



**PRACTICAL  
RUNWAY ICE and SNOW  
MANAGEMENT (PRISM)  
Computer Program**

(version 1.00)

Program Manual

November 1998

Prepared for:

Transportation Development Centre  
Transport Canada

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Transport Canada Aviation

Prepared by:



Fleet Technology Limited  
311 Legget Drive  
Kanata, ON  
K2K 1Z8

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Mr. J.-L. René	Transportation Development Centre (Transport Canada)
Mr. D. Morra	Aerodrome Safety Branch (Transport Canada)

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Mirabel Airport	Mr. P. Glenfield
	Mr. R. Lussier

North Bay Airport	Mr. G. Rigby
	Mr. H. Gauthier
	Mr. D. Williamson

## **FLEET TECHNOLOGY LIMITED PROJECT TEAM**

George Comfort	Project Manager
Mike Steele	System Developer
Terry Brown	Programmer
Andrew MacDonald	Programmer
J.P. Town	Programmer

## **DISCLAIMER**

The contents of this manual and the processes and data that are embedded in the program reflect the views of Fleet Technology Limited and do not necessarily reflect the official views or opinions of the Transportation Development Centre or the Aerodrome Safety Branch of Transport Canada.



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# CONTENTS

1.	INTRODUCTION .....	1
1.1	PRISM Software Background and Objectives.....	1
1.2	Software Development Status.....	2
1.2.1	Development Process and Stage of Development .....	2
1.2.2	Mirabel-Specific Features.....	2
1.2.3	Table Content.....	2
1.3	Software Installation .....	3
1.4	Hardware and Software Requirements .....	4
1.5	PRISM Program Overview .....	4
1.5.1	Application Used .....	4
1.5.2	Overview of Program Structure and Capabilities .....	4
1.6	Main User Interface .....	6
1.6.1	Title Page .....	6
1.6.2	Switchboard .....	6
1.6.3	Online Help.....	8
1.6.4	Language.....	8
1.7	Options.....	8
1.7.1	Consumable Options.....	8
1.7.2	Password Protection and Controls .....	8
1.7.3	Runway Surface Condition Remarks.....	9
1.7.4	Fax Setup .....	10
1.7.5	Importing Weather Data .....	10
1.7.6	Importing an External RSC File .....	10
2.	INPUTS.....	12
2.1	Overview.....	12
2.2	Chart Format RSCs.....	12
2.2.1	Overview.....	12
2.2.2	Preparing RSCs: Screen Layout.....	13
2.2.3	Preparing RSCs: Runway Remarks .....	13
2.2.4	Preparing RSCs: Copying RSCs to Many Taxiways.....	15
2.2.5	Preparing RSCs: Check Made during Data Entry.....	16
2.2.6	Preparing RSCs: Checking the Data in the RSC Form.....	16
2.2.7	Preparing RSCs: Saving RSCs and Password Protection.....	16
2.2.8	Preparing RSCs: Printing and Faxing RSC Reports.....	17
2.3	Map Format RSCs.....	17
2.4	Operations Log.....	19
2.5	Winter Maintenance Operational Scenarios at Mirabel Airport.....	20

CONTENTS (continued)

3.	RESOURCES .....	21
3.1	Overview.....	21
3.2	Consumables.....	22
3.2.1	Receiving Consumables.....	23
3.2.2	Consumables Status Report .....	24
3.3	Equipment.....	25
3.3.1	Equipment Log Summary.....	25
3.3.2	Equipment Status .....	26
3.4	Labour.....	28
3.5	Printing Reports .....	29
3.5.1	Printing a Consumables or Equipment Log Summary Report.....	29
3.5.2	Printing a Status Report for the Consumables or Equipment .....	29
3.5.3	Printing a Labour Status Report.....	31
4.	ACTION ADVISORY.....	32
4.1	Overview.....	32
4.2	Action Advisories for the Cases included in the PRISM Program.....	34
4.2.1	Case 1: No Precipitation on a Bare and Dry Surface.....	34
4.2.2	Case 2: Rain or No Precipitation on Various Surface Conditions.....	34
4.2.3	Case 3: Freezing Rain on a Bare and Dry Surface or on a Bare and Wet Surface ..	35
4.2.4	Case 4: Snow or No Precipitation on Various Surface Conditions .....	35
4.2.5	Case 5: Frost Forming on a Bare and Dry Surface or on a Bare and Wet Surface..	35
4.2.6	Case 6: Rain Falling on a Loose Snow or Packed Snow Surface.....	36
4.2.7	Case 7: Freezing Rain on Loose Snow or on Packed Snow .....	36
4.2.8	Case 8: Frost Forming on Various Surface Conditions .....	37
4.2.9	Case 9: Rain Falling on a Snowdrifted, Slush or Wet Snow Surface.....	37
4.2.10	Case 10: Freezing Rain on a Snowdrifted Surface .....	38
4.2.11	Case 11: No Precipitation on a Slush or Wet Snow Surface .....	38
4.2.12	Case 12: Freezing Rain on a Slush or Wet Snow Surface .....	38
4.2.13	Case 13: No Precipitation or Snow Falling on Various Surface Condtions .....	38
4.2.14	Case 14: Rain Falling on a Frost Surface or on Ice Patches .....	39
4.2.15	Case 15: Freezing Rain on a Frost Surface or on Ice Patches .....	40
5.	ANALYSIS.....	41
5.1	Overview.....	41
5.2	Consumables Analysis.....	42
5.3	Snow and Ice Control Effectiveness.....	43
5.4	Weather Analysis.....	45
5.5	Review RSCs .....	45
5.6	Export to Excel .....	47

APPENDIX WEATHER DATA INPUT FILE FORMAT

## LIST OF FIGURES

Figure 1.1: PRISM Program Overview .....	5
Figure 1.2: PRISM Title Screen.....	6
Figure 1.3: Main Switchboard of the PRISM Program .....	7
Figure 2.1: Runway Surface Condition (RSC) Screen: Left-Hand Side of RSC Form.....	13
Figure 2.2: Right-Hand Side of RSC Form .....	15
Figure 2.3: Preparing and Entering RSC Information in Map Format .....	18
Figure 2.4: Operations Log Screen .....	20
Figure 3.1: Resources Screen that is Accessed from the Main Switchboard.....	21
Figure 3.2: Consumables Log Summary Screen.....	23
Figure 3.3: Consumables Status Report.....	24
Figure 3.4: Equipment Status Summary .....	27
Figure 3.5: Staff Data Summary .....	28
Figure 4.1: Sample Action Advisory Screen .....	32
Figure 5.1: Analysis Switchboard.....	41
Figure 5.2: Consumables/Cost Analysis Screen .....	42
Figure 5.3: SNIC Effectiveness Analysis Screen .....	44
Figure 5.4: Weather Analysis Screen.....	46

## LIST OF TABLES

Table 1.1: PRISM Software Installation Files Placed in the Windows Directories .....	4
Table 1.2: Title Page Functions and Buttons .....	7
Table 1.3: Password Protection and Controls .....	9
Table 1.4: Required Format for External RSC Files.....	11
Table 2.1(a): Sample Runway Surface Condition Report: Left-Hand Side of Screen .....	14
Table 2.1(b): Sample Runway Surface Condition Report: Right-Hand Side of Screen.....	14
Table 2.2: Sample Operations Log Report .....	19
Table 3.1: Sample Consumables Log Summary Hard Copy Report .....	30
Table 3.2: Sample Equipment Log Summary Hard Copy Report .....	30
Table 3.3: Sample Consumables Status Hard Copy Report .....	31
Table 3.4: Sample Equipment Status Hard Copy Report .....	31
Table 3.5: Sample Staff Report.....	31
Table 4.1: Overview: Framework of Cases .....	33
Table 4.2: Sample Action Advisory Hard Copy Report.....	34



## GLOSSARY

### ACRONYMS

JBI	James Brake Index
PRISM	Practical Runway Ice and Snow Management
RSC	Runway Surface Condition
SNIC	Snow and Ice Control



# 1. INTRODUCTION

This document is the Program Manual for the Practical Runway Snow and Ice Management (PRISM) software. The PRISM program was developed for the Transportation Development Centre and the Aerodrome Safety Branch of Transport Canada by Fleet Technology Limited. The manual provides the user with information concerning the installation, capabilities and operation of the PRISM software.

The manual is divided into the following five sections:

- Introduction
- Inputs
- Resources
- Action Advisory
- Analysis

Most of the information contained in this manual is available to the user in the PRISM Online Help system.

## 1.1 PRISM Software Background and Objectives

Airport traffic volumes are increasing at rates of about 3% and 6% per year for passengers and cargo, respectively. At the same time, Transport Canada is in the process of privatizing or devolving Canadian airports to local airport authorities.

As a result, airports will become increasingly profit-oriented, and an increased need for management information systems is expected. The PRISM software was developed to address winter maintenance operations, an important concern for Canadian airports.

The objectives of the PRISM software are:

- (a) To provide a system that integrates key information related to winter maintenance operations. This information includes: Runway Surface Condition (RSC) data; weather records; equipment usage and status; winter maintenance materials used and available; and, labour resources used.

This management information databank is considered valuable for many purposes, including: cost control and budgeting; evaluating the effectiveness of winter maintenance operations; and, reference.

- (b) To provide a framework for developing a matrix of Action Advisories to advise operators regarding the most appropriate winter maintenance operations for given RSC and weather conditions.

This is considered valuable for a number of reasons. Currently, winter maintenance operations are selected based on the experience of the field personnel, given the prevailing runway surface conditions, the weather conditions and a number of other factors. This is a highly intuitive and empirical process. Staff reductions have occurred at many airports and there is concern that some expertise may have been lost. The Action Advisories eventually developed in the PRISM program may help to retain this knowledge and to provide training for new field personnel.

## 1.2 Software Development Status

### 1.2.1 Development Process and Stage of Development

The PRISM software was developed over a period of two years. Numerous meetings were held during this time with the Project Steering Committee and with airport representatives. The development process was iterative as software was developed, presented, commented on and then modified.

However, it should be recognized that the current software is a prototype, and that it has not yet been verified with field use at an airport.

### 1.2.2 Mirabel-Specific Features

It was recognized throughout the development process that the program would need to be site-specific. At the same time, efforts were made to make the program as general as possible. Mirabel Airport was used as a model for the PRISM program during its development. For this reason, the prototype program includes the following Mirabel-specific features:

- a map of Mirabel airport is shown and is used as the basis for one of the methods by which Runway Surface Condition (RSC) information may be entered;
- the snow-clearing and winter maintenance operational scenarios employed by Mirabel airport can be viewed on the screen in the Inputs section.

The program was also developed to include the capability to import the labour file that is regularly prepared and used by Mirabel airport staff to track contract labour used during winter maintenance operations. Because this file is specific to Mirabel, this feature was de-activated in the prototype program delivered to Transport Canada.

### 1.2.3 Table Content

The individual input tables (e.g., Consumables Log, Equipment Log, Operations Log, etc.) in the prototype PRISM program contain some values that were used in program development and testing. The user should be aware that **the content of all such input tables is for illustration purposes only.**

### 1.3 Software Installation

The PRISM software is provided in six (6) 3.5” diskettes, individually numbered from 1 to 6. The PRISM software is installed as follows:

- For the Windows 3.1 Operating System:
  - (a) Place PRISM disk 1 into disk drive (a:);
  - (b) Go to the Program Manager in Windows;
  - (c) Select the “File” menu item;
  - (d) Select the “Run” menu item;
  - (e) Type “a:\setup” in the Command line box and press Enter.
  
- For the Windows 95 Operating System
  - (a) Place PRISM Disk 1 into disk drive (a:);
  - (b) Select “Start” on the screen;
  - (c) Select the “Run” menu item;
  - (d) Type “a:\setup” in the Command line box and press Enter.

For each of the above operating systems, the software installation process is continued as follows:

- (a) A message box will appear welcoming the user to the PRISM Guide Installation routine. The user should select “OK”.
- (b) A message box will appear asking the user to specify the directory into which the PRISM program will be placed. The default directory is C:\PRISM and this is accepted by the user by selecting “OK”.
- (c) A message box will appear from which the user can begin installation. Installation is begun by clicking on the computer screen icon in the message box.
- (d) A message box will appear asking the user to choose the Program Group. The default Program Group is PRISM Guide, and this is accepted by the user by selecting “Continue”.
- (e) Disk 1 will be installed. The user is then prompted to install the remaining disks. This continues until all six disks have been installed.
- (f) A Windows box will appear which shows the Shortcut icons that have been created. The user should CLOSE this box.
- (g) A message box will appear stating that the PRISM Guide Setup was completed successfully. The user should choose “OK”. This transfers the user back to Windows.

Table 1.1 lists the files installed by the PRISM installation software and their respective locations.

Table 1.1: PRISM Software Installation Files Placed in the Windows Directories

\windows\system\	\windows\
masbc200.dll	reg.dat [updated]
dao2016.dll	prism.grp
msaexp20.dll	snic.ini
msaje200.dll	prismfax.ini
msjeterr.dll	
msjetint.dll	

## 1.4 Hardware and Software Requirements

The PRISM software was written for use in a Windows 3.1x operating environment on an IBM PC compatible computer. The software was tested in a Windows 95 operating environment and no significant problems were identified.

The computer on which the software is to be run should be a 486 with a minimum of 16 megabytes of RAM and 15 megabytes of free hard disk space.

## 1.5 PRISM Program Overview

### 1.5.1 Application Used

The PRISM program is written in MS Access, Version 2.0.

### 1.5.2 Overview of Program Structure and Capabilities

The general capabilities, structure, and input/output capabilities of the PRISM program are illustrated in Figure 1.1. The program has four main sections as follows:

Inputs – the inputs that can be entered are: Runway Surface Condition (RSC) data; and a log of the Operations undertaken.

Resources – this section allows the user to log and review: the winter maintenance materials (e.g., urea, sand) used and remaining on hand; the status of the available equipment; and the labour resources used.

Action Advisory – this section provides general recommendations regarding the most appropriate winter maintenance operation to be undertaken for the prevailing weather event and the pavement temperature.

Analysis – this section allows the user: to undertake basic analyses and plotting within the PRISM program; and, to prepare a file for export to Excel containing the relevant information required for more detailed analyses.

