasonally option:

   Step 1: First select one of the seasons, Winter, Spring, Summer, or Fall.

   Step 2: Specify the values for the following parameters: ceiling height, wind speed, dry bulb temperature, total cloud cover, opaque cloud cover, and wind direction.

   Step 3: Press the **Apply** button. The values for the selected season are placed in the table in the following way: Winter (January to March), Spring (April to June), Summer (July to August), and Fall (September to December).

3. **Monthly:** If you use this option, then you can specify different parameters for each month of the year. Follow the steps below on how to use the monthly option:

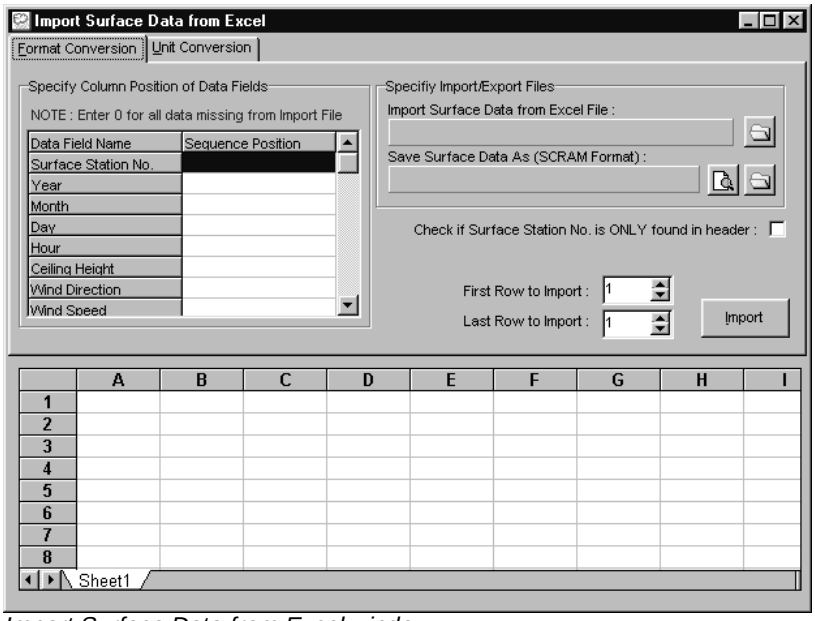
   Step 1: First select one of the months from the Month drop-down list box.

Step 2: Specify the values for the following parameters: ceiling height, wind speed, dry bulb temperature, total cloud cover, opaque cloud cover, and wind direction.

Step 3: Press the **Apply** button. The values for the selected month are placed in the table.

Note 1: When you finish inputting all the data into the table, do not forget to press **File | Save As** from the menu to save the surface data met file you just created. By closing the Hourly Surface File Maker window, all the information you input in this window will be lost.

Import Hourly Surface Data from Excel



Import Surface Data from Excel window

This utility is used to convert hourly surface data that is contained in a Microsoft Excel file to the proper SCRAM file format, which can be used with Rammet View. Also, within this process, you can convert units to the proper SCRAM units if your data are not already formatted in the proper units. The steps involved in doing this are as follows:

1. Click the **File** button next to the **Import Surface Data from Excel File** panel. Select the Excel 4.0 file you wish to import.

2. Click the **File** button next to the **Save Surface Data As (SCRAM Format)** panel. Select the file name you wish to save the newly imported file as.

3. In the spreadsheet area, located on the bottom of the window, you will see a preview of the Excel file you specified.

4. Go to the **Specify Column Position of Data Fields** frame. Then go through your Excel file column by column. Specify on the **Column Position** portion of the table the column number for the appropriate descriptive **Data Field Name** (e.g, Surface Station No., Year, Ceiling Height, etc.)

