FIRI

Farm irrigation rating index

User Manual

Version 1.2
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USDA Natural Resources Conservation Service (NRCS)

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Chapter 1- Overview

Introduction

WELCOME to FIRI, an on farm irrigation efficiency estimating program. This is a specialized program intended to be used by technical personnel employed by the USDA Natural Resources Conservation Service (NRCS), Conservation Districts, or by anyone who needs to estimate of seasonal farm irrigation efficiency on a field by field basis. The Farm Irrigation Rating Index (FIRI) provides a uniform and objective evaluation method for planning irrigation water conservation. It provides good documentation of the effects of improvements in irrigation management practices and system changes.

It is important to understand that FIRI analyzes **seasonal** irrigation efficiencies. These are not the same as potential efficiency for a particular system for a single irrigation. Seasonal efficiencies take into account scheduling, water measurement, irrigator skill and other factors that will impact irrigation water use efficiency over an entire irrigation season.

This Windows based program is designed to replace several DOS based programs that have been in use by the NRCS and others for a number of years.

FIRI is specifically designed to perform computations based on the following publication:

> "Farm Irrigation Rating Index (FIRI), a method for planning, evaluating, and improving irrigation management", USDA, Soil Conservation Service, West National Technical Service Center, Portland Oregon, June 1991.

Program History

The FIRI process has been used extensively by the Natural Resources Conservation Service (NRCS) to analyze on farm irrigation system efficiency. David Taylor, NRCS, Wyoming, developed the original DOS version of the program for performing FIRI calculations. Several enhanced versions were developed. Those versions were named "FIRS". David Taylor's program was modified slightly by John Dalton, for use in Montana. That version was named "FIRI".

The direction given for the development of the Windows version of the FIRI calculation program was to prepare a Windows based program that strictly follows procedures in the Farm Rating Index publication, but will allow for modification of the base data without having to modify program code.

Statistical Method of Calculating Efficiency

Recent review of the FIRI process by water management researchers has led to the recommendation that the original process of directly multiplying together efficiency factors be changed to a statistical approach. The recommended statistical approach as been included as an option in the current FIRI program.

A.J. (Bert) Clemmens, Hydr. Engr, U.S. Water Conservation Lab., USDA/ARS, Phoenix, AZ, is co-author of the ASCE paper "Estimation of Global Irrigation Distribution Uniformity". This paper describes the following formula:

DU = 1 – sqrt**[** (1-DUa)^2 + (1-Dub)^2+ .....**]** where DUa is the DU you would calculate based on the variation in parameter a, similarly DUb for parameter b, etc. for as many parameters as you have.

Mr. Clemmens states the following in correspondence discussing the formulas applicability to FIRI:

> "The implication is that if one parameter causes poor distribution, the other parameters have less influence. The differences get more striking when you add more parameters. The multiplication approach essentially assumes a worst case scenario where each influence has full weight regardless of other factors. The statistical approach recognizes that if one condition is poor, that the influence of another variable is not as great as it would be if it were the only problem."

The re-use "R" factor is multiplied after the rest of the factors are statistically combined.

System requirements and installation

The FIRI program requires Windows 95/98/NT/2000/XP. At least 21 MB of free hard disk space should be available for the program. The space will vary depending on the amount of database data, the number of jobs archived in the job database, and whether or not the Borland database engine has previously been previously installed.

Remove any previous versions of FIRI before installing this FIRI 1.0 version. To remove the FIRI program from the computer, use the Windows *Add/Remove Programs* utility. Use only standard windows uninstall procedures, since the database registry must be properly uninstalled.

Recommended screen setting is 1024 x 768 pixels or higher. A screen setting of 800 x 600 pixels will also work, but not as well.

Installation of the program is handled by a standard windows install procedure. Standard install procedures must be followed since the database elements of this program must be properly registered in Windows.

- Install from CD-ROM

If the program is distributed on CD-ROM, insert the CD-ROM. Locate the **setup.exe** file and click on it. Follow the directions on the screen. The program will be installed under the c:\ProgramFiles\USDA\FIRI directory.

- Download from internet and install

If the program is downloaded from the Internet, a single executable file will be downloaded. Click on the downloaded file and follow directions on the screen to install the program. The version downloaded from the NRCS site is a CCE certified version. This version is the only one certified for use on NRCS networked computers. It will also work on non-networked, non-NRCS computers.

- Database administration tool (BDE Administrator**)**

When FIRI is installed, the BDE Administrator is also installed, if it is not already installed. This tool may be accessed from the Windows Control panel. Click the tool's Help menu to find out how to use it.

The Borland Database Engine manages the local Paradox compatible database that is used by FIRI. If for some reason you get an error message that the program is unable to access the database, the BDE Administrator can be used to re-establish the connection so the Database Engine will know where to access the database and what kind of database it is.

The database aliases should be shown in the BDE Administrator. This is named ***IWRpm***. If this alias has been corrupted, or the database directory has been moved, re-establish the alias. The data that the alias should contain is as follows:

Type	STANDARD
DEFAULT DRIVER	PARADOX
ENABLE BCD	FALSE
PATH	(Navigate to the FIRI database directory)

- Program Problems

When making bug reports or getting help with program problems please make a copy of the program's detailed report for the job being run. The report may be submitted in hard copy or as a "*.QRP" file that is generated when using the detailed report save button.

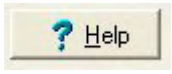
Make bug reports or comments to: Irrigation Engineer (Clare Prestwich), USDA-NRCS, West National Technology Center, 1201 NE Lloyd Blvd, Suite 1000, Portland Oregon 97232. Email Clarence.prestwich@por.usda.gov Phone (503) 414-3075.

Help Facilities

Normal Windows on-line help facilities are available.

- **Menu Bar**- From the menu bar, select the **Help** menu item. Menu items include **Contents**, **Search for Help on** and **About**. The **About** item will display information about the latest version of this program.

- **Help Buttons**- Three forms of help buttons are included.



Located at the top of the dialog or window, this button brings up general information about using the current dialog or window.


Located in the FIRI Factor dialogs, this button brings up specific information about the FIRI factor.


Located in the FIRI Factor dialogs, this button brings up a graphical factor chart as presented in the FIRI manual.

- **F1 key**- Context sensitive help is available at some data entry points. Click F1 when the data entry item has been selected.

- **Tips**- Pop up tips show up when certain buttons or entry points are pointed to with the mouse.

- **User Manual**- The user manual is available in the **FiriMan.pdf** file. This is an Adobe Acrobat file. Nearly all material in the on-line help is contained in the manual. The Adobe Acrobat Reader program is free, is widely available, and can be downloaded from www.adobe.com. It is required to read and print this documentation. Please be sure to read the documentation.

Chapter 2-Program Basics

General

This program has been designed to lead the user through selection of FIRI factors that are described in the FIRI manual. Reports may be viewed and printed or saved for use in other documents or presentations.