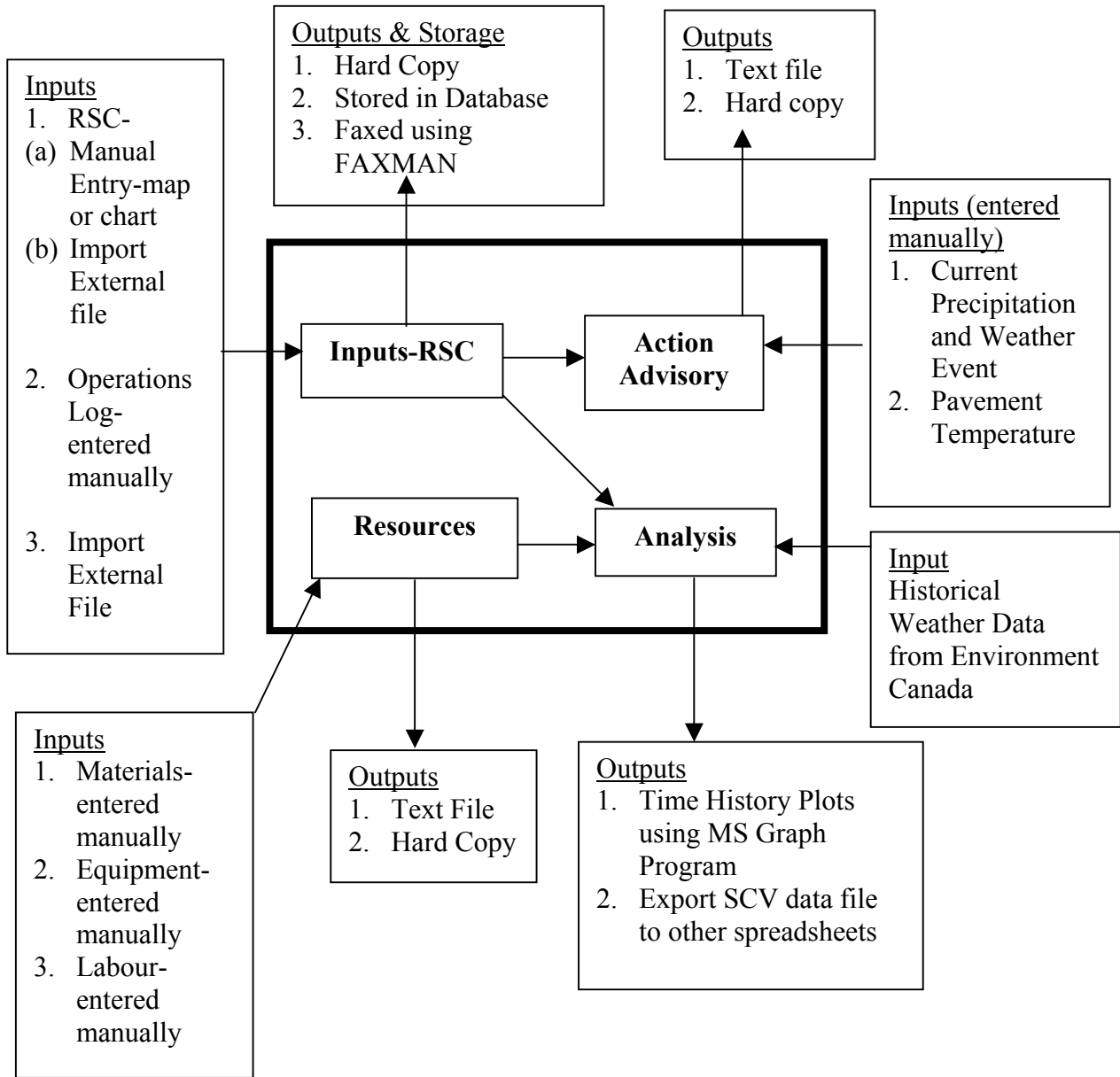


Figure 1.1: PRISM Program Overview

## 1.6 Main User Interface

### 1.6.1 Title Page

The title page (shown in Figure 1.2) is presented to the user after the program icon has been selected in the Windows Program Manager. The title page has five active buttons as summarized in Table 1.2.

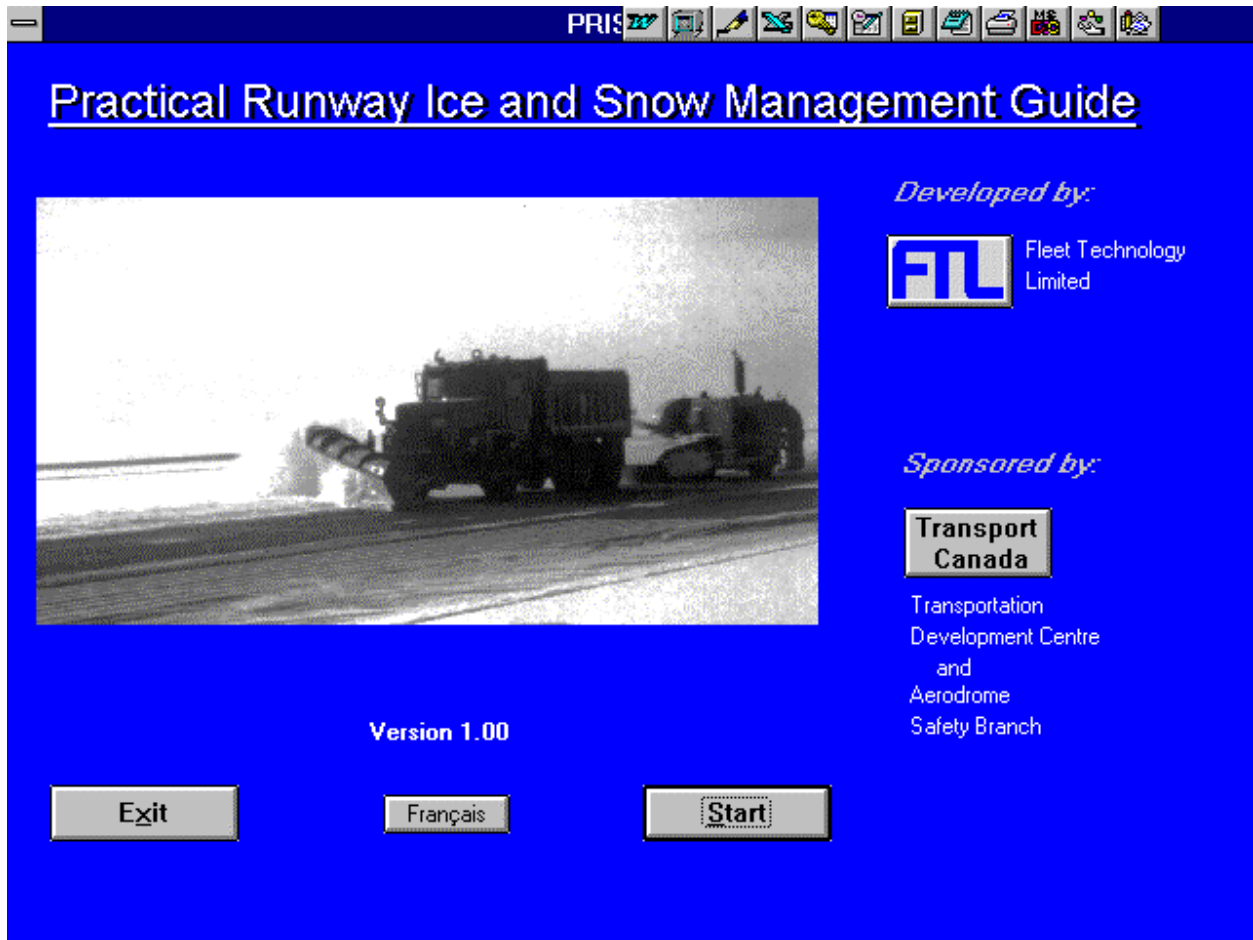


Figure 1.2: PRISM Title Screen

### 1.6.2 Switchboard

The main switchboard, shown in Figure 1.3, is accessed by clicking the START button on the title page. It provides access to the five primary interfaces. For the user's convenience, it is also equipped with an exit button which allows the user to exit the software and return to the Windows Program Manager.



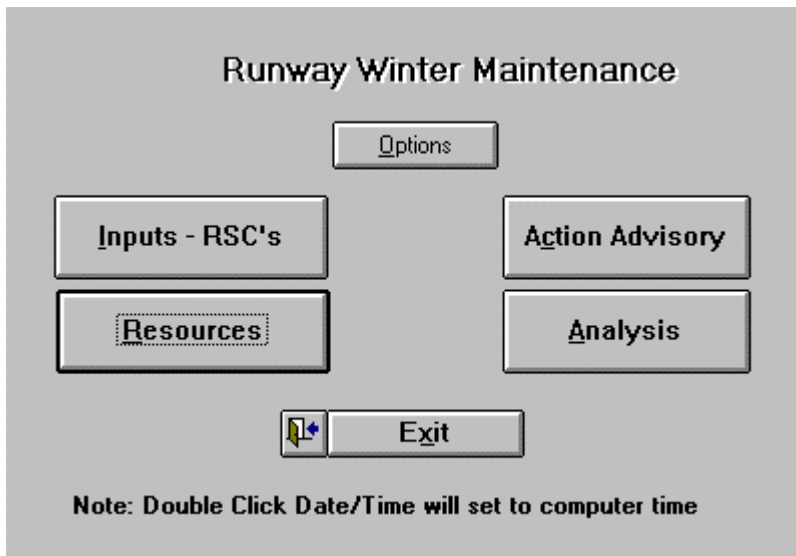


Figure 1.3: Main Switchboard of the PRISM Program

Table 1.2: Title Page Functions and Buttons

1. Translation-[English/français]	This button will allow the user to run the program in either English or French. However, this section of the PRISM program is not complete. The PRISM program is currently available in <b>ENGLISH</b> only.
2. Exit	This button allows the user to exit the software and return to the Windows Program Manager.
3. Start	Selecting this button will allow the <i>Practical Runway Ice and Snow Management (PRISM) Guide</i> software to proceed to the main switchboard screen where the user is able to enter the various parts of the program.
4. Transport Canada (Project Sponsor)	This button provides the user with points of contact at the Transportation Development Centre (TDC) and the Aerodrome Safety Branch of Transport Canada, both sponsors of the <i>Practical Runway Ice and Snow Management (PRISM) Guide</i> . The project scientific authorities were J-L. René of TDC and D. Morra of Aerodrome Safety (tel: 613-990-1376; fax: 613-990-0508). Because J.-L. René is no longer with TDC, the user is referred to Howard Posluns (tel: 514-283-0034, fax: 514-283-7158) for a point of contact at the TDC. Technical direction was also provided by representatives of Mirabel Airport (P. Glenfield and R. Lussier) and North Bay Airport (G. Rigby).
5. Fleet Technology Limited (Software Developer)	This button provides the user with a point of contact at Fleet Technology Limited, the consulting firm responsible for the development of the <i>Practical Runway Ice and Snow Management (PRISM) Guide</i> software. Questions or comments concerning the software can be directed to the address, phone or facsimile number provided.

### 1.6.3 Online Help

The PRISM program has an online Help menu that provides information concerning program navigation and operation, data fields and interpretation of results.

The help menu operates in the same manner as other Windows applications. Any text displayed in green is “hyper-text”. When this is selected (by clicking with the mouse), it will provide the user with further information concerning the selected item.

### 1.6.4 Language

The current PRISM software is available in English only, because it is a prototype.

## 1.7 Options

This screen is divided into the main sections listed below. They allow the user to specify various options related to:

- (a) Consumable Options;
- (b) Program Administration (e.g., Passwords and Control);
- (c) Runway Surface Condition Remarks;
- (d) Fax Setup;
- (e) Importing an External RSC File;
- (f) Importing Weather Data.

### 1.7.1 Consumable Options

The CONSUMABLE OPTIONS part of the screen allows the user to specify:

- (a) the consumables that are to be tracked;
- (b) whether the consumables section of the Resources part of the program is to display information for only the currently tracked consumables (selected in item (a) above) or for all previously tracked consumable items.

### 1.7.2 Password Protection and Controls

RSC data input to the program in the Input-RSCs section of the program is controlled using passwords. No other part of the program is password-protected.

The PASSWORD OPTIONS part of the screen contains buttons that provide the functions listed in Table 1.3.

Table 1.3: Password Protection and Controls

Available to:	Function by BUTTON Name			
	ADMIN	ADD	REMOVE	CHANGE
Program Administrator	<ul style="list-style-type: none"> <li>Specify the Program Administrator and his or her password</li> <li>Change the Program Administrator and his or her password</li> </ul>	Allows Program Users to be Added and Registered	Allows Program Users to be de-registered	Allows a user to change his or her password
Program User	Not Available to Program Users	Not Available to Program Users	Not Available to Program Users	Allows a user to change his or her password

Application Notes:

- (a) The program allows only ONE Program Administrator. The as-delivered PRISM program is set up for an administrator name of JLR, and an administrator password of TDC.
- (b) There is no limit to the number of program users that can be registered at any one time.
- (c) The ADMIN, ADD, and CHANGE functions require that any passwords entered be confirmed (in the space provided) before they will be accepted by the program.

1.7.3 Runway Surface Condition Remarks

The RUNWAY REMARK OPTION allows the user to specify the list of remarks that are available as pre-specified inputs for the Input-RSC part of the program. Remarks can be added, or edited in either FRENCH or ENGLISH. It should be noted that the user can make remarks other than those in this list on the Runway Surface Condition (RSC) Form. However, these other remarks must be entered manually by the user on the RSC Form.

The following functions can be performed on the list of RUNWAY REMARKS:

- (a) ADD – This button allows the user to add a remark to the list. The added remark must be saved (using the SAVE button that appears) before it is permanently added to the list.
- (b) EDIT – This button allows the user to edit a remark in the list. The edited remark must be saved (using the SAVE button that appears) before it is permanently added to the list.
- (c) REMOVE – This button allows the user to DELETE a remark from the list using the DELETE button that appears.

#### 1.7.4 Fax Setup

The FAX SETUP OPTION allows the user to specify the following fax parameters:

- (a) DIALING PREFIX – This is the code required to obtain access to the desired fax line. The required input depends on whether the call is an overseas or domestic one, and whether or not the call originates from a location with direct access to an outside line.
- (b) FAX NO. – The destination fax number is entered here. The PRISM program only allows a fax to be sent to one fax number at one time.
- (c) NO. of RETRIES – This is the number of times that the program will retry sending the fax, in the event that it does not connect with the destination fax, before terminating.
- (d) RETRY INTERVAL – This is the time interval between retries.
- (e) RESOLUTION – This allows the user to specify the resolution of the transmitted fax.
- (f) USER INFO – This allows the user to specify the header information that will appear on the transmitted fax. The user's name, company, phone number and fax number can be specified.

#### 1.7.5 Importing Weather Data

The WEATHER DATA OPTION allows the user to import a weather data file from Environment Canada. Appendix A describes the format of the Environment Canada weather data file that the PRISM program is set up to accept.

The user is transferred into Windows when this button is pushed, and the appropriate file is selected from the Windows Menu screen that appears.

#### 1.7.6 Importing an External RSC File

The IMPORT RSC OPTION allows the user to import a data file containing RSC information. The user is transferred into Windows when this button is pushed, and the appropriate file is selected from the Windows Menu screen that appears.

The RSC file must be in ASCII format, and made up of several rows with each row corresponding to a unique runway, taxiway or apron. Each row must contain the information specified in Table 1.4. Where the same information applies to more than one runway, taxiway or apron, the segment designators can be combined as in note 2 for Table 1.4.