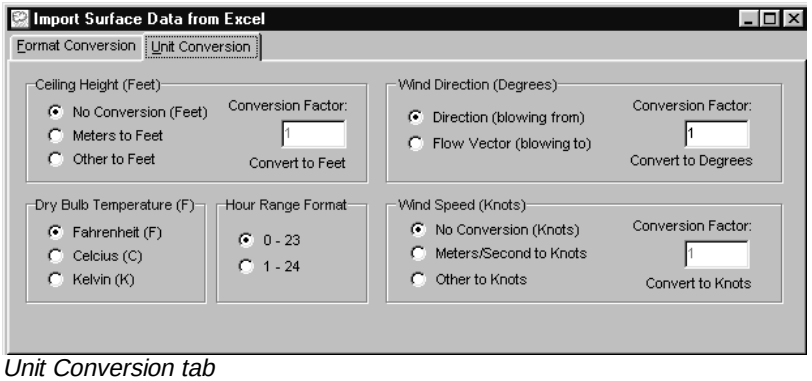
5. Determine the rows where you meteorological data starts and ends. Then place this information under the **First Row to Import** and **Last Row to Import** fields. Use these options to limit the import to only those rows containing actual data.

6. You must determine if the **Surface Station Number** is included on every row of data or if the **Surface Station Number** is only found once in the header area. If it is only in the header, then you must select the **Check If Surface Station No. is Only Found in Header** option.

7. You must also determine if you need to convert your units in your data file. The required units in the SCRAM data file are:

   - **Ceiling Height:** Hundreds of Feet,
   - **Wind Direction:** Tens of Degrees - Flow Vector (blowing to),
   - **Wind Speed:** Knots,
   - **Dry Bulb Temperature:** Fahrenheit,
   - **Hour Range Format:** 0-23,

   If any of your units are not correct, then fill out the proper panel, figuring out the proper conversion factor.

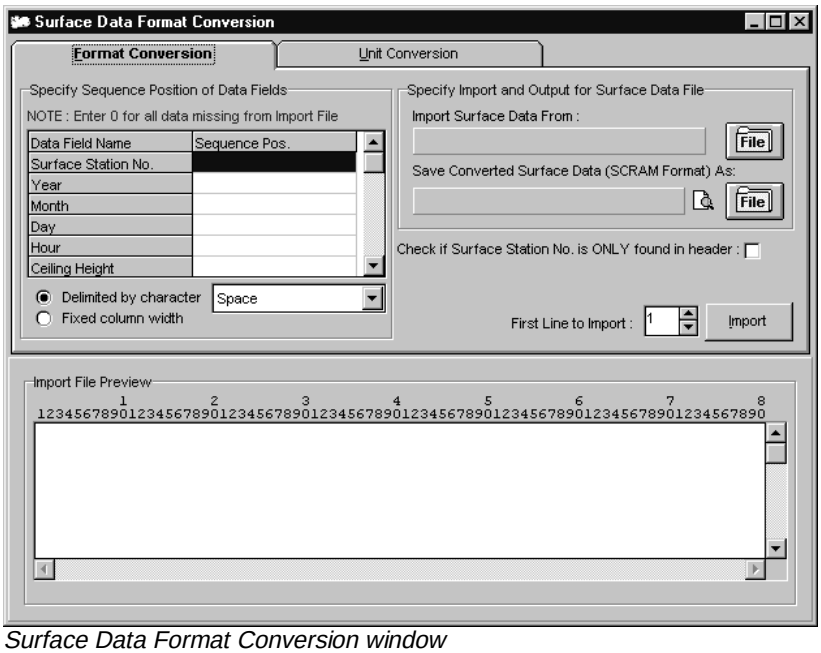


Unit Conversion tab

8. Then go back to the **Format Conversion** tab and click the **Import** button and you are done.

Note 1: It is extremely important that you ensure that the Excel files you are trying to import are Microsoft Excel version 4.0 only. Thus you may have to go back into Excel and save your file as Excel version 4.0 by selecting Save As and then selecting the pull down box of Save As Type and selecting Microsoft Excel 4.0 Worksheet.

Surface Data Format Conversion



Surface Data Format Conversion window

This utility is used to convert hourly surface data that is contained in an unusual file format to the proper SCRAM file format, which can be used with Rammet View. Also, within this process, you can convert units to the proper SCRAM units if your data are not already formatted in the proper units. The steps involved in doing this are as follows:

1. Click the **File** button next to the **Import Surface Data From** panel. Select the file you wish to import.

2. Click the File button next to the **Save Converted Surface Data (SCRAM Format) As** panel. Select the file name you wish to save the newly imported file as.