Technical capabilities of the program

The main menu

The main menu drops down selections are as follows:

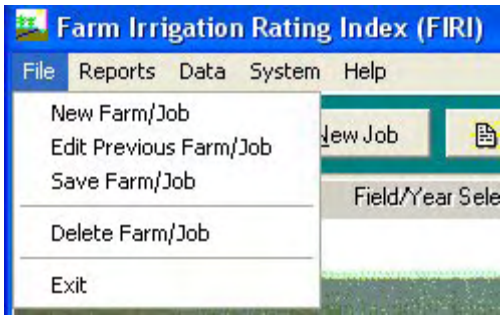


Figure 2.1

File menu (Figure 2.1)

- **New Farm/Job**

Starts a new FIRI job. The 

button serves the same purpose.

- **Edit Previous Farm/Job**

Load and review or edit an existing FIRI job. The 

button serves the same purpose.

- **Save Farm/Job**

Save the current FIRI job. The 

button serves the same purpose

- **Delete Farm/Job**

A dialog appears that will allow deleting previously saved jobs.

- **Exit**

Exit FIRI. If the current FIRI job has not been saved, a dialog will come up and prompt for a save. The 

button serves the same purpose.

Reports menu (Figure 2.2)

Figure 2.2

- **List of jobs**

View and print a list of currently stored FIRI jobs.

Data menu (Figure 2.3)

Figure 2.3

- **Base Data**

A dialog comes up that will allow editing the factor base data database. See Chapter 4 for details.

- **Irr System Data**

A dialog comes up that will allow viewing or editing the irrigation system potential efficiency database. The data in this database is password protected. Set up for editing as described under System defaults.

System menu (Figure 2.4)

Figure 2.4

- **System Defaults**

Figure 2.5 will be displayed.

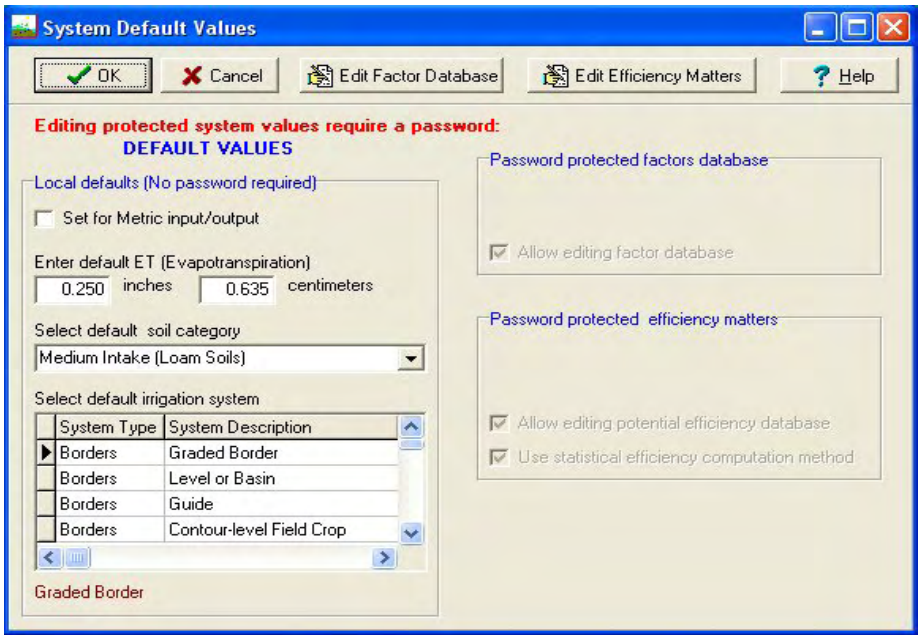


Figure 2.5

- **Local defaults (No password required**)

1. Set for metric input/output

   Check this box to display all input and output in metric units.

2. Enter default ET (Evapotranspiration)

   This is the default daily ET for the peak water use month in the area. Use the IWR program or get from the local irrigation guide. This value varies by crop, so use a typical value for the crops grown in the area.

3. Select default soil category

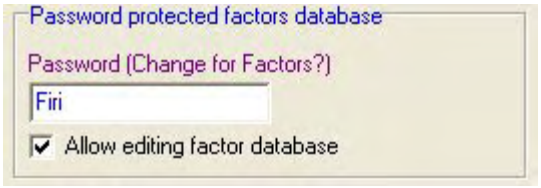
   Used to select the runoff/deep percolation ratio. Select from one of the three in the list.

4. Select default irrigation system

   Select the most often used type of irrigation system in the area.

- **Password protected factors database**

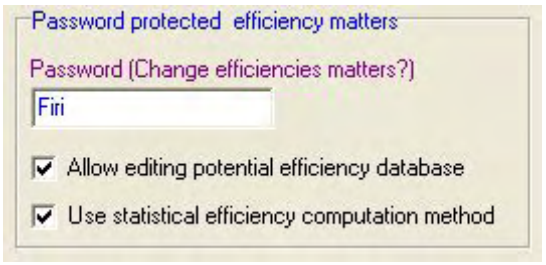
Clicking the ***Edit Factor Database*** button will display a dialog allowing entry of a password. Entry of the correct password will display the password and will activate the *Password protected factors database* box.



Checking the *Allow editing factor database* check box allows editing the factors database. When the box is checked, a navigator bar  will be displayed in all factor dialogs that allow changing factor information and data in the factor database.

- **Password protected efficiency matters**

Clicking the ***Edit Efficiency Matters*** button will display a dialog allowing entry of a password. Entry of the correct password will display the password and will activate the *Password protected efficiency matters* box. The password is displayed in the box and may be changed.



Checking the *Allow editing the potential efficiency database* check box allows editing the potential efficiency database. When checked, the *Irrigation System Potential Efficiency Editor* may be used to add systems and modify system values and descriptions. The editor is found under the *Data/Irr System Data* main menu item.

Checking the *Use statistical efficiency computations* check box sets a switch which calculates efficiency using the statistical method described in Chapter 1 of this document. Un-checking the box calculates efficiency based on a simple multiplication procedure.

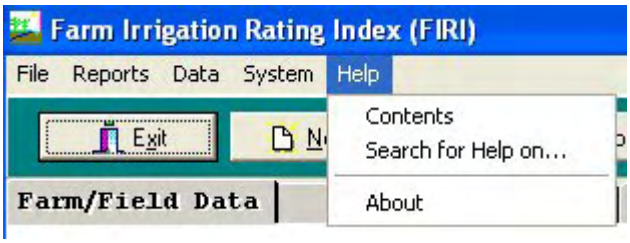


Figure 2.6

Help menu (Figure 2.6)

- **Contents**

A Windows help dialog will appear and help subjects may be selected.

- **Search for Help on**

A Windows help dialog will appear allowing search for help items.