Table 1.4: Required Format for External RSC Files

Item	Type	Range	Units
Report No.	Integer	1 to 2147483647	Not applicable
Segment	Text	50 char maximum	Runway or Taxiway designations
Cleared or Remaining?	Integer	0 to 1	0 = cleared; 1 = remaining
Cleared Width	Integer	1 to runway max.	Feet
Bare & Dry Percentage	Integer	0 to 100	%
Bare & Wet Percentage	Integer	0 to 100	%
Loose Snow Percentage	Integer	0 to 100	%
Loose Snow Depth	Floating Pt	0 to 10	Inches
Compacted Snow Percentage	Integer	0 to 100	%
Snow Drift Percentage	Integer	0 to 100	%
Snow Drift Depth	Floating Pt	0 to 10	Inches
Slush Percentage	Integer	0 to 100	%
Slush Depth	Floating Pt	0 to 10	Inches
Frost Percentage	Integer	0 to 100	%
Ice Patches Percentage	Integer	0 to 100	%
Sand Applied?	Integer	0 to 1	0 = no; 1 = yes
De-Icing Chemical Applied?	Integer	0 to 1	0 = no; 1 = yes
Remarks	Text	50 char maximum	Not applicable
Ambient Temp for JBI	Floating Pt	-50 to 50	°C
Average JBI	Floating Pt	0 to 1	Not Applicable
Zulu Time of JBI Report	Date	hh:mm	Not Applicable
Voice Report to	Text	50 char maximum	Not Applicable
Local Time of RSC Report	Date	hh:mm	Not Applicable
Day of RSC Report	Integer	1 to 31	Not Applicable
Month of RSC Report	Integer	1 to 12	Not Applicable
Year of RSC Report	Integer	0 to 99	Not Applicable
User Name	Text	50 char maximum	Not Applicable

Notes to Table 1.4:

1. Data should be ASCII text, and comma-separated. Each line is a different set of conditions for the given segment(s).
2. If the set of conditions pertains to more than one runway/taxiway segment, the segment designators can be combined using an underscore separator (e.g., 175, B1\_C1\_C2\_D, 0 75, 25, etc.)
3. Null entries are OK (e.g., 175, B1, , , 1, 75, , , 25, 15, etc.).
4. The cleared/remaining flag is only relevant for runway segments. It is ignored for taxiways and aprons.

## 2. INPUTS

### 2.1 Overview

The main functions of this section are:

- (a) To prepare a Runway Surface Condition (RSC) form. The program allows RSCs to be prepared in one of two ways, as follows:
  - Chart Format: This is the default method for preparing an RSC report, and a screen that reproduces Transport Canada's current RSC form appears when the INPUT-RSCs button in the Main Switchboard is clicked (Figure 2.1).
  - Map Format: This option is selected by clicking on the RSC MAP button in the bottom left-hand corner of the screen. Information for each runway or taxiway segment is entered by clicking on that segment, that causes an information screen to appear for completion by the user.
- (b) To enter and store a Log of the Operations undertaken.
- (c) To view which runways and taxiways are included in the various Winter Maintenance Scenarios for Mirabel International Airport.

### 2.2 Chart Format RSCs

#### 2.2.1 Overview

This is the default method for preparing Runway Surface Condition (RSC) reports. The RSC Chart form appears when the INPUT RSCs button in the MAIN SWITCHBOARD is clicked. The RSC Chart form can also be accessed from the RSC Map screen by clicking on the RSC FORM button in the lower left-hand corner of that screen

The screen that appears reproduces the current Transport Canada (TC) RSC Form. An RSC is prepared by typing the values in the appropriate boxes on this form.

#### Toolbar Buttons at the Bottom of the Screen:

- Help: Directs the user to the Help section of the program.
- RSC Map: Allows the user to prepare an RSC report using a map of the airport.
- Print/Fax: Allows the user to obtain a hard copy of the RSC (Tables 2.1(a) and 2.1(b)) or to fax it.
- Operations: Allows the user to Enter and store a record of the operations undertaken.
- Check Data: Displays errors and omissions in a completed RSC report.
- Load Last: Displays the most recently completed RSC form on the screen.
- Switchboard: Transfers the user to Main Switchboard of the program.
- Clear: Clears the RSC form on the screen.

## Runway Surface Condition Report

Airport:  Report No.:  Last Saved Report:

Runway	Portion	Width Feet	Bare &		Loose		Compact	Snow	Slush /		Frost	Ice
			Dry %	Wet %	Snow %	In. In.	Snow %	Drifts %	In. In.	Wet Snow %		
▶ 0624	Cleared											
0624	Remaining											
1129	Cleared											
1129	Remaining											

Taxiway:	Feet	%	%	%	In.	%	%	In.	%	In.	%	%
▶ A5												
A5,A6,A												
A6												
B												
B,A,C												
B4												
B5												

Voice Report To:  Local Time:  Day:  Month:  Year:  Signature:  Supervisor:

Figure 2.1: Runway Surface Condition (RSC) Screen: Left-Hand Side of RSC Form

### 2.2.2 Preparing RSCs: Screen Layout

The RSC form is divided on the screen into four parts, as follows:

- (a) Runways vs Taxiways
- (b) Left-hand side of the current TC RSC form vs right-hand side (Figures 2.1 and 2.2). This is done because of space limitations on the screen.

To move between the left-hand and right-hand sides, click on **either end** of the scroll bar at the bottom of the taxiways section.

### 2.2.3 Preparing RSCs: Runway Remarks

A menu of remarks can be accessed by clicking the REMARKS box on the RSC Chart for the runway or taxiway of interest.

A combination box will appear which presents the user with the selections that are available. This list can be edited, added to, or deleted from, by going to the Options Section.

Table 2.1(a): Sample Runway Surface Condition Report: Left-Hand Side of Screen

Runway Surface Condition Report		24-Nov-98			Report No 55								
<b>Voice Report To</b>	<b>Time Local</b>	<b>Day</b>	<b>Mo</b>	<b>Year</b>	<b>Signed By</b>	<b>Supervisor</b>							
R.O.C.C. - F.S.S.	10:06:00 AM	16	10	1998	J.Bitars								
<b>Runways</b>													
Segment	Portion	Width	Bare & Dry	Bare & Wet	Loose Snow Pct.	Loose Snow Depth	Compacted Snow Pct.	Snow Drifts Pct.	Snow Drifts Depth	Slush/Wet Snow Pct.	Slush/Wet Snow Depth	Frost Pct.	Ice Pct.
0624	Remaining	100			100	1							
0624	Cleared	100	50	30	20	1							
1129	Remaining				100	1							
1129	Cleared		50	20	30	1							
<b>Taxiways and Aprons</b>													
Segment	Width	Bare & Dry	Bare & Wet	Loose Snow Pct.	Loose Snow Depth	Compacted Snow Pct.	Snow Drifts Pct.	Snow Drifts Depth	Slush/Wet Snow Pct.	Slush/Wet Snow Depth	Frost Pct.	Ice Pct.	
A,A5,A6	100	100											
B,B4,B5,B6	100	70	10	20	1								

Table 2.1(b): Sample Runway Surface Condition Report: Right-Hand Side of Screen

Runway Surface Condition Report		24-Nov-98			Report No 55		
<b>Voice Report To</b>	<b>Time Local</b>	<b>Day</b>	<b>Mo</b>	<b>Year</b>	<b>Signed By</b>	<b>Supervisor</b>	
R.O.C.C. - F.S.S.	10:06:00 AM	16	10	1998	J.Bitars		
<b>Runways</b>							
Segment	Portion	Ice Control		Time Zulu	Remarks	JBI Temp.	Average JBI
0624	Remaining	Sand <input type="checkbox"/>	Chemical <input type="checkbox"/>		Snow Covered over Ice Surface		
0624	Cleared	Sand <input type="checkbox"/>	Chemical <input type="checkbox"/>		Scattered Bare & Dry Patches		0.55
1129	Remaining	Sand <input type="checkbox"/>	Chemical <input type="checkbox"/>		Snow Covered over Ice Surface		
1129	Cleared	Sand <input type="checkbox"/>	Chemical <input type="checkbox"/>	18:35	Scattered Bare & Dry Patches		0.62
<b>Taxiways and Aprons</b>							
Segment	Ice Control		Time Zulu	Remarks			
A,A5,A6	Sand <input type="checkbox"/>	Chemical <input type="checkbox"/>					
B,B4,B5,B6	Sand <input type="checkbox"/>	Chemical <input type="checkbox"/>					



## 2.2.4 Preparing RSCs: Copying RSCs to Many Taxiways

For cases where the same RSC information applies to several runways or taxiways, this can be entered by completing the information for one row and then clicking the “Taxiway” or “Runway” box beside that row.

A combination box will appear that allows the user to add other runways or taxiways as desired. For example, suppose that taxiways B4, B5 and B6 all have the same conditions. This can be registered on the RSC form by typing the following into the “Taxiway” box: B4, B5, B6.

**Runway Surface Condition Report**

Airport:  Report No.:  Last Saved Report:

Runway	Portion	Frost %	Ice %	Ice Control		Time Zulu	Remarks	Av. JBI	Ambient Temp
				Sand	Chem.				
▶ 0624	Cleared			<input type="checkbox"/>	<input type="checkbox"/>				
0624	Remaining			<input type="checkbox"/>	<input type="checkbox"/>				
1129	Cleared			<input type="checkbox"/>	<input type="checkbox"/>				
1129	Remaining			<input type="checkbox"/>	<input type="checkbox"/>				

Taxiway:	Frost %	Ice %	Sand	Chem.	Zulu	Remarks
▶ A5			<input type="checkbox"/>	<input type="checkbox"/>		
A5,A6,A			<input type="checkbox"/>	<input type="checkbox"/>		
A6			<input type="checkbox"/>	<input type="checkbox"/>		
B			<input type="checkbox"/>	<input type="checkbox"/>		
B,A,C			<input type="checkbox"/>	<input type="checkbox"/>		
B4			<input type="checkbox"/>	<input type="checkbox"/>		
B5			<input type="checkbox"/>	<input type="checkbox"/>		

Voice Report To:  Local Time:  Day:  Month:  Year:  Signature:  Supervisor:

Figure 2.2: Right-Hand Side of RSC Form

### 2.2.5 Preparing RSCs: Check Made during Data Entry

The PRISM program checks for the following types of incorrect entries during RSC preparation:

- (a) Invalid Taxiway: The message below is displayed if an invalid taxiway is entered:  
“\_ is not a valid taxiway”

In this case, the user MUST select “OK” in the message box that appears, which will return control to the main program where the entry can be corrected. The incorrect data entry MUST be corrected before conducting ANY other operations in PRISM.

- (b) Inappropriate data or values out of range: The entry of inappropriate data, such as an alphabetic character being entered for a surface coverage field, which requires a numeric value in %, causes the following message to appear:  
“The value you have entered is not appropriate for this field.”

Values that are out of range (such as percentages that exceed 100 or are less than 0) cause the following message to appear:

“Value must be between 0 and 100.”

In either case, the user MUST select “OK” in the message box that appears, which will return control to the main program where the entry can be corrected. The incorrect data entry MUST be corrected before conducting ANY other operations in PRISM.

### 2.2.6 Preparing RSCs: Checking the Data in the RSC Form

The Check Data button displays errors in the RSC due to:

- (a) Surface Coverage Not Being Equal to 100%: Runways, taxiways or aprons where the sum of the entries for the various surface coverage is not equal to 100% are listed.
- (b) Incomplete data: The following checks are made:
- Cleared width not specified for a runway;
  - No data entered for a particular runway, taxiway or apron;
  - No JBI data entered for a particular runway.
- (c) “Extra” Data: More than one set of data entered for a particular runway, taxiway or apron.

### 2.2.7 Preparing RSCs: Saving RSCs and Password Protection

An RSC must be signed off with the user’s password before it can be saved. There are two levels of signature:

- (a) Program User: Once an RSC has been signed off by a user, no Program Users (other than that user) can edit it. The list of registered Program Users can be viewed by clicking the Combination box arrow to the right of the Signature box.

- (b) Supervisor: A Supervisor can edit a user's RSC. However, once the RSC has been signed off by a Supervisor, no one other than that Supervisor can edit it. The list of registered Supervisors can be viewed by clicking the Combination box arrow to the right of the Supervisor box.

The lists of registered Program Users and Supervisors can be edited by going to the Options section.

An RSC is saved by clicking the SAVE button at the bottom right-hand corner of the RSC.

### 2.2.8 Preparing RSCs: Printing and Faxing RSC Reports

The PRINT/FAX button allows the user to either Print or Fax the RSC report (Tables 2.1(a) and 2.1(b)). The user is transferred to Windows when this button is pushed.

An RSC report can be printed by selecting File in the Windows screen, and then making the appropriate Print Setup and Send selections.

An RSC report can be faxed by selecting File in the Windows screen, and then making the appropriate Print Setup and Send selections.

## 2.3 Map Format RSCs

The user elects to prepare RSCs in map format by clicking on the RSC Map button in the first screen that appears when the Input-RSC button is pushed from the Main Switchboard. This causes the screen shown in Figure 2.3 to appear. As discussed in Section 1, a map of Mirabel Airport appears, because this airport was used as a model for developing the program. However, it should be recognized that the program is not limited to Mirabel, and that future versions of the program could be developed for other airports.

RSC information is entered by selecting Conditions in the View box at the lower right-hand corner of the map of Mirabel International Airport. This is done by placing the cursor in the Conditions circle and clicking the mouse.

To make an RSC easier to prepare, the Clear Form button (at the bottom of the screen) can be used to clear the Airport map before starting.

An RSC is prepared in map format by:

- (a) Selecting a runway or taxiway. This is done by placing the cursor on that runway or taxiway and clicking the mouse.
- (b) Filling in the blanks of the chart that next appears on the screen.
- (c) When all information has been entered for that runway or taxiway, returning to the Airport Map screen by clicking on the OK button. The segment with the completed information will now be coloured in green.
- (d) Repeating steps (a) to (c) for the other runways and taxiways.

As for the RSC data entered in Chart Format (described in Section 2.2), RSC data entered in Map Format can be:

- (a) Copied to many taxiways, as described in Section 2.2.4;
- (b) Checked for errors, duplications or omissions as described in section 2.2.5;
- (c) Saved and password-protected, as described in Section 2.2.6;
- (d) Printed or faxed, as described in Section 2.2.7.