3. In the bottom of the window you will see a preview of your file.

4. Go to the **Specify Sequence Position of Data Fields** frame. Then go through your data file column by column. For each column, put its beginning character number in the **Sequence Position** portion of the table under the appropriate descriptive **Data Field Name**. You also will have to select either **Delimited By Character** if the end of the data field is marked by a specific character such as a space, or**, Fixed Column Width** and then you will have to specify this columns width.

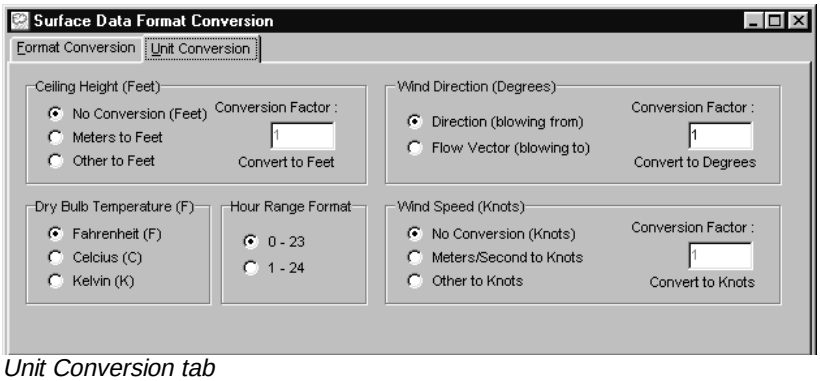
5. You have to specify the line number for the first line of data from your file. Do this under the **First Line to Import** field. Use these options to limit the import to only those rows containing actual data.

6. In your file, you must determine if the surface station number is included on every data line or, if the surface station number is only found once in the header area. If it is only in the header, then you must select the **Check if Surface Station No. is Only Found in Header** option.

7. You must also determine if you need to convert your units in your data file. The required units in the SCRAM data file are:

   - **Ceiling Height:** Hundreds of Feet,
   - **Wind Direction:** Tens of Degrees - Flow Vector (blowing to),
   - **Wind Speed:** Knots,
   - **Dry Bulb Temperature:** Fahrenheit,
   - **Hour Range Format:** 0-23,

   If any of your units are not correct, then fill out the proper panel, figuring out the proper conversion factor.



Unit Conversion tab

8. Then go back to the **Format Conversion** tab and click the **Import** button and you are done.

The Mixing Height Data Utility

Select **Utilities | Mixing Height Data** from the menu and choose one of the two options:

- **File Maker…**
- **Estimate From Surface Data…**

Mixing Height File Maker

The Mixing Height File Maker Utility generates mixing height data files, for Concentration and Deposition estimates, in the SCRAM format. This utility was developed to help users to generate met data when this is not available in a format recognized by Rammet View.

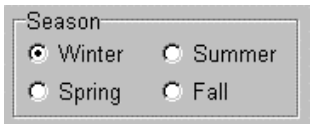
To generate a mixing height data file, the following parameters must be defined:

- **Station Number:** This is a 5-digit number that identifies the station for which mixing height information is being supplied.
- **Year:** This is the year for the mixing height data.
- **AM Mixing Height [m]:** This is the minimum mixing height for a given day calculated from the 1200 GMT upper air sounding on that day, using morning surface temperature augmented by 5º C to account for urban heating.
- **PM Mixing Height [m]:** This is the maximum mixing height for a given day calculated from the afternoon surface temperature and the 1200 GMT upper air sounding for that day.

Mixing Height File Maker window

You have three options for preparing the mixing height data: yearly, seasonally, and monthly. Each option is contained in a different tab.

1. **Yearly:** If you use this option, then the parameters that you specify for AM mixing height and PM mixing height, will be used throughout the year.
2. **Seasonally:** If you use this option, then you can specify different parameters for each season. Follow the steps below on how to use the seasonally option:



Step 1: First select one of the seasons, Winter, Spring, Summer, or Fall.