- **About**

A dialog will appear which describes information about the current version of the FIRI program and the program author's contact information.

Moving between data entry fields

Use the ***TAB*** key or the ***mouse*** to move from one data entry field to another. Using the ***TAB*** key automatically moves to the next appropriate entry field. Most fields are laid out in the preferred sequence of entry.

Using window tabs

Figure 2.7

The main window contains tabs at the top of the work area. Click these with the mouse to get into another part of the current window.

Data should be entered by starting at the left tab and moving to the right. You will not be allowed to move to the next tab unless required data have been entered in the current tab screen.

Using database navigation button bars

Some windows use a navigation button bar to navigate within a database. These are the left and right arrows shown in Figure 2.9.

The vertical scroll bar on database tables may also be used to move from record to record.

Some windows also have additional buttons that allow inserting, editing and deleting database records.

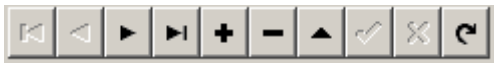


Figure 2.8

The buttons are as follows

 Navigate from record to record.

 Insert Record

 Delete Record

 Edit Record

 Post Edit

 Cancel edit

 Refresh data

When in the edit mode, the keyed in data is not posted to the database until the Post record button is clicked. You may also navigate to the next record and the edited record will be posted.

To add a record at the end of a table, use the keyboard down arrow to move beyond the last record and enter a new record.

Printing reports

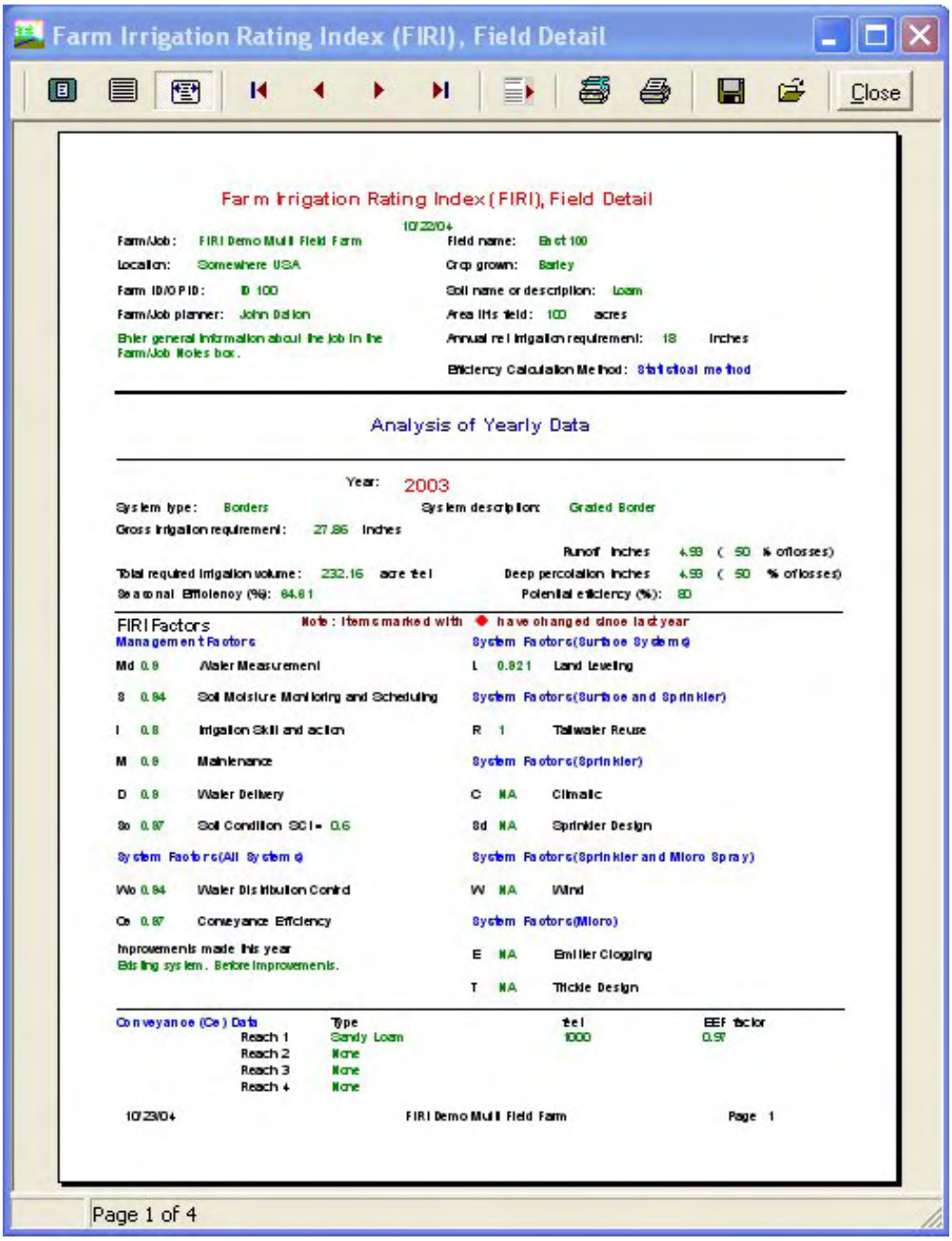


Figure 2.9

Report windows have buttons that will allow viewing and printing appropriate reports. All reports use the same report generator. The report takes a little time to be generated on slow machines.

Figure 2.10 illustrates the button bar. Some reports are multiple pages long. Use the appropriate buttons to scroll from page to page.

Figure 2.10

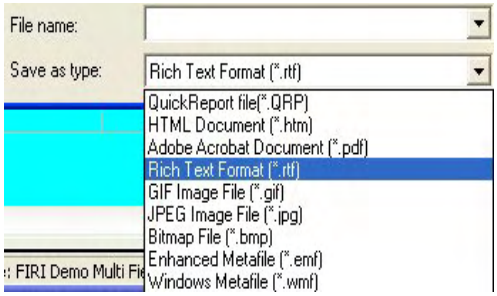


Figure 2.11

Reports may be saved to a file in various formats. Figure 2.11 shows the drop down menu that allows selection of a format that the report may be saved in. The RTF format is a universal format that can be interpreted by most late version word processors. The PDF format may be viewed using the Adobe Acrobat reader program. QRP format files may be read from any FIRI report by clicking the *Load Report* button on the report button bar.

Use the ***print*** button to print the report.