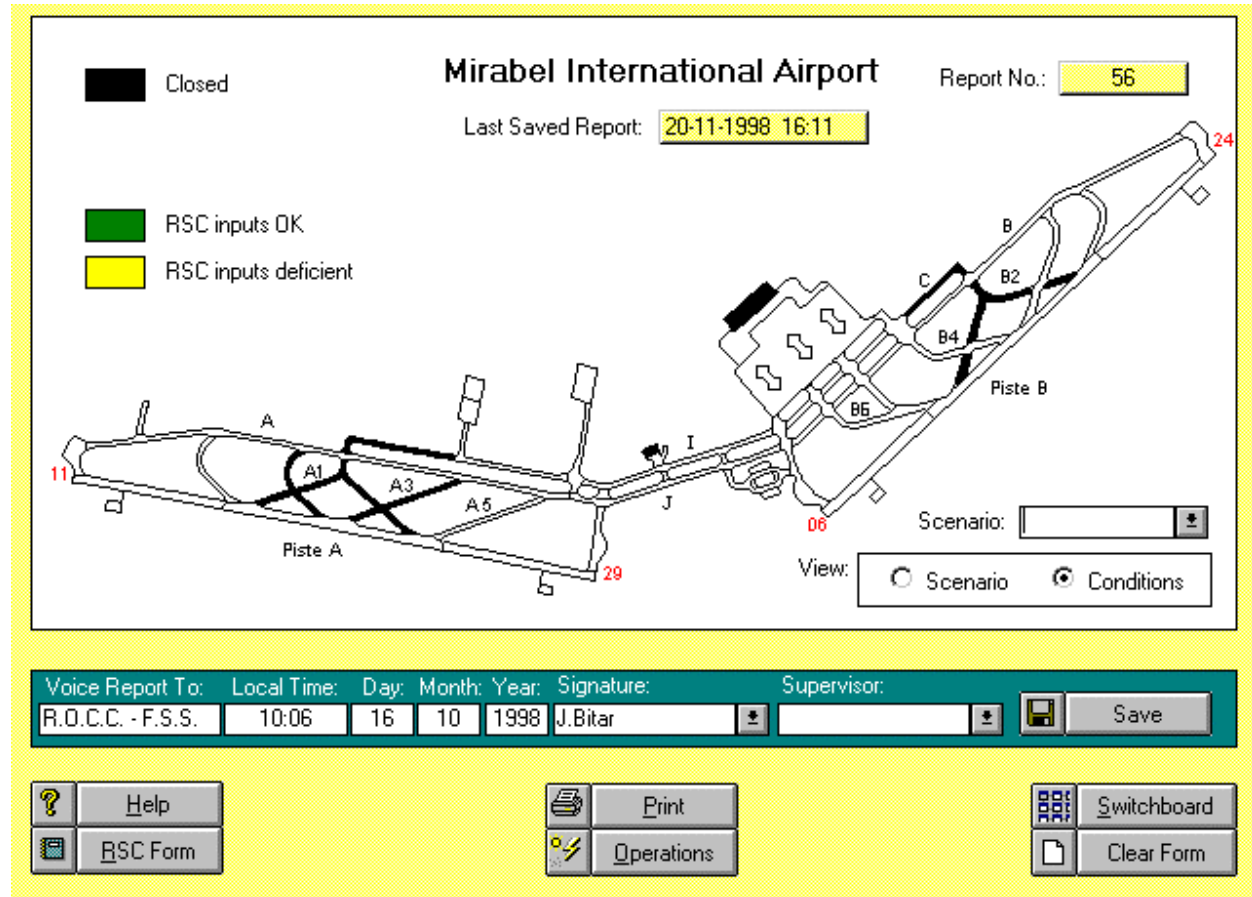


Figure 2.3: Preparing and Entering RSC Information in Map Format

Toolbar Buttons at the Bottom of the Screen:

- Help: Directs the user to the Help section of the program.
- RSC Form: Allows the user to prepare an RSC report using Transport Canada’s current RSC form.
- Print: Allows the user to obtain a hard copy of the RSC or to fax it.
- Operations: Allows the user to prepare and store a record of the operations undertaken.
- Switchboard: Transfers the user to Main Switchboard of the program.
- Clear Form: Clears the RSC form on the screen.

## 2.4 Operations Log

The Operations button allows the user to prepare and store an Operations Log (Figure 2.4). This is shown in the Centre part of the screen.

The Operations Log has the following editing features:

- (a) Period of record to be shown: This is controlled using the Entries From and the Entries To Combination boxes on the screen.
- (b) Adding an Entry: This is done using the Add Entry button on the right-hand side of the screen.
- (c) Editing an Entry: This is done using the Edit Entry button. An entry can only be edited after the row containing that entry has been highlighted using the mouse.
- (d) Deleting an Entry: This is done using the Delete Entry button. An entry can only be deleted after the row containing that entry has been highlighted using the mouse.
- (e) Printing a Hard Copy Report: This is done using the Print button (Table 2.2)

### Toolbar Buttons at the Bottom of the Screen:

- Help: Directs the user to the Help section of the program.
- Exit: Allows the user to exit the program.
- RSC Map: Transfers the user to the RSC MAP section of the program.
- RSC Form: Transfers the user to the RSC FORM section of the program.
- Switchboard: Transfers the user to Main Switchboard of the program.
- Print: Allows the user to print the Operations Log.

Table 2.2: Sample Operations Log Report

## Operations Log

24-Nov-98

Date	Time	Segment	Action	Comments
05/Sep/1998	09:41	both runways	Apply Urea	start of freezing rain
05/Sep/1998	11:05	0624 Remaining	Apply Urea	slush - reapplied
05/Sep/1998	11:13	1129 Remaining	Apply Urea	slush - reapplied
05/Sep/1998	11:55	both runways	Apply Sand	low JBI
05/Sep/1998	12:30	0624 Cleared	Apply Sand	Priority : 0624
05/Sep/1998	13:35	0624 Cleared	Apply Urea	slush on runway
05/Sep/1998	15:17	0624 Cleared	Plow and Sweep	Acceptable JBI

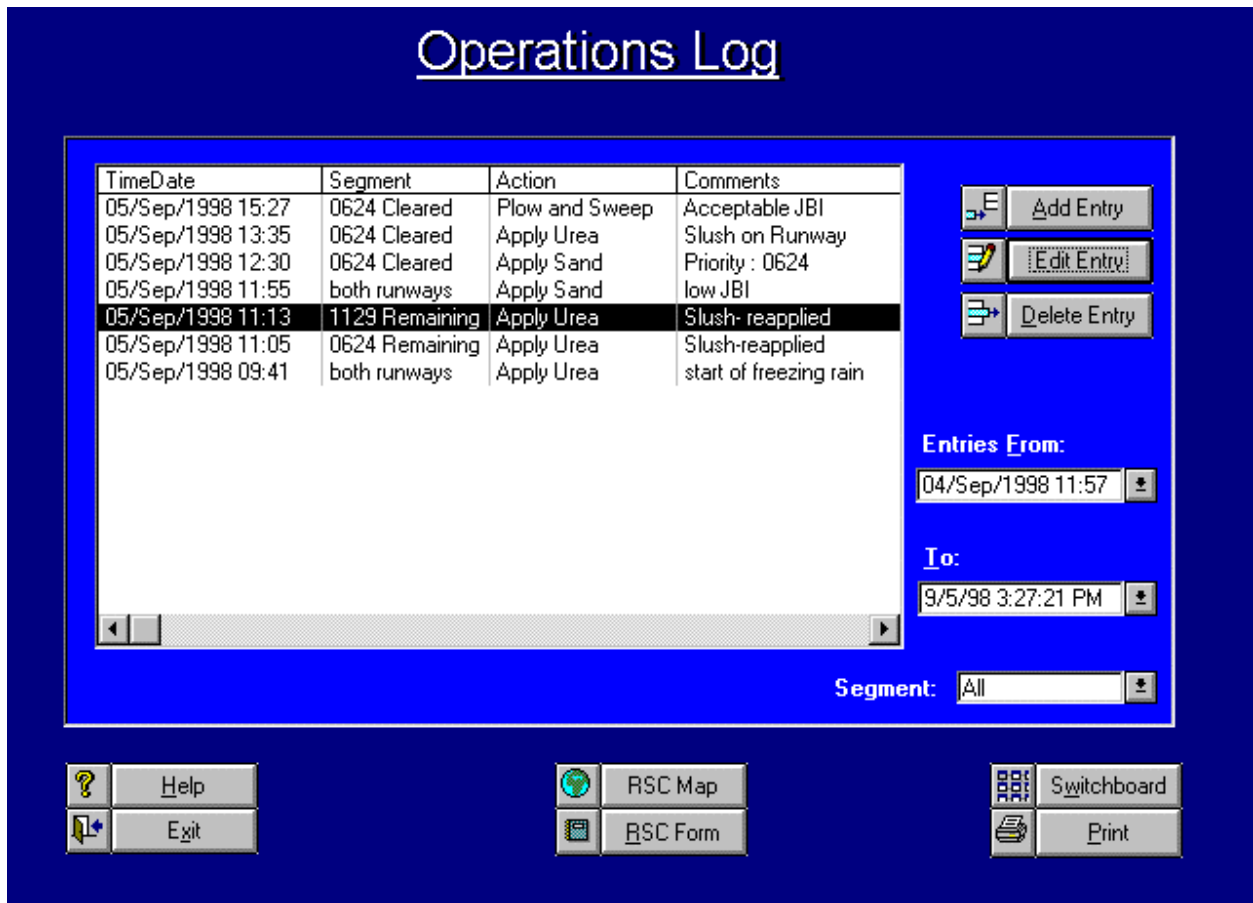


Figure 2.4: Operations Log Screen

## 2.5 Winter Maintenance Operational Scenarios at Mirabel Airport

The runways and taxiways that are included and not included in Operational Scenarios A, B, C, D, E and F at Mirabel International Airport can be viewed by:

- (a) Selecting Scenario in the View Option box at the lower right-hand corner of the map of Mirabel International Airport: This is done by placing the cursor in the Scenario circle (Figure 2.3) and clicking the mouse.
- (b) Selecting the Scenario to be viewed: This is done using the Scenario Combination Box in the lower right-hand corner of the airport map. To activate this combination box, click the mouse on the arrow to the right of the box.

The status of the runways and taxiways for the scenario selected are shown with colours as follows:

- (a) In Scenario: Blue
- (b) Not In Scenario: White
- (c) Closed for Winter: Black

### 3. RESOURCES

#### 3.1 Overview

The top part of the screen (Figure 3.1) shows the quantities remaining for each tracked consumable. Consumables can be added (up to a maximum of 6) or deleted from this display using the Options Selection in the Main Switchboard screen.

An item with a RED background indicates that the quantity remaining for that consumable is less than the set Alarm limit. Alarm limits are set in the Consumables section of the program, which is accessed by pushing the Consumables button at the bottom of the screen.

The centre section of the screen, which has a light blue background, is an Equipment Log Summary. This shows all records for all equipment being monitored. A number of editing features are built into this section as indicated and described in the Equipment section of the HELP library. These editing features can be accessed directly from the screen that first appears when the Resources button is pushed in the Main Switchboard screen or by pushing the Equipment button in the toolbar at the bottom of the screen.

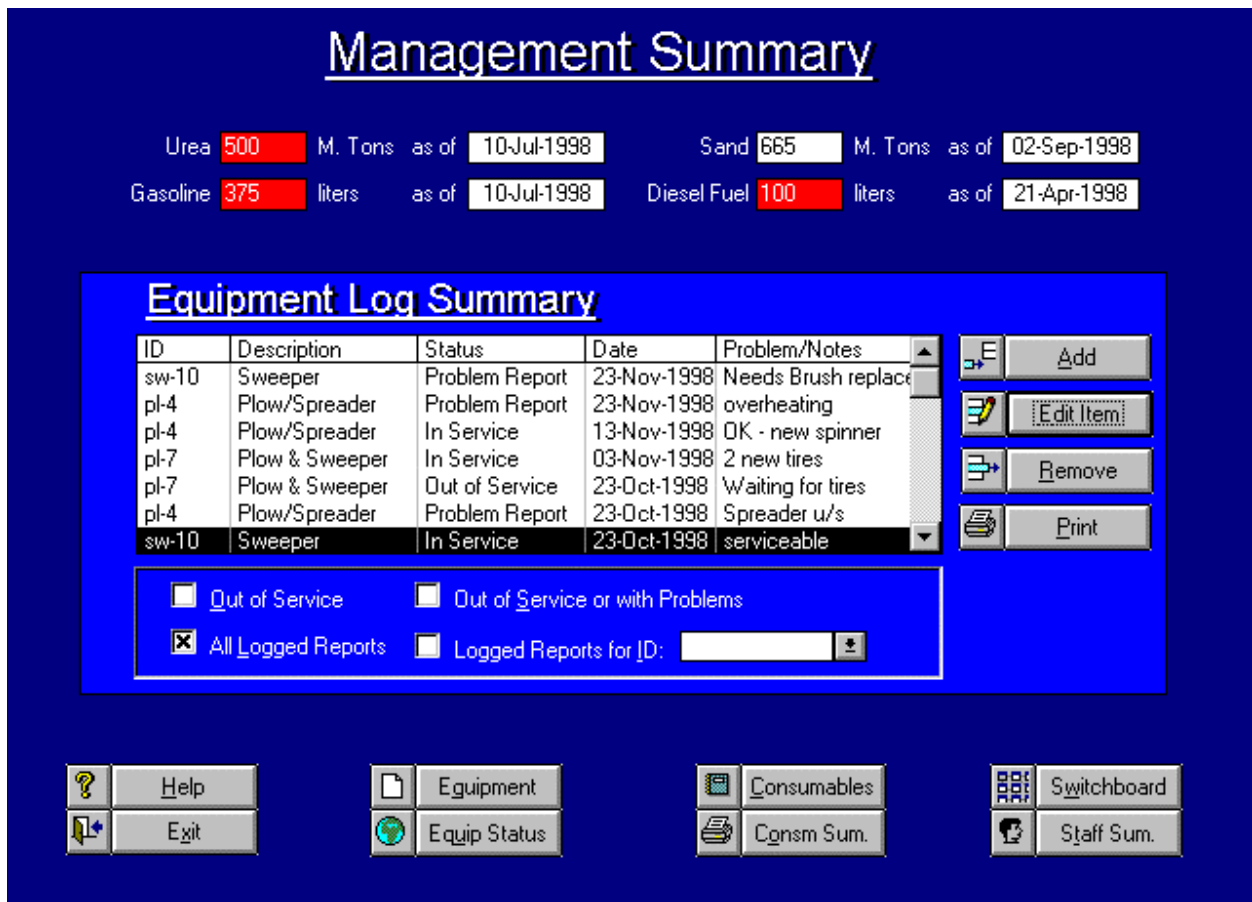


Figure 3.1: Resources Screen that is Accessed from the Main Switchboard

### Toolbar Buttons at the Bottom of the Screen:

- Consumables: Directs the user to the Consumables Tracking section of the program.
- Consm Sum: Provides the user with a summary of the Consumables used and material costs incurred over a specified time period.
- Equipment: Allows the user to view, edit and monitor the status of the available Snow and Ice Control Equipment.
- Equip Status: Provides the user with a summary of the current status of all tracked equipment.
- Staff Sum: Directs the user to the Labour Tracking section of the program.
- Switchboard: Transfers the user to Main Switchboard of the program.
- Exit: Returns the user to the Windows Program Manager.
- Help: Transfers the user to the Help section of the program.