Step 2: Specify the values for the AM mixing height and PM mixing height.

Step 3: Press the **[Apply]** button. The values for the selected season are placed in the table in the following way: Winter (January to March), Spring (April to June), Summer (July to August), and Fall (September to December).

3. **Monthly:** If you use this option, then you can specify different parameters for each month of the year. Follow the steps below on how to use the monthly option:

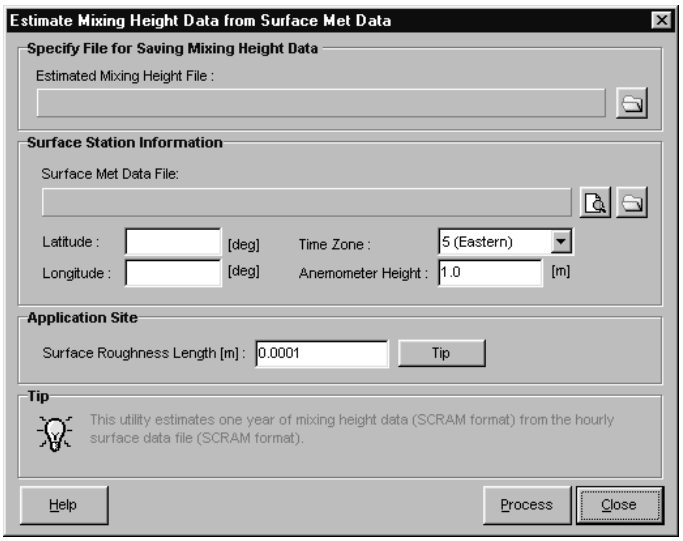
Step 1: First select one of the months from the Month drop-down list box.

Step 2: Specify the values for the AM mixing height and PM mixing height.

Step 3: Press the **Apply** button. The values for the selected month are placed in the table.

Note 2: When you finish inputting all the data into the table, do not forget to press **File | Save As** from the menu to save the mixing height data file you just created. By closing the Mixing Height File Maker window, all the information you input in this window will be lost.

Estimate Mixing Height Data From Surface Met Data



Estimate Mixing Height Data from Surface Data window

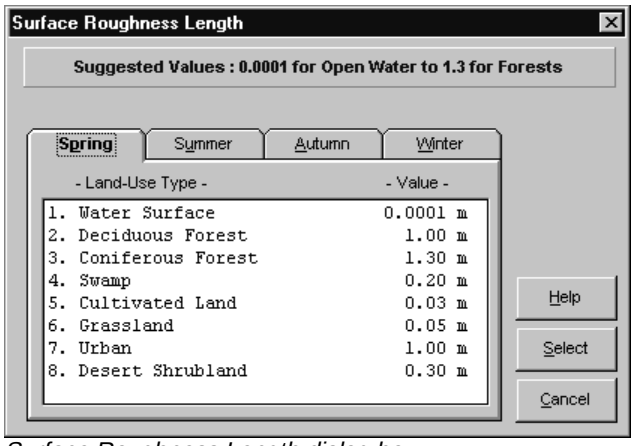
The Estimate Mixing Height Data from Surface Met Data Utility generates mixing height data files, for **Concentration** and **Deposition** estimates, in the SCRAM format. It does this through estimating one year of mixing height data (SCRAM format) from the hourly surface data file (SCRAM format). This utility was developed to help users to generate met data when this is not available in a format recognized by Rammet View. The steps involved in estimating this way are as follows:

1. Click the **File** button located inside the **Specify File For Saving Mixing Height Data** frame. Then specify the name and location of the file where you wish to save the output estimated mixing height file.

2. Click the **File** button located inside the **Surface Station Information** frame. Then specify the name and location of the file that contains the surface met data that you will be using to estimate. You must also accurately fill in the following information for the surface station: **Latitude**, **Longitude**, **Time Zone**, and **Anemometer Height**.