Saving a job

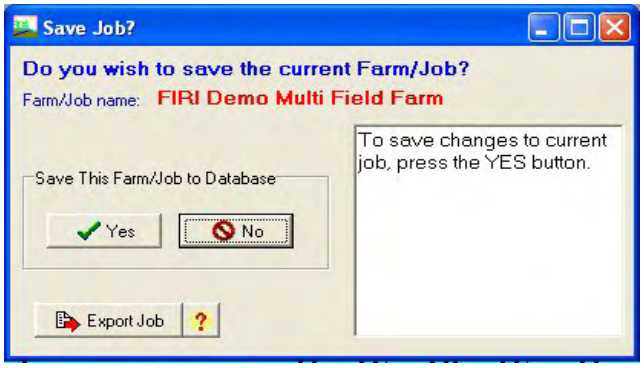


Figure 2.12

The current job may be saved to the database for future use. If you exit the program, and any modifications have been made to a job, a dialog similar to the one in Figure 2.12 will pop up and you may select whether or not to save the job. The *Delete Farm/Job* menu item may be used to delete jobs no longer needed

Note that jobs are saved by name. All names must be unique. If more than one version of a job is saved, add a version number to the name.

Exporting/importing jobs between computers

Any job may be exported to another computer. When the FIRI program was installed, a folder named **"FiriTransfer"** was installed in the FIRI program directory. This directory contains database files that are transferred from the main database directory when the ***Export Job*** button, as shown in Figure 2.12 is clicked. These database files are Paradox compatible files that can't be read with a text editor.

Copy the entire folder and replace the same named folder on the target computer. The target computer must be running the same version of FIRI as is used on the originating computer. Note that the folder may be transmitted via Email or by floppy. The folder should fit on a single floppy. If it does not, try using a zip utility to compress the folder and its contents.

On the import computer, simply click the ***Import Job*** button when loading a previous job. After viewing the job, it may be saved to the target computer's database. The job name might need to be changed if there is already a job with the same name on the target computer. Saving as a file with the same name will replace the job that is already stored.

Chapter 3-FIRI Job Creation & Editing

Creating a new job: General job data, 1st Page

When the program starts, the following window will appear. Select either the ***New Job*** or **Previous Job** button.

Figure 3.1

Figure 3.1 shows the initial program window. Note that the Tabs are faded out. They will not work unless you are working on a FIRI job.

Start a completely new FIRI job by clicking the ***New Job*** button. The window shown in Figure 3.2 will then be displayed.

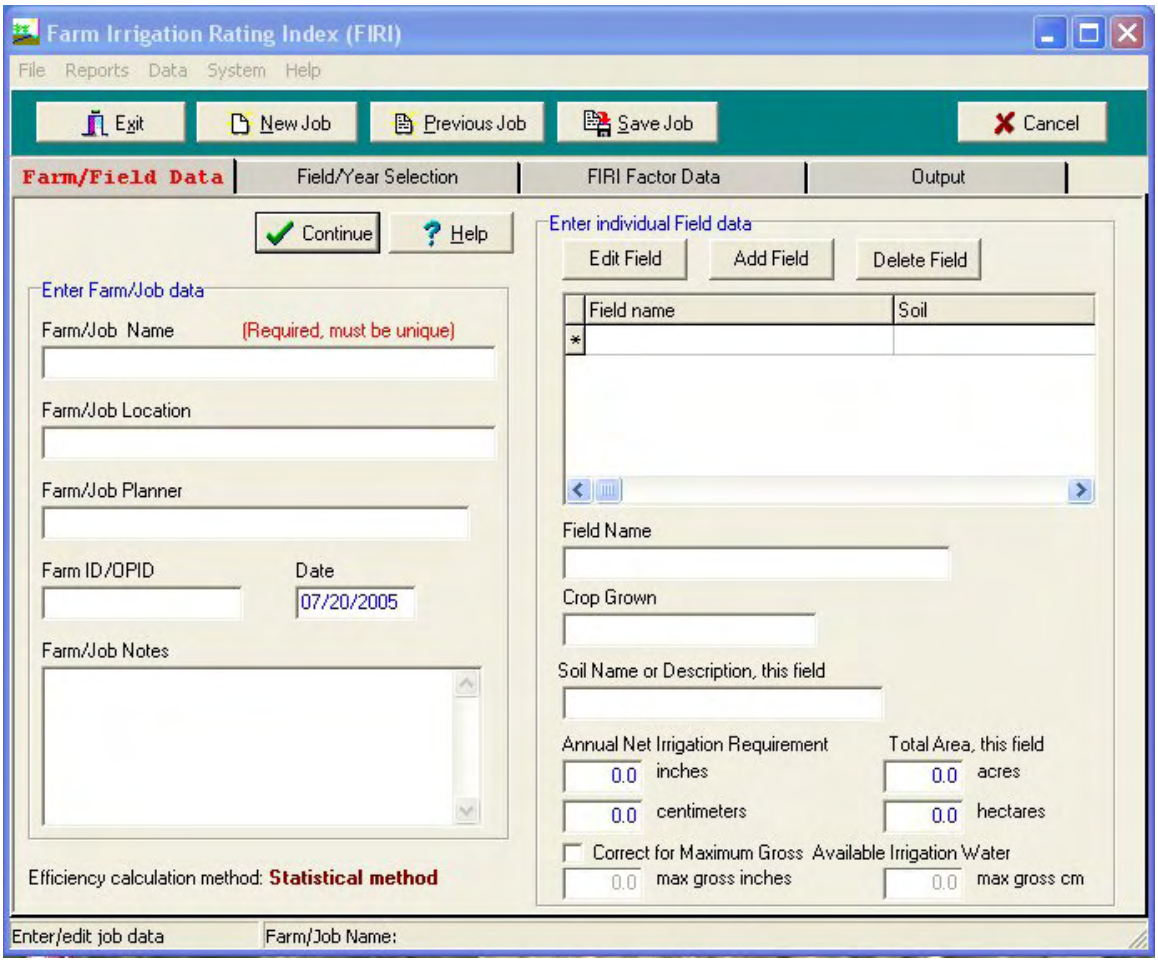


Figure 3.2

Enter Farm/Job data

- **Job identification**

1. A unique Farm/Job name must be entered. The name is used by the database to keep track of this job. If you want to make additional alternatives of a previous job, include a version identification number in the name. If a name that was previously been used is entered, you will be asked if you want to replace the existing named job.

2. Enter appropriate data in the *Farm/Job Location*, *Farm/Job Planner*, and *Farm ID/OP ID* fields.

- **Farm/Job comments**

Enter general notes pertaining to this Farm/Job, as needed. Click the ***TAB*** key to move to the Field data entry page.

Enter Individual Field Data

For a new job, when the ***TAB*** key is used to move into the *Enter Individual Field data* box, the cursor will go to the *Field Name* entry location. Enter the field name and ***TAB*** to the next entry location.

Any number of fields may be entered for a Farm/Job. Use the ***TAB*** key to move between fields. Use the ***Edit Field***, ***Add Field*** and ***Delete Field*** keys to edit, add or delete fields from the database.