### **3.2 Consumables**

The PRISM program provides two types of Consumables reports as follows:

- (a) Consumables Log Summary
- (b) Consumables Status Report

The Consumables Log Summary (Figure 3.2) has the following editing features:

- (a) Consumables to be shown: The Combination Box Item at the bottom left-hand corner of the Consumables Log Summary allows the user to select this. It is activated by pushing the arrow on the right-hand side.
- (b) Period of record to be shown: This is controlled using the From and To Combination boxes below the Consumables Log Summary.
- (c) Adding an Entry: This is done using the Add Entry button on the right-hand side of the Consumables Log Summary.
- (d) Editing an Entry: This is done using the Edit Entry button on the right-hand side of the Consumables Log Summary. An entry can ONLY be edited after the row containing that entry has been highlighted using the mouse.
- (e) Deleting an Entry: This is done using the Delete Entry button on the right-hand side of the Consumables Log Summary.
- (f) Receiving: This is done using the Receive button on the right-hand side of the Consumables Log Summary.
- (g) Printing a Hard Copy Report: This is done using the Print button on the right-hand side of the Consumables Log Summary.



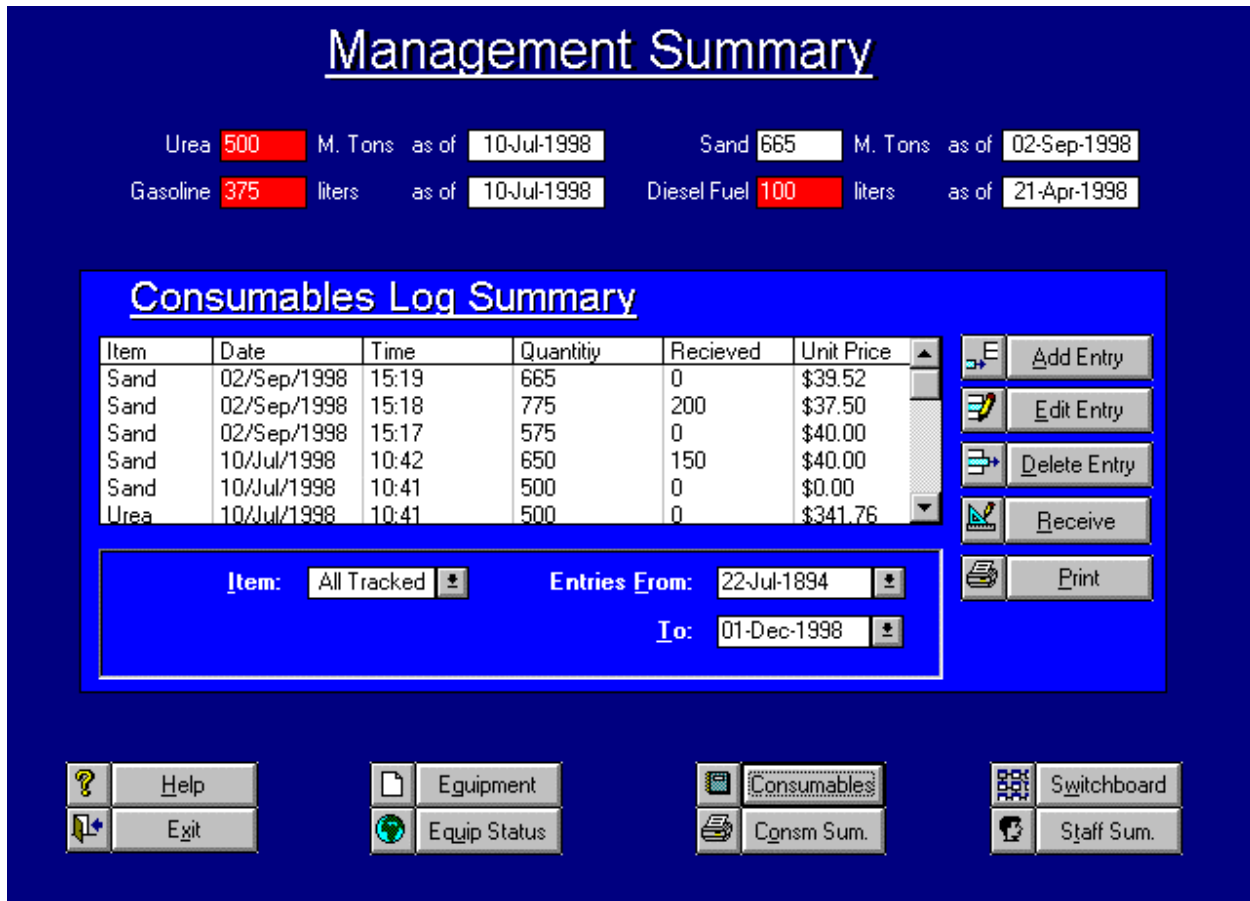


Figure 3.2: Consumables Log Summary Screen

### 3.2.1 Receiving Consumables

This allows quantities of consumables to be added to the inventory along with their associated costs. It is accessed from the Resources screen by first selecting the Consumables section (using the button at the bottom of that screen), and then selecting the Receive button (shown in Figure 3.2) on the Consumables Log Summary that appears.

The Receive screen allows the user to:

- (a) Specify the Type of Consumable(s) to be added: This is done using the Item Combination Box at the top of the screen. It is activated by pushing the arrow on the right-hand side with the mouse.
- (b) Specify the Quantity received: This is done by selecting the indicated box and typing in the correct amount.
- (c) Specify the date and time when the material was received: This is done by selecting the indicated boxes and typing in the correct values.
- (d) Specify the unit price of the consumable received: This is done by selecting the indicated box and typing in the correct amount.

- (e) Edit the quantity on hand before the material was received: This is done by selecting the indicated boxes and typing in the correct value.
- (f) Edit the time and date that applies to the quantity on hand before the material was received: This is done by selecting the indicated boxes and typing in the correct values.
- (g) View the quantity on hand after the material has been received: This is done by selecting the indicated box and clicking the mouse. The “before” and “received” amounts must be filled in before this can be activated.

A Receive entry is completed by clicking the “OK” button with the mouse. This returns the user to the Consumables section of the program.

### 3.2.2 Consumables Status Report

The Consm Sum button produces a Consumables Status Report (Figure 3.3) in the centre part of the screen on the Management Summary. (This part of the screen has a light blue background.) The other parts of the Resources screen are unchanged.

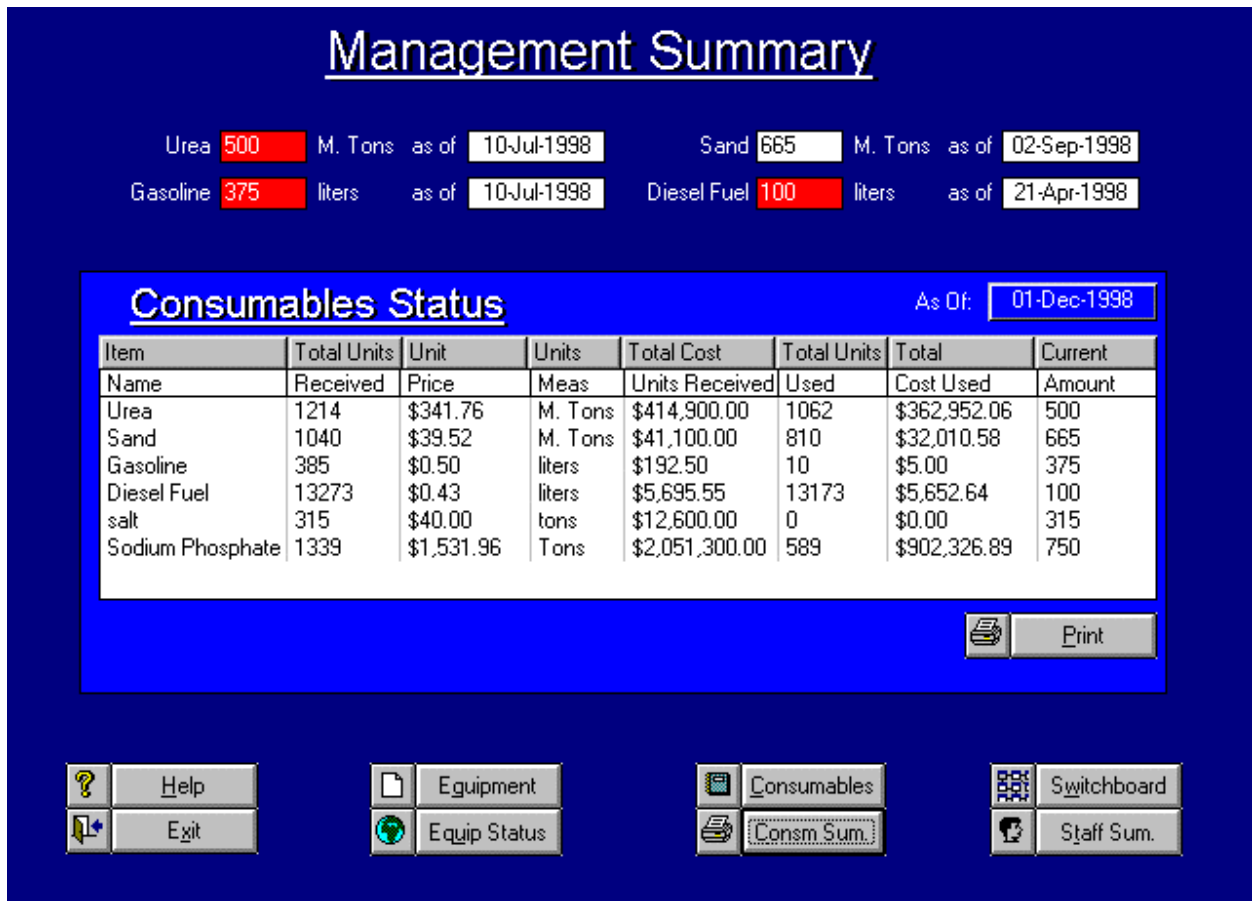


Figure 3.3: Consumables Status Report

The Consumables Status Report displays the following summary for each consumable item:

- (a) The measurement units.
- (b) The total number of units received.
- (c) The unit price: The price shown is the weighted average over the period of record. The procedure used to calculate the unit price is illustrated in the example below:

Suppose that shipments of sand are received as follows:

- Nov 10: 400 tons @ \$35/ton
- Nov 15: 1,000 tons @ \$40/ton
- Nov 20: 1,800 tons @ \$38/ton

The unit price will be calculated by dividing the total cost of the sand by the total amount received as follows:

$$(400 \text{ tons} \times \$35/\text{ton}) + (1,000 \text{ tons} \times \$40/\text{ton}) + (1,800 \text{ tons} \times \$39/\text{ton}) / 3,200 \text{ tons total}$$

For this example, the unit price will be \$38.25.

- (d) The total cost of the consumable that has been received: This is calculated by multiplying the total quantity received by the unit price.
- (e) The total quantity of consumable that has been used over the period of record.
- (f) The total cost of the consumable that has been used: This is calculated by multiplying the total quantity used by the unit price.
- (g) The quantity of consumable currently on hand (termed the current amount in the table).

A hard copy Consumables Status Report can be printed by clicking the Print button.

### **3.3 Equipment**

The PRISM program provides two types of equipment reports as follows:

- (a) Equipment Log Summary
- (b) Equipment Status Report

#### **3.3.1 Equipment Log Summary**

The Equipment button produces an Equipment Log Summary (Figure 3.1) in the centre part of the screen on the Management Summary. (This part of the screen has a light blue background.) The other parts of the Resources screen are unchanged.

The Equipment Log Summary allows the user:

- (a) To select which information is displayed on the screen, as follows:
  - all logged reports – click the box beside All Logged Reports;
  - only equipment that is out-of-service – click the box beside Out of Service;
  - only equipment that is either out-of-service or is operating but has problems noted – click the box beside Out of Service or With Problems;
  - a specific piece of equipment – use the Combination Box beside Logged Reports for ID to select the equipment ID. This is activated by pushing the arrow on the right-hand side.
- (b) To edit information for equipment that is already registered, as follows:
  - to add an entry: click the Add button;
  - to edit an existing entry, highlight the entry to be edited using the mouse and then click the Edit button;
  - to delete an Entry: highlight the entry to be edited using the mouse and then click the Remove button;
- (c) To add a new piece of equipment: Click the Add button and then type the new equipment ID in the ID Box at the upper left-hand corner of the screen.
- (d) To remove a piece of equipment from the list: This is done by deleting all records, using the Remove button, containing the particular equipment ID to be removed.
- (e) To print a hard copy report: This is done using the Print button.

### 3.3.2 Equipment Status

The Equip Status button produces an Equipment Status summary (Figure 3.4) in the centre part of the screen on the Management Summary. (This part of the screen has a light blue background.) The other parts of the Resources screen are unchanged.

The Equipment Status Report displays the most recent information record for each equipment ID.

A hard copy Equipment Status Report can be printed by clicking the Print button.


# Management Summary



Urea **500** M. Tons as of **10-Jul-1998** Sand **665** M. Tons as of **02-Sep-1998**  
Gasoline **375** liters as of **10-Jul-1998** Diesel Fuel **100** liters as of **21-Apr-1998**



## Equipment Status



As Of: **01-Dec-1998**

ID	Description	Status	As Of	Notes	Days Down	Percent Down
sw-10	Sweeper	Problem Report	23-Nov-1998	Needs Brush replac	0	0.00%
pl-4	Plow/Spreader	Problem Report	23-Nov-1998	overheating	0	0.00%
su-10	Small Snow Plow	Out of Service	23-Oct-1998	Waiting for tires	0	0.00%
su-1	Motorized Sweeper	Out of Service	23-Oct-1998	Waiting for tires	0	0.00%
pl-7	Plow & Sweeper	Out of Service	23-Oct-1998	Waiting for tires	0	0.00%

 Print

 Help  
 Exit

 Equipment  
 Equip Status

 Consumables  
 Consm Sum.



 Switchboard  
 Staff Sum.