3. You must enter a **Surface Roughness Length Factor**. The surface roughness length is a measure of the height of obstacles to the wind flow. It is not equal to the physical dimensions of the obstacles, but is generally proportional to them. Click **Tip** button to see a list of possible values arranged by season. Choose the season tab and then click the value you think is most representative of the site and click the **Select** button.

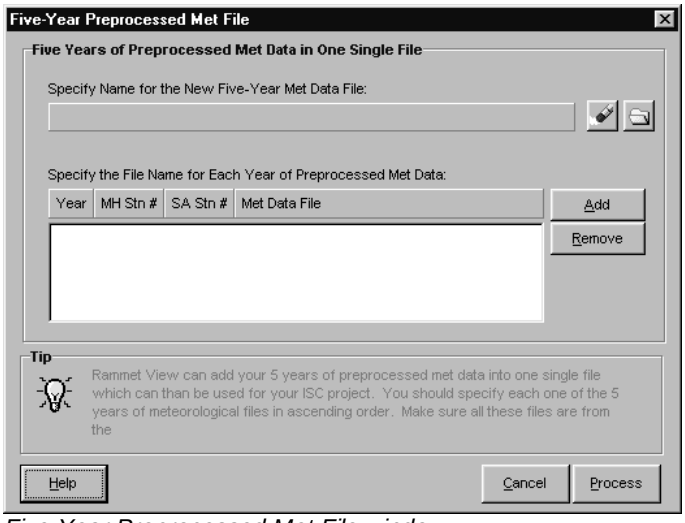
4. Finally, click the **Process** button and you are done.



Surface Roughness Length dialog box

The Five-Year Preprocessed Met File Utility

Select **Utilities | Five-Year Met File** from the menu to display the **Five Year Preprocessed Met File** dialog box.



Five-Year Preprocessed Met File window

The Five-Year Preprocessed Met File Utility preprocesses five years of meteorological data and adds them all together into one large data file, which can then be used for your ISC View project. You should specify each one of the five years of meteorological files in ascending order. Make sure all these files are from the same Mixing Height (MH) and Surface Air (SA) stations. The steps involved in this process are as follows:

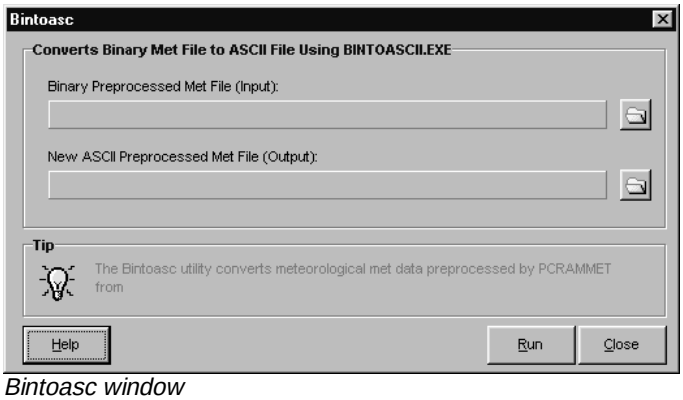
1. To specify the name for the new five-year met data file, click the **File** button. Then specify the name and location of the file where you wish to save this output file.

2. Next, specify the file names for each of the five years of preprocessed met data. Specify the files in ascending order starting with the beginning of the year. To do this, click the **Add** button and then specify the files.

3. Finally, click the **Process** button and you are done.

The Bintoasc Utility

Select **Utilities | Bintoasc** from the menu to display the **Bintoasc** dialog box.



Bintoasc window

The Bintoasc Utility converts meteorological data preprocessed by PCRAMMET from binary (unformatted) file format to ASCII file format. The full year of met data will be converted. The steps involved in this process are as follows:

1. Click the **File** button located beside the **Binary Preprocessed Met File** panel to specify the name for the binary input file.

2. Click the **File** button located beside the **New ASCII Preprocessed Met File (Output)** panel to specify the name for the output ASCII file.

3. Finally, click the **Run** button and you are done.

The QAQC Hourly Surface Data Utility

Select **Utilities | QAQC Hourly Surface Data** from the menu. The QAQC Hourly Surface Data Utility is a Quality Assurance/Quality Control (QAQC) utility that will examine your hourly surface data file to ensure that the hours, days, months, years are all in the correct order and then it will report the results of this check back to you. It will run this check on the currently open hourly surface data file.