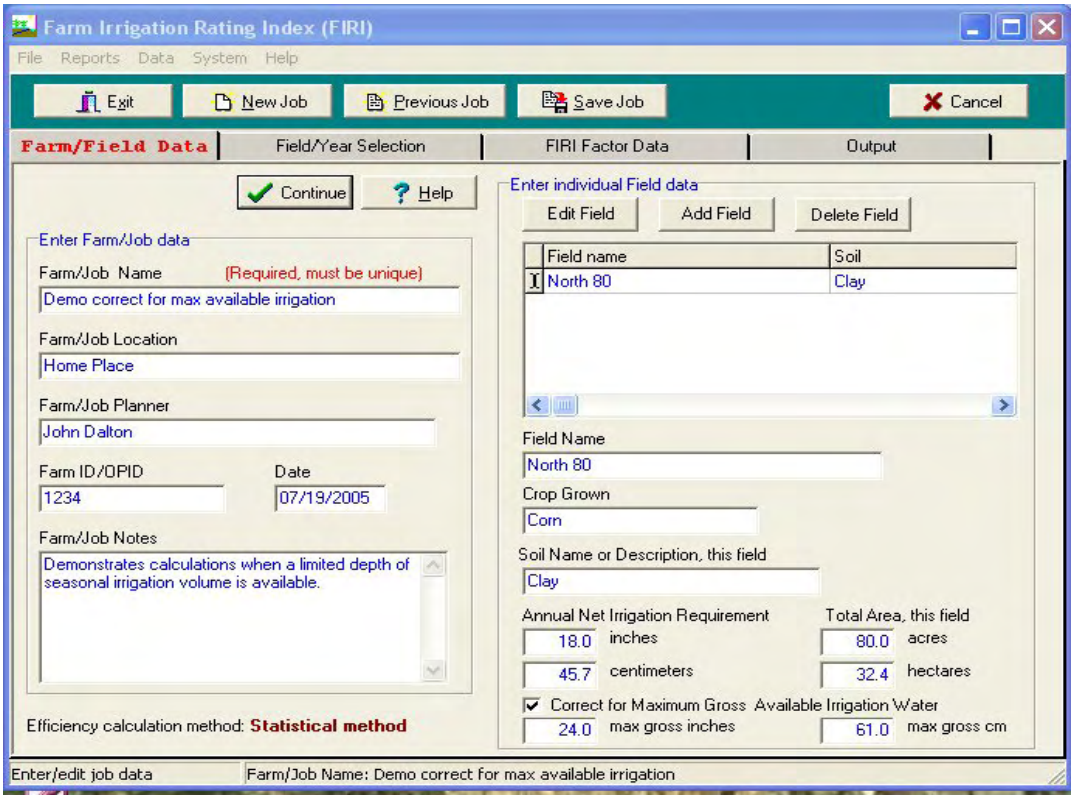


Figure 3.2a

- **Field Name**

Enter a unique name for the field.

- **Crop Grown**

Enter a description of the crop or crops to be grown.

- **Soil Name or Description, this field**

Enter the soil name or a description of the predominant soil in the field,

- **Annual Net Irrigation Requirement**

Use the IWR program or local irrigation guide to determine annual net irrigation requirement for the crop to be grown. Enter either metric or English units and the other unit value will be calculated.

- **Total Area, this field**

Enter the total area of the field being analyzed. Enter either metric or English units and the other unit value will be calculated.

- **Correct for Maximum Gross Available Irrigation Water**

Clicking this item to active state will allow entering a depth that represents the maximum total gross depth of irrigation water that is available to the irrigator during the season. The program will output corrected deep percolation and runoff based on the maximum available water if that is less than the annual net irrigation requirement. The corrected runoff and deep percolation will be based on efficiencies calculated for the net irrigation requirement.

Go to the Field/Year Selection Page

Either click the **Continue** button or click the **Field/Year Selection** Tab to move to the next page.

Field/Year Selection, 2nd Page

A window similar to Figure 3.3 appears.

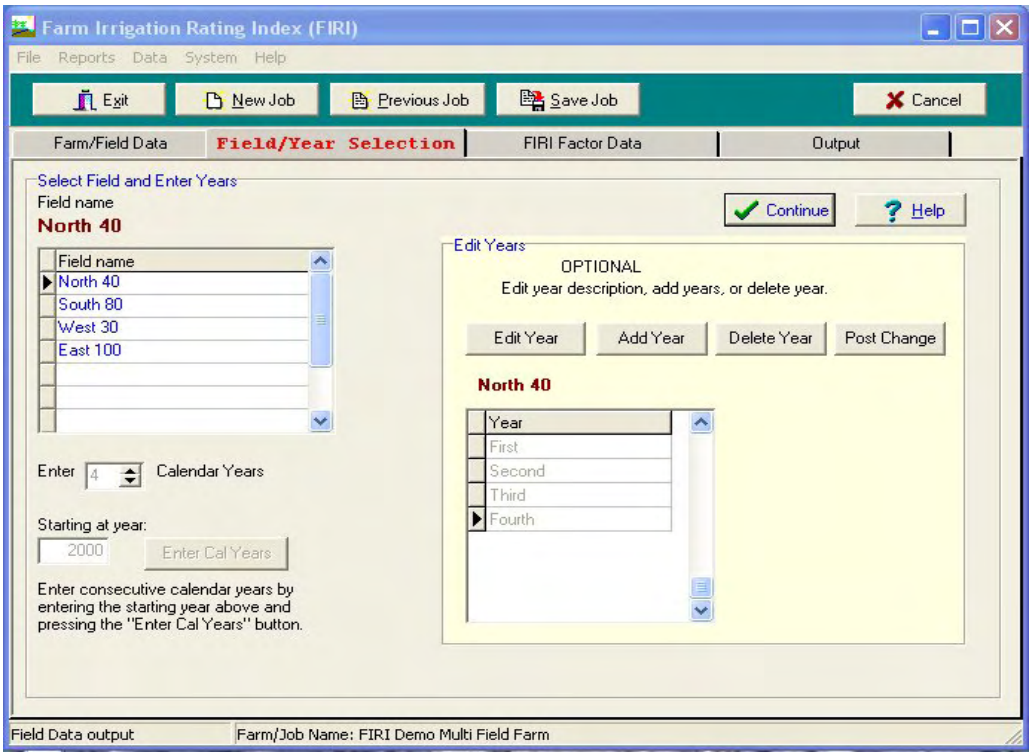


Figure 3.3

The page shown in Figure 3.3 will be displayed. Fields entered on the previous page will be displayed under field name. The purpose of this page is to enter or modify the years to be analyzed for each field. When years are entered in the database, default values are entered for factors. If a year is added, the default values are the values for the previous year.