Figure 3.4: Equipment Status Summary

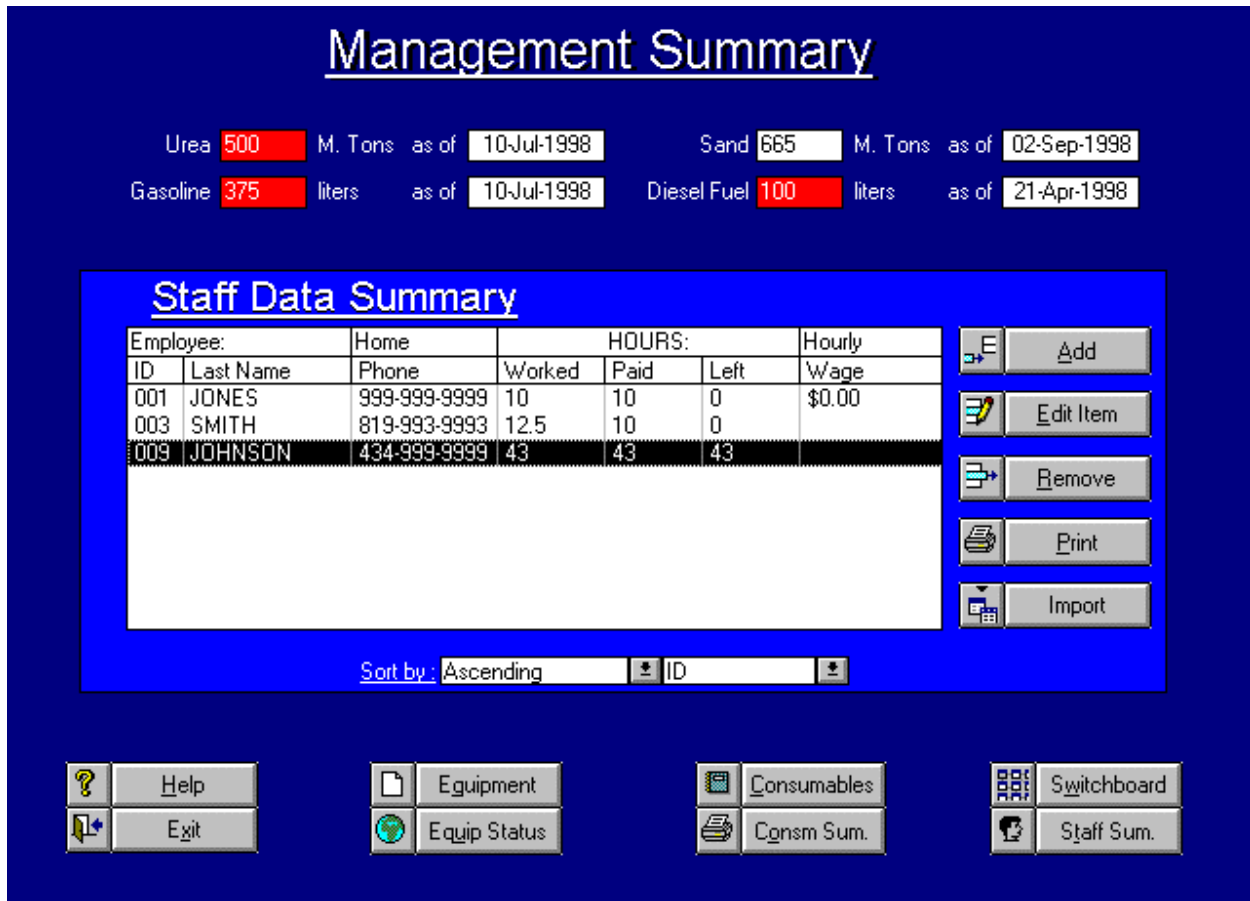


Figure 3.5: Staff Data Summary

### 3.4 Labour

The STAFF SUM button produces a Staff Data Summary (Figure 3.5) in the centre part of the screen on the Management Summary. (This part of the screen has a light blue background.) The other parts of the Resources screen are unchanged.

The Staff Data Summary allows the user:

- (a) To edit information as follows:
  - to add an entry: click the ADD button;
  - to edit an existing entry: click the EDIT ITEM button;
  - to delete an entry: click the REMOVE button.
- (b) To sort the staff data: This is done using the SORT BY button. Information can be displayed:
  - in either ASCENDING or DESCENDING order;
  - by employee ID, Last Name, Phone (Number), Worked (Hours), Paid (amount), (hours) left (on contract), or by (hourly) wage.
- (c) To print a hard copy report: This is done using the Print button.

The screen also shows an IMPORT button. This was included to import an Excel file provided by Mirabel Airport containing staff information, which was used during the development of the program. The IMPORT button is **not active at present**. The IMPORT Button transfers the user to the Windows Open File dialog box. If the user attempts to import a file, the following message will appear:

“This section will import a Mirabel-specific labour file.”

### **3.5 Printing Reports**

#### **3.5.1 Printing a Consumables or Equipment Log Summary Report**

This allows a hard copy report of either the Consumables Log Summary or the Equipment Log Summary to be printed (Tables 3.1 and 3.2 respectively).

A hard copy report is generated by clicking the PRINT button with the mouse. This transfers the user to the standard Windows menus, and printing is accomplished by making the appropriate selections.

To return to the PRISM program, the user must select CLOSE from the standard Windows menus.

***Note: Selecting EXIT will exit the PRISM program.***

#### **3.5.2 Printing a Status Report for the Consumables or Equipment**

This allows a hard copy status report to be printed for the consumables or the equipment (Tables 3.3 and 3.4 respectively).

For either the Consm Sum section or the Equip Status section, a report is printed by clicking the PRINT button at the bottom right-hand part of the screen. This causes either a Consumable Status Report or an Equipment Status report to be displayed on the screen.

The action of clicking the PRINT button also transfers the user to the standard Windows menus, and printing is accomplished by making the appropriate selections.

To return to the PRISM program, the user must select CLOSE from the standard Windows menus.

Table 3.1: Sample Consumables Log Summary Hard Copy Report

<b>Consumable Log Report</b>			Log Entries Between:		22-Jul-1894		
Date of Report: 24-Nov-1998 14:06					And		
					24-Nov-1998		
Consumable	Log Date	Log Time	Current Qty.	Received Qty.	Unit Price	Ending Qty.	Unit Measurement
Urea	10-Jul-1998	10:41	500	0	\$341.76	500	M. Tons
		10:40	927	76	\$350.00	1003	M. Tons
	09-Jul-1998	15:28	851	1	\$350.00	852	M. Tons
		15:27	600	0	\$341.20	600	M. Tons
		15:26	850	250	\$350.00	1100	M. Tons
		15:23	600	300	\$350.00	900	M. Tons
		15:23	300	0	\$0.00	300	M. Tons
		12:46	260	160	\$350.00	420	M. Tons
	09-Jun-1998	12:45	100	0	\$0.00	100	M. Tons
		12:52	200	0	\$326.58	200	M. Tons
		12:52	42	0	\$326.58	42	M. Tons
	14-Apr-1998	11:31	300	200	\$350.00	500	M. Tons
	13-Apr-1998	10:54	100	0	\$305.95	100	M. Tons
	08-Apr-1998	13:26	157	0	\$305.95	157	M. Tons
	07-Apr-1998	15:07	160	100	\$250.00	260	M. Tons
		15:05	60	0	\$350.00	60	M. Tons
		12:00	80	0	\$350.00	80	M. Tons
		11:48	90	0	\$350.00	90	M. Tons
		11:44	100	10	\$350.00	110	M. Tons
		11:43	90	0	\$350.00	90	M. Tons
11:39		100	0	\$350.00	100	M. Tons	
06-Apr-1998		16:25	117	50	\$350.00	167	M. Tons
	16:25	67	67	\$350.00	134	M. Tons	

Table 3.2: Sample Equipment Log Summary Hard Copy Report

<b>All Equipment Log Reports</b>				
Date of Report: 24-Nov-1998 13:53				
Airport ID	Description	Log Date	Status	Problem/Notes
pl-4	Plow/Spreader	23-Nov-1998	Problem Report	overheating
		13-Nov-1998	In Service	OK- new spinner
		23-Oct-1998	Problem Report	Spreader u/s
pl-7	Plow & Sweeper	03-Nov-1998	In Service	2 new tires
		23-Oct-1998	Out of Service	Waiting for tires
sw-10	Sweeper	23-Nov-1998	Problem Report	Needs Brush replacement
		23-Oct-1998	In Service	serviceable



Table 3.3: Sample Consumables Status Hard Copy Report

<b>Consumables Status Report</b>							
<b>Date of Report:</b> 24-Nov-1998 14:19							
Consumable	Tot. Received	Unit Price	Unit	Tot. Cost Received	Tot. Used	Tot. Cost Used	Cur. Amt
Gasoline	0	\$0.50	liters	\$0.00	0	\$0.00	665
Sand	1040	\$39.52	M. Tons	\$41,100.00	810	\$32,010.58	665
Urea	1214	\$341.76	M. Tons	\$414,900.00	1062	\$362,952.06	500

Table 3.4: Sample Equipment Status Hard Copy Report

<b>Equipment Status Report</b>						
<b>Date of Report:</b> 24-Nov-1998 13:57						
Airport ID	Description	Status	As Of	Notes	Days Down	Percent Down
sw-10	Sweeper	Problem Report	23-Nov-1998	Needs Brush repl	0	0.00%
pl-7	Plow & Sweeper	Problem Report	23-Nov-1998	overheating	0	0.00%
pl-4	Plow/Spreader	Problem Report	23-Nov-1998	overheating		0.00%

### 3.5.3 Printing a Labour Status Report

This is done using the Print button on the Staff Data Summary Screen (Figure 3.5). This transfers the user to Windows where a hard copy report (Table 3.5) can be printed by making the appropriate selections from the menu.

Table 3.5: Sample Staff Report

#### All Staff Reports

24-Nov-98

ID	Last Name	Phone	Hours Worked	Hours Paid	Hours Left	Wage
003	JONES	999-999-999	10	10	0	
004	SMITH	999-999-999	12.5	15	75	
005	JOHNSON	898-988-989	20	20	5	
			<b>42.5</b>	<b>45</b>	<b>80</b>	

## 4. ACTION ADVISORY

### 4.1 Overview

This part of the program provides an advisory regarding the actions that should be taken for various weather and runway surface conditions. It is accessed from the main switchboard by pushing the Action Advisory button. Figure 4.1 shows the screen that appears in this section of the program.

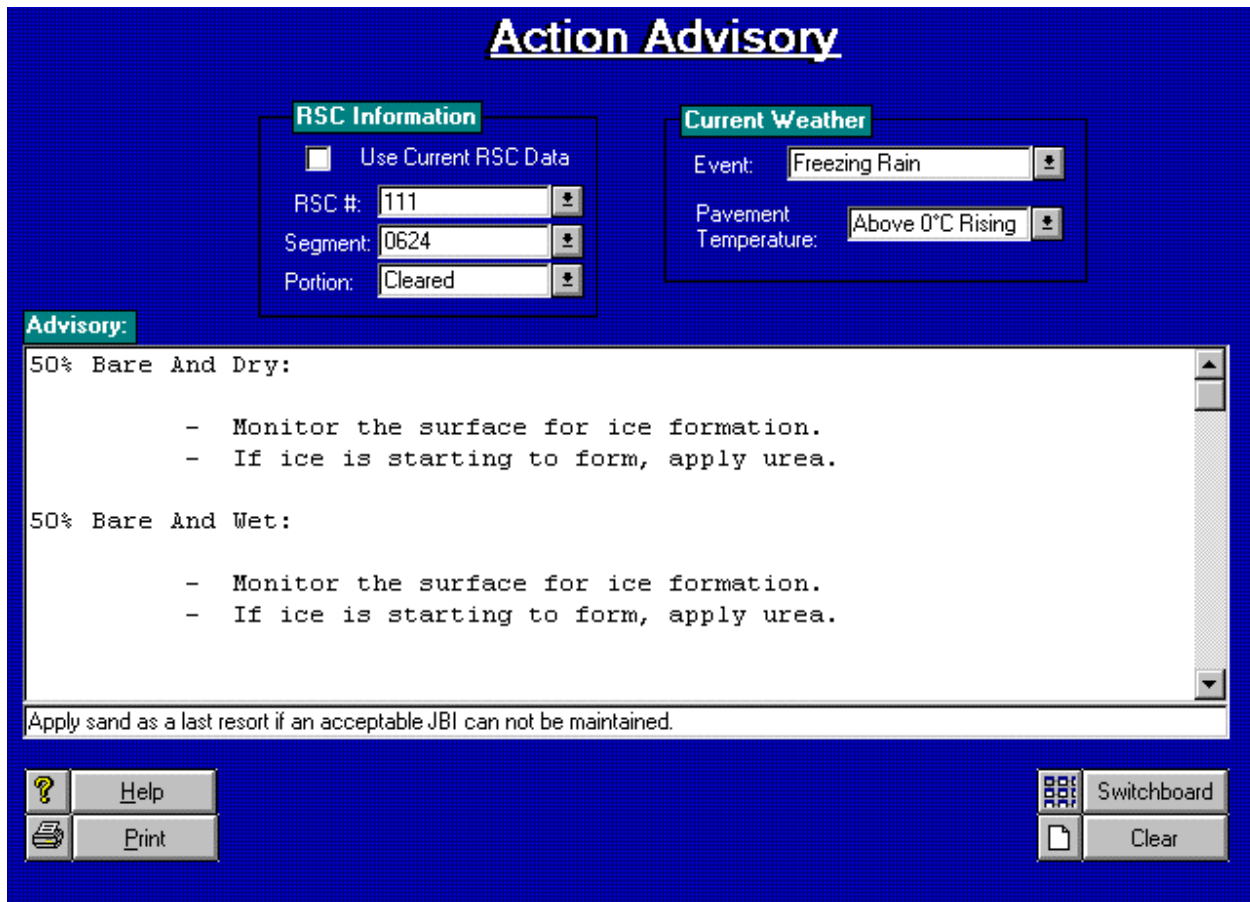


Figure 4.1: Sample Action Advisory Screen

The actions advised by the program depend on the prevailing weather conditions and the current Runway Surface Condition. The following weather parameters affect which action is advised:

- (a) The type of weather event. Five events are included, as follows:
  - No precipitation;
  - Rain;
  - Freezing rain;
  - Snow;
  - Frost.

- (b) the current pavement temperature;
- (c) whether the pavement temperature is rising or falling.

A total of 15 cases are specified as listed in Table 4.1. The actions advised for each case are listed in Section 4.2.

If the runway, taxiway or apron has a non-uniform surface condition, actions are advised for each specified surface condition (e.g., see Figure 4.1).

Table 4.1: Overview: Framework of Cases

RSC	No Precip.	Rain	Freezing Rain	Snow	Frost
Bare & dry	Case1	Case2	Case3	Case4	Case5
Bare & wet	Case2	Case2	Case3	Case4	Case5
Loose snow	Case4	Case6	Case7	Case4	Case8
Packed snow	Case4	Case6	Case7	Case4	Case8
Snow drifts	Case4	Case9	Case10	Case4	Case8
Slush/wet snow	Case1	Case9	Case12	Case4	Case8
Frost	Case13	Case14	Case15	Case13	Case8
Ice patches	Case13	Case14	Case15	Case13	Case8

The following information **MUST** be filled in to obtain an Action Advisory:

- (a) The Type of Weather Event or Precipitation: This is done by clicking on the combination box arrow with the mouse, and then clicking on the correct Weather Event or Precipitation Type from the list in the box.
- (b) The Runway Surface Condition: The following must be filled in:
  - the RSC number;
  - the airport segment (e.g., runway, taxiway, apron);
  - whether the segment is the cleared or the remaining section.

If no surface temperature information is filled in by the user, then an advisory will be provided for the applicable ranges of temperatures. However, if temperature information is input, then only the Advisory for that temperature case will be output, which shortens the output that the user must review.

The user can input the surface temperature using the combination box provided. The last selection in this box is BLANK. The BLANK selection is used to obtain an Advisory for a case where no temperature data are available. In this case, the program will provide an Advisory for all temperatures.