The Screen Met Data Utility

Select **Utilities | Screen Met Data** from the menu to display the METISC DOS window. The Screen Met Data Utility generates ISC preprocessed met data for screening purposes. The program is called METISC and was developed by Pat Hanrahan at the Oregon Department of Environmental Quality.

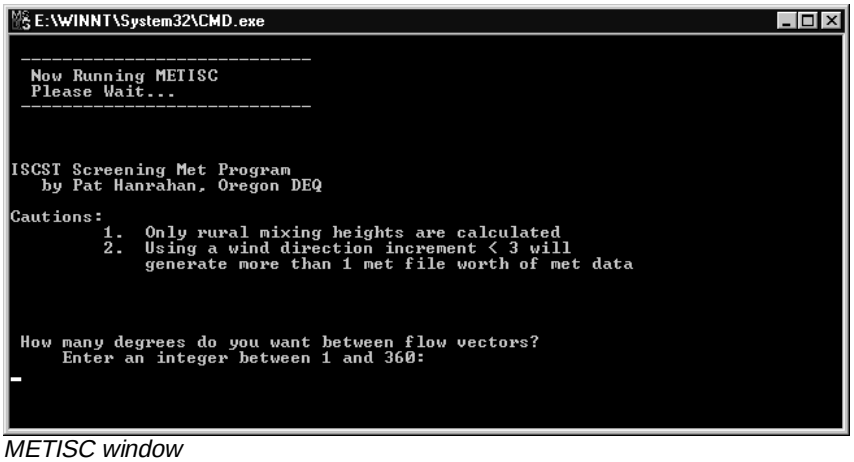
METISC generates the worst case possible for contaminant release as a meteorological data file for use in the modeling process. Since you only need the worst case meteorological conditions for air dispersion modeling, the met file generated by METISC will not be a full year of met data.

See below the steps to follow to create a meteorological file using METISC:

1. As the METISC DOS window is displayed, the following message appears on your screen:

   Cautions:
   1. *Only rural mixing heights are calculated*
   2. *Using a wind direction increment < 3 will generate more than 1 met file worth of met data*

   METISC will only generate rural mixing heights. On the generated preprocessed met file the urban mixing heights will be the same as the rural mixing heights.



METISC window

2. The first input requested from you is the following:

How many degrees do you want between flow vectors? Enter an integer between 1 and 360.

Note that if you choose 1, 2, or 3 degrees between flow vectors, than more than 1 file worth of met data will be generated.

3. After you have entered the degrees between flow vectors, the following message appears on your screen:

   Very buoyant plumes can necessitate using higher mixing heights

   ENTER DATA FOR YOUR MOST BOUYANT PLUME

   Current input for estimating plume rise is as follows:

   (1) Ambient Temperature = 293.0 deg Kelvin
   (2) Stack Height = 10.0 meters
   (3) Stack Diameter = 1.000 meters
   (4) Exit Velocity = 2.00 m/sec
   (5) Exit Temperature = 300.0 deg Kelvin

   Enter number of item to change (1-5) or
   Enter 7 if above choices are good

   To have a better approximation for the mixing heights you should specify the data for your most buoyant plume. If you want to use the default values provided by ISCMET than you should enter the number 7 and press the Enter key.

4. METISC then processes your met data and will give you the following message:

   Met data has been written to SCREEN.met
   For desired Flow Vectors from 0. to 360. degrees
   Press any key to continue . . .

   The met data file will always be written to SCREEN.MET and will be placed on the same directory you installed Rammet View. If you are going to create different met data files using METISC, you should remember to rename SCREEN.MET before you create a new met data.

References

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Iqbal, M., 1983. An Introduction To Solar Radiation. Academic Press, New York, NY.

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Paine, R.J., 1987. User's Guide to the CTDM Meteorological Preprocessor (METPRO) Program. U. S. Environmental Protection Agency, Research Triangle Park, NC.

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