Initial entry of years for a field

1. Select a field by clicking the appropriate Field in the list.

2. Select number of years to be analyzed

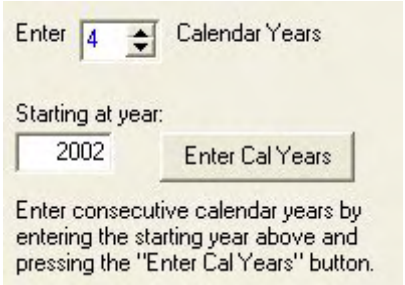


Figure 3.4

As shown in Figure 3.4, use the up/down arrows in the *Enter Calendar Years* entry field to select an appropriate number of years.

3. Select a starting year

   The default-starting year is the current year. If desired, manually enter a later year in the entry field.

4. Click the ***Enter Cal Year*** button.

   The years database will be populated and will appear in the *Edit Years* list.

5. Select another Field

   Perform actions 1 through 4 for all fields.

Edit, Add or Delete years

Use the buttons to edit the year descriptions, add new years or delete years. When all changes have been made, post the changes by clicking the ***Post Change*** button.

The year description may be a text description (e.g. First, Second, Third, Fourth, etc) or actual calendar years (e.g. 2003, 2004, 2005, 2006, etc).

Go to the FIRI Factor Page

Either click the ***Continue*** button or click the ***FIRI Factor Data*** Tab to move to the next page.

FIRI Factor, 3rd Page

The following dialog appears.

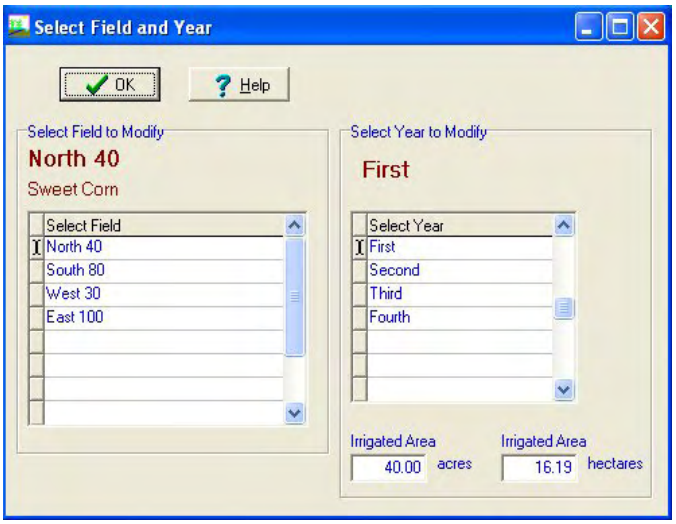


Figure 3.5

Select Field and Year in dialog

- **Select Field**

First click on the appropriate Field in the Select Field list box.

- **Select Year**

Next click on the appropriate year in the Select Year list box.

- **Set irrigated area**

The total field area appears by default in *Irrigated Area* entry area. This may be changed if the irrigated area is less than the field area. For example, this might be used when converting from a surface irrigation system to a pivot sprinkler system.

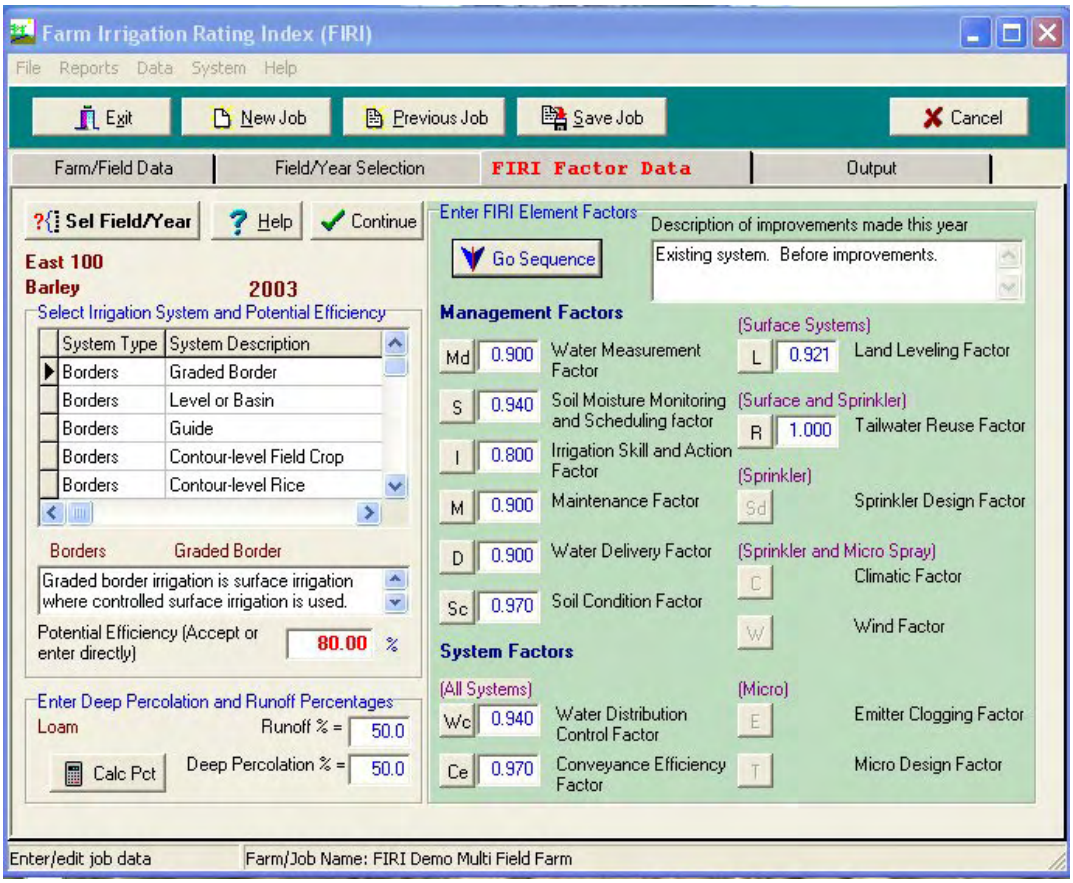


Figure 3.6

Select Irrigation System and Potential Efficiency

Click on an appropriate System type/description. An explanation of the system is displayed below the list. The potential efficiency is displayed in the entry field at the bottom of the box.

It potential efficiency may be manually entered. Changing the default potential efficiency is **not** recommended, since changing that value would negate much of the system comparison value of the FIRI process.

Enter deep percolation and runoff percentages

When a system is selected, default percent deep percolation and runoff values are set. These values depend on both system type and soil conditions. The default soil intake (low, medium or high intake) is set in the local default values section of the *System Default* Dialog. See Chapter 2 of this document.

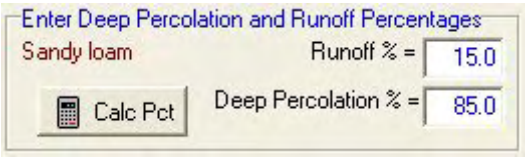


Figure 3.7

Deep percolation and runoff percentages may be entered directly or may be calculated by clicking the **Calc Pct** button. Total of the two percentages must equal 100 percent. Deep percolation depends on soil characteristics. Consult the local irrigation guide.