Toolbar Buttons at the Bottom of the Screen:

- Help: Transfers the user to the Help section of the program.
- Print: Allows the user to obtain a hard copy report of the Advisory using functions in Windows (Table 4.2).
- Switchboard: Transfers the user to Main Switchboard of the program.
- Clear: Clears the screen.

Table 4.2: Sample Action Advisory Hard Copy Report

<b>PRISM - Action Advisory Report</b>		RSC Number: 111
Date of Report: 24-Nov-1998 14:18		Segment: 0624
		Portion: Cleared
Current Weather Event: Freezing Rain		
<b>Advisory:</b>	If adequate JBI readings cannot be maintained, use sand as a last resort.	
50% Bare And Dry:		
- Monitor the surface for ice formation.		
- If ice is starting to form, apply urea.		
50% Bare And Wet:		
- Monitor the surface for ice formation.		
- If ice is starting to form, apply urea.		

**4.2 Action Advisories for the Cases included in the PRISM Program**

4.2.1 Case 1: No Precipitation on a Bare and Dry Surface

Advisory: No action required.

4.2.2 Case 2: Rain or No Precipitation on Various Surface Conditions

Applicable Conditions: Rain and bare and dry surface;  
Rain and bare and wet surface;  
No Precipitation and bare and wet surface.

Current Surface Temperature above 0°C and Falling OR

Current Surface Temperature below 0°C and Falling OR

Current Surface Temperature below 0°C and Rising:

Advisory: Step 1. Monitor surface for ice formation.  
Step 2. If ice is starting to form, apply urea.  
Step 3: Apply sand as a last resort if an acceptable JBI cannot be maintained.

Current Surface Temperature above 0°C and Rising:

Advisory: No action required.

#### 4.2.3 Case 3: Freezing Rain on a Bare and Dry Surface or on a Bare and Wet Surface

Current Surface Temperature Above 0°C and Falling OR

Current Surface Temperature Below 0°C and Falling OR

Current Surface Temperature Below 0°C and Rising:

Advisory: Step 1. Apply urea.

Step 2. Apply sand as a last resort if an acceptable JBI cannot be maintained.

Current Surface Temperature Above 0°C and Rising:

Advisory: Step 1. Monitor surface for ice formation.

Step 2. No action required if ice is not forming on the surface.

Step 3. Apply urea if ice is forming on the surface.

Step 4. Apply sand as a last resort if an acceptable JBI cannot be maintained.

#### 4.2.4 Case 4: Snow or No Precipitation on Various Surface Conditions

Applicable Conditions: Snow falling on a Bare and Dry Surface or on a Bare and Wet Surface;  
Snow falling on a Loose Snow surface condition;  
Snow falling on a Packed Snow surface condition;  
Snow falling on a Snowdrift surface condition;  
Snow falling on a Slush/Wet Snow surface condition.

No Precipitation and Loose Snow surface condition;  
No Precipitation and Packed Snow surface condition;  
No Precipitation and Snowdrifted surface condition.

Advisory: Step 1. Plow and sweep surface to remove contaminant.

Step 2. Apply sand as a last resort if an acceptable JBI cannot be maintained.

#### 4.2.5 Case 5: Frost Forming on a Bare and Dry Surface or on a Bare and Wet Surface

Advisory: Step 1. Monitor surface for ice formation.

Step 2. If ice is starting to form, apply urea.

Step 3. Apply sand as a last resort if an acceptable JBI cannot be maintained.

#### 4.2.6 Case 6: Rain Falling on a Loose Snow or Packed Snow Surface

- Advisory:
- Step 1. Leave the contaminant on the surface for as long as possible, depending on aircraft traffic, and the JBI of the contaminated surface.
  - Step 2. If it is necessary to remove the contaminant, then plow and sweep the surface.
  - Step 3. After removing the contaminant, take actions as below, depending on temperature.

Current Surface Temperature Above 0°C and Falling OR  
Current Surface Temperature Below 0°C and Falling OR  
Current Surface Temperature Below 0°C and Rising:

- Advisory:
- Step 1. Monitor surface for ice formation.
  - Step 2. If ice is starting to form, apply urea.

Current Surface Temperature Above 0°C and Rising:

- Advisory: Step 1. No action required.

- Step 4. Apply sand as a last resort if an acceptable JBI cannot be maintained.

#### 4.2.7 Case 7: Freezing Rain on Loose Snow or on Packed Snow

- Advisory:
- Step 1. Leave the contaminant on the surface for as long as possible, depending on aircraft traffic, and the JBI of the contaminated surface.
  - Step 2. If it is necessary to remove the contaminant, then plow and sweep the surface.
  - Step 3. After removing the contaminant, take actions as below, depending on temperature.

Current Surface Temperature above 0°C and Falling OR  
Current Surface Temperature below 0°C and Falling OR  
Current Surface Temperature below 0°C and Rising :

- Advisory: 1. Apply urea.

Current Surface Temperature above 0°C and Rising:

- Advisory:
1. Monitor surface for ice formation.
  2. If ice is starting to form, apply urea.

- Step 4. Apply sand as a last resort if an acceptable JBI cannot be maintained.

#### 4.2.8 Case 8: Frost Forming on Various Surface Conditions

Applicable Conditions: Frost forming on a Loose Snow surface condition;  
Frost forming on a Packed Snow surface condition;  
Frost forming on a Snowdrifted surface condition;  
Frost forming on a Slush/Wet Snow surface condition;  
Frost forming on a Frost surface condition;  
Frost forming on an Ice Patches surface condition.

Advisory: Step 1. Leave the contaminant on the surface for as long as possible depending on aircraft traffic, and the JBI of the contaminated surface.  
Step 2. If it is necessary to remove the contaminant, then plow and sweep the surface.  
Step 3. Take actions as below depending on temperature:

Current Surface Temperature above  $-7^{\circ}\text{C}$  OR  
Current Surface Temperature below  $-7^{\circ}\text{C}$  and Rising:

Advisory: Step 1. Apply urea.  
Step 2. Apply sand as a last resort if an acceptable JBI cannot be maintained.

Current Surface Temperature Below  $-7^{\circ}\text{C}$  and Falling:

Advisory: Step 1. Apply sand as necessary to maintain JBI.

#### 4.2.9 Case 9: Rain Falling on a Snowdrifted, Slush or Wet Snow Surface

Advisory: Step 1. Remove the contaminant by plowing and sweeping.  
Step 2. After removing the contaminant, take actions as below, depending on temperature.

Current Surface Temperature above  $0^{\circ}\text{C}$  and Falling OR  
Current Surface Temperature below  $0^{\circ}\text{C}$  and Falling OR  
Current Surface Temperature below  $0^{\circ}\text{C}$  and Rising:

Advisory: Step 1. Monitor surface for ice formation.  
Step 2. If ice is starting to form, apply urea.

Current Surface Temperature above  $0^{\circ}\text{C}$  and Rising:

Advisory: Step 1. No action required.

Step 3. Apply sand as a last resort if an acceptable JBI cannot be maintained.

#### 4.2.10 Case 10: Freezing Rain on a Snowdrifted Surface

- Advisory:
- Step 1. Leave the contaminant on the surface for as long as possible, depending on aircraft traffic and whether or not ice will form on the pavement in the area between the snowdrifts.
  - Step 2. If it is necessary to remove the contaminant, then plow and sweep the surface.
  - Step 3. After removing the contaminant, take actions as below, depending on temperature.

Current Surface Temperature above 0°C and Falling OR  
Current Surface Temperature below 0°C and Falling OR  
Current Surface Temperature below 0°C and Rising:

Advisory: Step 1. Apply urea.

Current Surface Temperature above 0°C and Rising:

Advisory: Step 1. Monitor surface for ice formation.  
Step 2. If ice is starting to form, apply urea.

Step 4. Apply sand as a last resort if an acceptable JBI cannot be maintained.

#### 4.2.11 Case 11: No Precipitation on a Slush or Wet Snow Surface

- Advisory:
- Step 1. Take no action if the slush or wet snow will evaporate in the time before the next flight.
  - Step 2. Otherwise, plow and sweep surface to remove contaminant.
  - Step 3. After removing the contaminant, monitor surface for ice formation.
  - Step 4. If ice is starting to form, apply urea.
  - Step 5. Apply sand as a last resort if an acceptable JBI cannot be maintained.

#### 4.2.12 Case 12: Freezing Rain on a Slush or Wet Snow Surface

- Advisory:
- Step 1. Plow and sweep the surface to remove the contaminant.
  - Step 2. Apply urea.
  - Step 3. Apply sand as a last resort if an acceptable JBI cannot be maintained.

#### 4.2.13 Case 13: No Precipitation or Snow Falling on Various Surface Conditions

Applicable Conditions: No Precipitation and a Frost surface condition;  
No Precipitation and an Ice Patches surface condition;  
Snow falling on a Frost surface condition;  
Snow falling on an Ice Patches surface condition.



- Advisory: Step 1. Plow and sweep the surface to remove as much of the contaminant as possible.  
Step 2. Take actions as below, depending on temperature.

Current Surface Temperature above 0°C and Rising:

- Advisory: Step 1. Monitor surface to determine whether ice remains on it.  
Step 2. Plow and sweep the surface again.

Current Surface Temperature between 0°C and -7°C and Falling OR

Current Surface Temperature between 0°C and -7°C and Rising OR

Current Surface Temperature below -7° and Rising:

- Advisory: Step 1. Apply urea.  
Step 2. Wait for about 20 minutes and plow and sweep the surface again.  
Step 3. Repeat Steps 2 and 3 as required.

Current Surface Temperature below -7°C and Falling:

- Advisory: Step 1. Monitor surface for whether ice remains on it.  
Step 2. Plow and sweep the surface again.  
Step 3. Use other mechanical equipment (e.g., graders) to remove the contaminant.  
Step 3. Apply sand as a last resort if an acceptable JBI cannot be maintained.

4.2.14 Case 14: Rain Falling on a Frost Surface or on Ice Patches

- Advisory: Step 1. Plow and sweep the surface to remove as much of the contaminant as possible.  
Step 2. Take actions as below, depending on temperature.

Current Surface Temperature above 0°C and Rising:

- Advisory: Step 1. Monitor surface.  
Step 2. Apply urea if ice remains on the surface or if ice is forming on the surface.

Current Surface Temperature below 0°C and Falling OR

Current Surface Temperature below 0°C and Rising OR

Current Surface Temperature above 0°C and Falling:

- Advisory: Step 1. Apply urea.  
Step 2. Wait for about 20 minutes and plow and sweep the surface again.  
Step 3. Repeat Steps 2 and 3 as required.

Step 3. Apply sand as a last resort if an acceptable JBI cannot be maintained.

#### 4.2.15 Case 15: Freezing Rain on a Frost Surface or on Ice Patches

- Advisory:
- Step 1. Plow and sweep the surface to remove as much of the contaminant as possible.
  - Step 2. Apply urea.
  - Step 3. Wait for about 20 minutes and plow and sweep the surface again.
  - Step 4. Repeat Steps 2 and 3 as required.
  - Step 5. Apply sand as a last resort if an acceptable JBI cannot be maintained.

## 5. ANALYSIS

### 5.1 Overview

The Analysis Switchboard provides access to the main interfaces in this section, which are shown in Figure 5.1. For the user's convenience, the screen is also equipped with an exit button which allows the user to exit the software and return to the Windows Program Manager.



Figure 5.1: Analysis Switchboard

The PRISM program has basic analysis capabilities which allow it to plot time histories of parameters related to:

- Consumable usage and costs;
- Runway surface conditions;
- Weather.

However, it should be noted that the plotting routines in PRISM will not allow more detailed plots (such as combinations of cost, Runway Surface Conditions, and weather data).

It can also prepare a file for Export to Excel to allow more detailed analyses.

## 5.2 Consumables Analysis

The Consumable/Cost Analysis screen (Figure 5.2) allows the user to view and plot the usage of consumables over a specified time period.

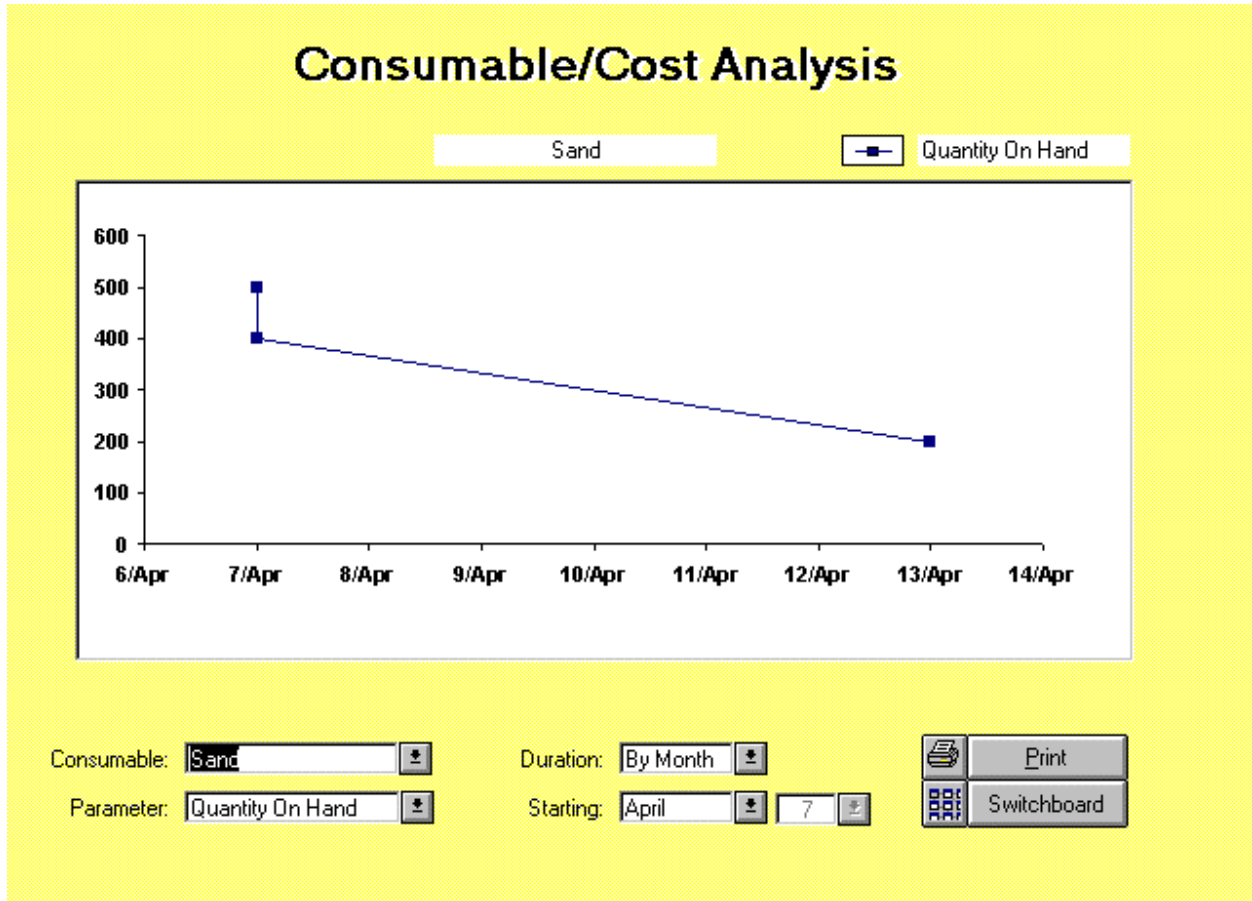


Figure 5.2: Consumables/Cost Analysis Screen

The user can make the following selections:

- (a) **CONSUMABLE:** This combination box allows the user to select the consumable for which information is to be plotted. The selected consumable is shown in the white box centred above the plot on the screen.
- (b) **PARAMETER:** This combination box allows the user to select which parameter is to be plotted. The choices are:
  - **USED:** Shows the amount used on a daily basis. Only the days when material was used are plotted as points. Days with zero-usage are not plotted as separate points, and the program draws a straight line between the days when material was used.
  - **USED CUMULATIVE:** Shows the cumulative amount used.
  - **COST:** Shows the cost of the consumable used on a daily basis, using the same convention described above for the “USED” selection.