If the **Calc Pct** button is clicked, the dialog shown in Figure 3.8 is displayed.

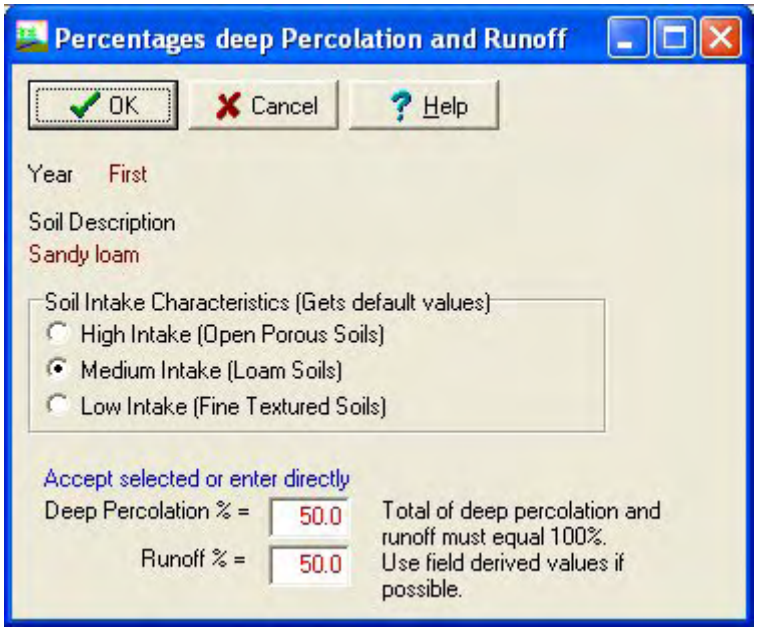


Figure 3.8

Click on the appropriate check box in Figure 3.8 or enter the values directly. Then click on the ***OK*** button

Description of improvements made this year

A text entry box is located in the upper right hand corner of the screen. Enter a description of improvements made this year. This is an optional entry.

Proceed to FIRI Element Factor Entry

Depending on the type of irrigation system that is selected, only the FIRI factors applicable to that type of system will be accessible.

There are two ways to proceed with data entry. One is to click each factor button individually. This will pop up a dialog that will allow entering or selecting the appropriate factor value. The other is to click the ***Go Sequence*** button that will lead the user through all required entry dialogs. The ***Go Sequence*** procedure is recommended for the first year of a new job. The individual button procedure is recommended for editing subsequent years or previously entered data.

FIRI Factor dialogs, general

Each pop up dialog is unique. Some are very similar. All have similar buttons at the top of the dialog. The following will explain use of these dialog buttons.

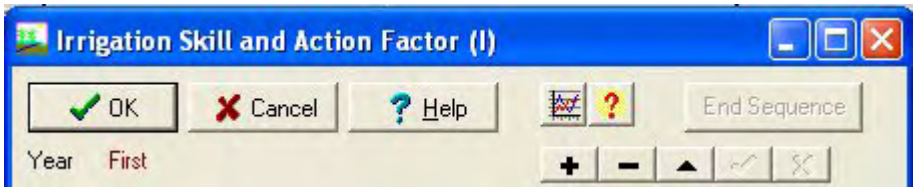


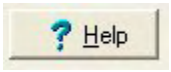
Figure 3.9

- **OK Button**

After all entries have been made, click the ***OK*** button. This may perform some final calculations and will save the factor data to the database.

- **Cancel Button**

This will cancel changes made in the dialog. Changes will not be saved to the database. Clicking the window **X** button will do the same.

- **Help**  **Button**

This button will bring up general help for using the factor dialog.

- **Help**  **Button**

This button will bring up a dialog showing the original FIRI documentation graph for the factor.

- **Help**  **Button**

This will bring up documentation concerning technical details of the FIRI factor.

- **End Sequence Button**

This button is enabled only when in the sequence mode. Clicking the button will exit the sequence mode.

- **Navigation Bar** 

The database navigation bar is displayed only when the *Password protected factors database* box is checked in the system default dialog. This will allow the user to edit factor data and

comments that are displayed in the factor dialog. Not every factor dialog may have it's factor data and comments modified.

FIRI Factor dialogs, specific

- **(Md), (S), (I), (M), (Wc), (Sd) dialogs**

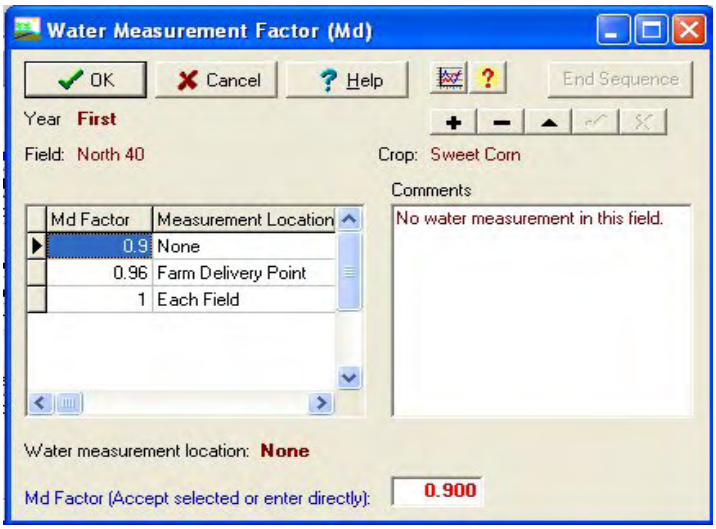


Figure 3.10

Several dialogs are similar to the one shown in Figure 3.10. Select the appropriate factor from the selection list (recommended). As an alternative, the user may enter the factor directly in the entry field.

Note the navigation bar that appears in the upper right of the box. This bar will only appear when the system is set to allow modification of the database. See chapter 2. If it shows, the user may add to, edit or delete items in the factor database.

The Comments section may be edited if the navigation bar is present. This may be used to provide further explanation of each selectable item.

Click the ***OK*** button to accept the factor and move on.