- COST CUMULATIVE: Shows the cumulative cost of the material used.
- QUANTITY ON HAND: Shows the quantity on hand on a daily basis.

The selected parameter is shown in the white box located above the upper right-hand corner of the plot on the screen.

- (c) DURATION: This combination box allows the user to select the Time Duration of the plot. The choices are:
- WINTER: Plots information for the whole winter.
  - MONTH: Plots information for the selected month.
  - WEEK: Plots information for the selected week.
- (d) STARTING: This combination box allows the user to specify the starting month and day for the plot. The choices are:
- MONTH: Allows the user to select the month.
  - WEEK: Allows the user to specify the starting day of the month for the plot.

For the user's convenience, the Cost Analysis screen is also equipped with:

- (a) A PRINT button which allows the user to print the plot using plotting features in Windows.
- (b) A Main Switchboard button which returns the user to the Main Switchboard screen.

### **5.3 Snow and Ice Control Effectiveness**

The SNIC (Snow and Ice Control) Effectiveness screen (Figure 5.3) allows the user to view and plot Runway Surface Conditions over a specified time period.

The user can make the following selections:

- (a) SEGMENT: This Combination Box allows the user to select the runway, taxiway or apron for which information is to be plotted. The selected segment is shown in the white box centred above the plot on the screen.
- (b) ITEM: This Combination Box allows the user to select which parameter is to be plotted. All of the parameters on the Transport Canada Runway Surface Condition (RSC) form are available as choices. This includes the cleared width, the % bare & dry, the % bare and wet, the % snow, the snow depth, the % compacted snow, the % snowdrifts, the snowdrift depth, the % slush, the slush depth, the % frost, whether sand has been applied, whether de-icing chemical has been applied, the ambient temp, and the JBI reading.

The selected item is shown in the white box located above the upper right-hand corner of the plot on the screen.

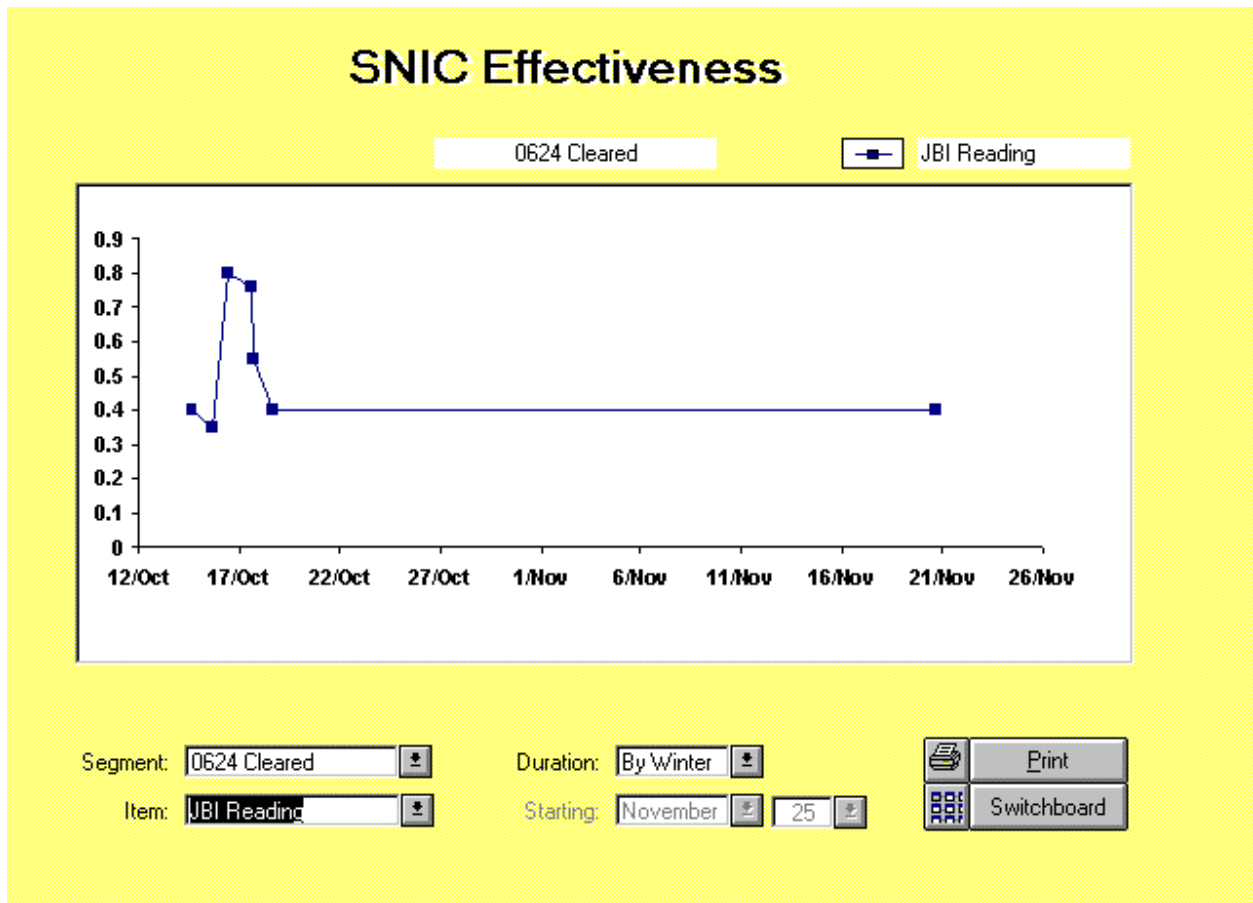


Figure 5.3: SNIC Effectiveness Analysis Screen

- (c) **DURATION:** This combination box allows the user to select the Time Duration of the plot. The choices are:
- WINTER: Plots information for the whole winter.
  - MONTH: Plots information for the selected month.
  - WEEK: Plots information for the selected week.
- (d) **STARTING:** This combination box allows the user to specify the starting month and day for the plot. The choices are:
- MONTH: Allows the user to select the month.
  - WEEK: Allows the user to specify the starting day of the month for the plot.

For the user's convenience, the SNIC Effectiveness screen is also equipped with:

- (a) A PRINT button which allows the user to print the plot using plotting features in Windows;
- (b) A Main Switchboard button which returns the user to the Main Switchboard screen.

## 5.4 Weather Analysis

The WEATHER ANALYSIS screen (Figure 5.4) allows the user to view and plot weather conditions over a specified time period.

The user can make the following selections:

- (a) **EVENT:** This Combination Box allows the user to select which parameter is to be plotted. The choices are: the air temperature, the cumulative precipitation, the cumulative rainfall, the cumulative snowfall, the dew point, the daily rainfall, the daily snowfall, the hours of sunshine per day, the total precipitation, the wind direction, and the wind speed.

The selected parameter and the applicable units are displayed in the boxes near the upper right-hand corner of the plot.

- (b) **DURATION:** This combination box allows the user to select the Time Duration of the plot. The choices are:
- **WINTER:** Plots information for the whole winter.
  - **MONTH:** Plots information for the selected month.
  - **WEEK:** Plots information for the selected week.
- (c) **STARTING:** This combination box allows the user to specify the starting month and day for the plot. The choices are:
- **MONTH:** Allows the user to select the month.
  - **WEEK:** Allows the user to specify the starting day of the month for the plot.

For the user's convenience, the WEATHER ANALYSIS screen is also equipped with:

- (a) A **PRINT** button which allows the user to print the plot using plotting features in Windows;
- (b) A **Main Switchboard** button which returns the user to the Main Switchboard screen.

## 5.5 Review RSCs

The Review RSCs button allows the user to review a Runway Surface Condition (RSC) report.

Previous RSCs can be edited and overwritten by making changes, signing them off, and then saving them, using the **SAVE** button. Before an RSC can be overwritten and saved, the user must verify that the input changes are to be accepted.

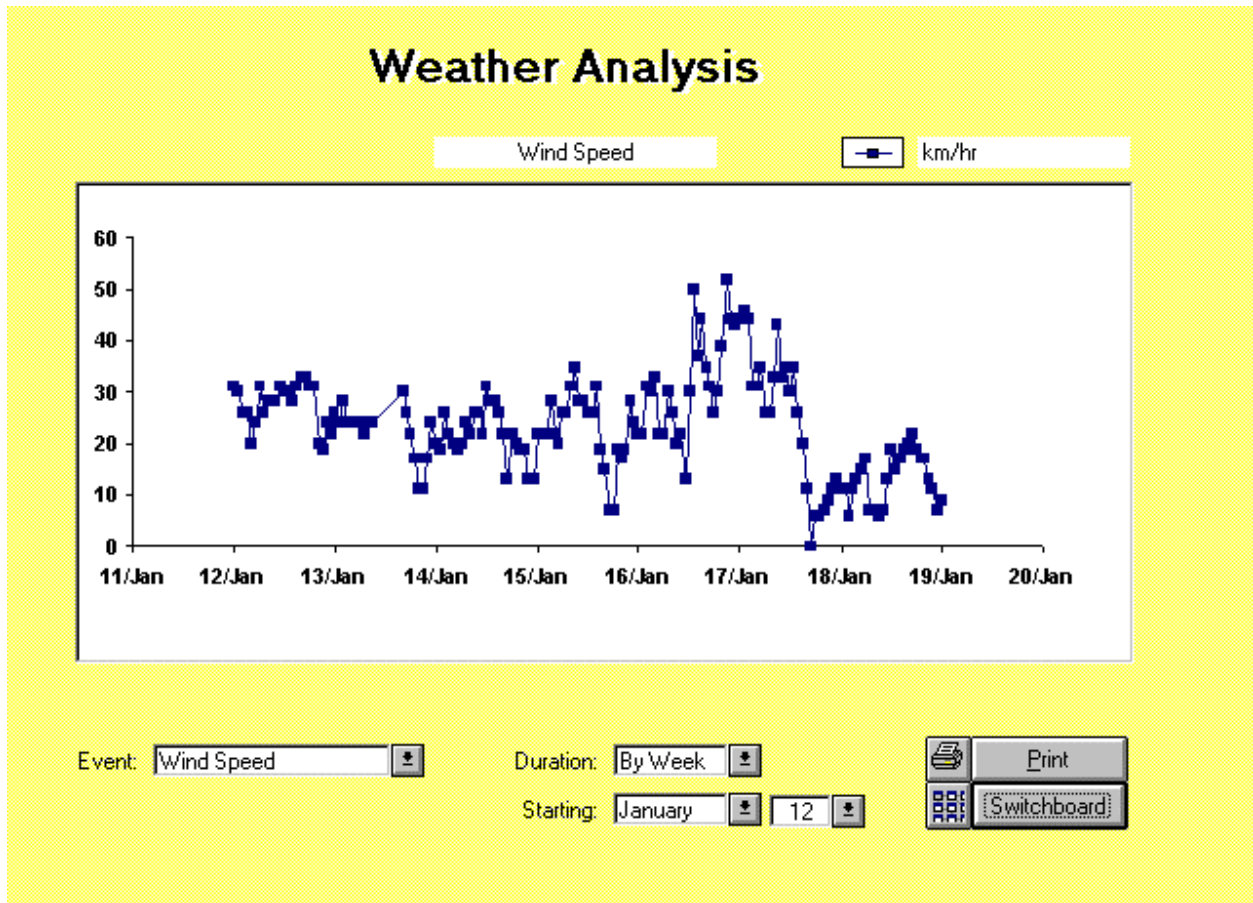


Figure 5.4: Weather Analysis Screen

Toolbar Buttons at the Bottom of the Screen:

- Help: Directs the user to the Help section of the program.
- Load: Allows the user to select which RSC is to be reviewed.
- Print: Allows the user to obtain a printed copy of the RSC.
- Load Last: Allows the user to review the most recent RSC.
- Switchboard: Transfers the user to Main Switchboard of the program.
- Clear Form: Clears the RSC on the screen.



## 5.6 Export to Excel

A screen with the following choices appears when the Export To Excel button is pushed:

- (a) DATA TYPE: The user can select which data type is to be exported using the combination box provided. The data types include:
  - Consumable data;
  - Daily weather data;
  - Equipment data;
  - Hourly weather data;
  - Labour data;
  - Operations Log data;
  - RSC data.
- (b) ENTRIES FROM: Allows the user to specify the starting date for the data to be exported.
- (c) ENTRIES TO: Allows the user to specify the ending date for the data to be exported.
- (d) EXPORT: Transfers the user to Windows where the user can specify the destination of the file to be exported.

## **APPENDIX**

### **WEATHER DATA INPUT FILE FORMAT**

(Provided by Environment Canada, which supplied the weather data  
used for program development)



The file format for hourly data files

ftl.078

ftl.074

ftl.076

ftl.156

is :

ssssssssyyyymmdeeeXXXXXXXX YYYYYYY .... ZZZZZZZ

Each line is a day with 24 hours

sssssss is the station ID (Dorval = 7025250)

yyy is the year (997 for 1997, etc)

mm is the month

dd is the date

eee is the element (078 = temperature unit 0.1 degree)

(074 = dew point unit 0.1 degree)

(076 = wind speed unit 1 km/h)

(156 = wind direction unit is 36 points 36=N, 9  
=E, 18=S, 27=W, etc)

XXXXX and all others 6 digits group are the data

The first group is the 00h (EST) the last is 23h (EST)

The format of the daily data files

ftl.010

ftl.011

ftl.012

ftl.179

is :

ssssssssyyyymmdeeeXXXXXXXX YYYYYYY .... ZZZZZZZ

Each line is a month with 31 days

sssssss is the station ID (Dorval = 7025250)

yyy is the year (997 for 1997, etc)

mm is the month

eee is the element (010 = rainfall unit 0.1mm)

(011 = snowfall unit 0.1cm)

(012 = total precip. unit 0.1mm)  
(179 = duration of sunshine unit 0.1hr)

NB

000000T means a trace of precipitation  
-99999M means missing.