Water Delivery (D) dialog

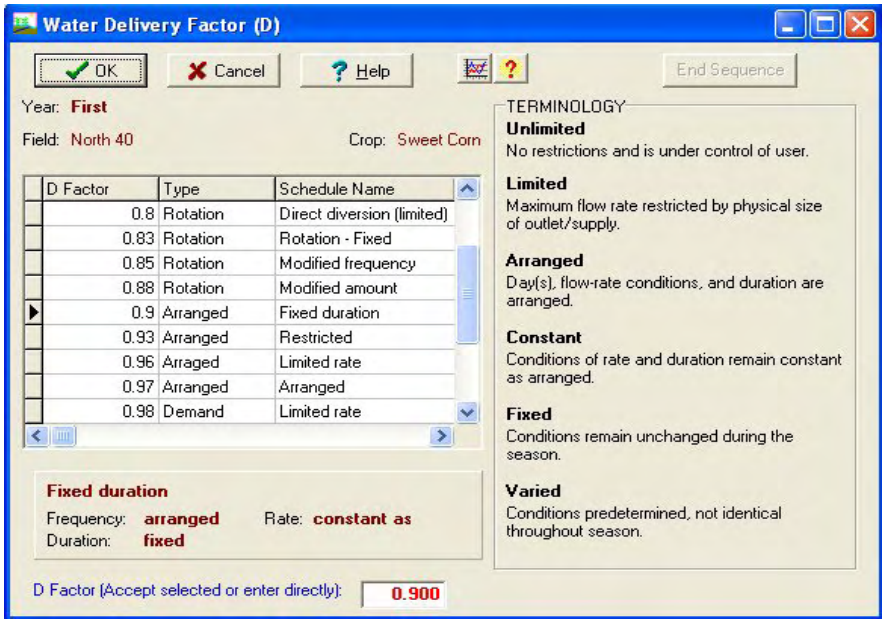


Figure 3.11

Simply select the appropriate factor or enter one directly. An explanation of terms shows in the box to the right.

- **Soil Condition Factor (Sc) dialog**

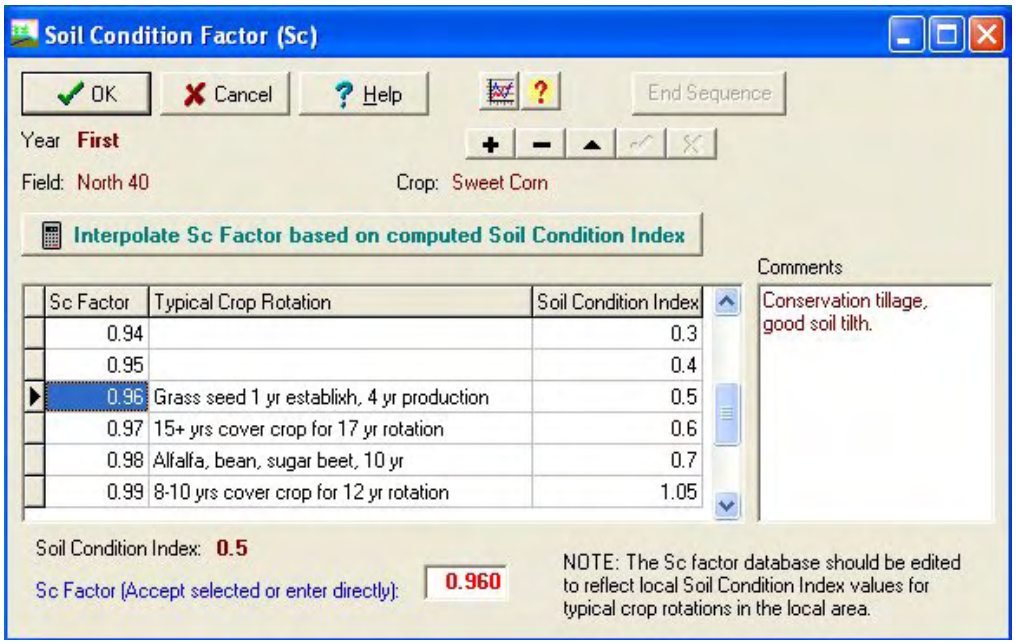


Figure 3.12

The soil condition factor is based on a soil condition index. There have been improvements in computing a soil condition index since the original publication of the FIRI document. NRCS Computer spreadsheets are available to compute the index based on specific crop rotations in specific areas. It is recommended that locally computed soil condition indexes be used to determine the FIRI soil condition (Sc) factor.

Typical crop rotations based on local soil condition index values should be included in the FIRI database. Edit the FIRI soil condition database to show these typical crop rotations. This will allow their rapid selection during FIRI job runs.

There are three ways to enter the FIRI soil condition (Sc) factor:

1. Enter the Sc factor directly by typing it in the factor space.

2. Select a typical crop rotation from the selection list.

3. Click the **Interpolate Sc Factor based on computed Soil Condition Index** button.

   Use this option if a specific soil condition index has been computed for the job. A dialog is displayed that allows entering a computed soil condition index. The FIRI Sc factor will then be computed.

- **Conveyance Efficiency (Ce) dialog**

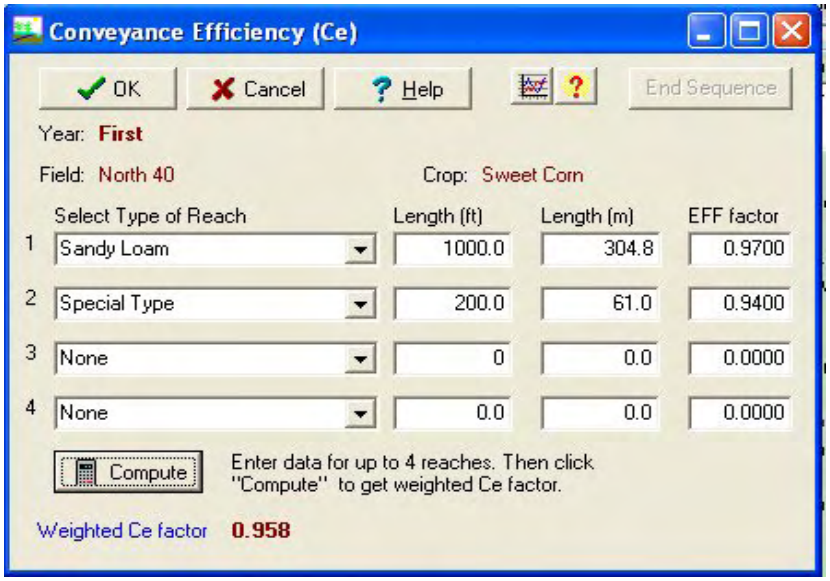


Figure 3.13

This is a unique dialog. Up to four reaches of ditch or pipe may be selected. First select the type of reach from the drop down selection list. Then TAB to the Length. Enter the length of segment. If entering feet, meters will automatically be calculated. Note the FIRI default *EFF* factor has been entered by the system. The user may manually enter an EFF factor if better information is available.

In the example a “Special Type” has been selected. The “Special type” is used where the other reach types are not descriptive of the conveyance material, and the user has information on an *EFF* factor that should be used.

When data for all reaches has been entered, click the ***Compute*** button. A weighted Ce factor will then be displayed. Click the ***OK*** button to accept and proceed. If you forget to click the ***Compute*** button, the computation will be done when the ***OK*** button is clicked

- **Land Leveling (L) dialog**

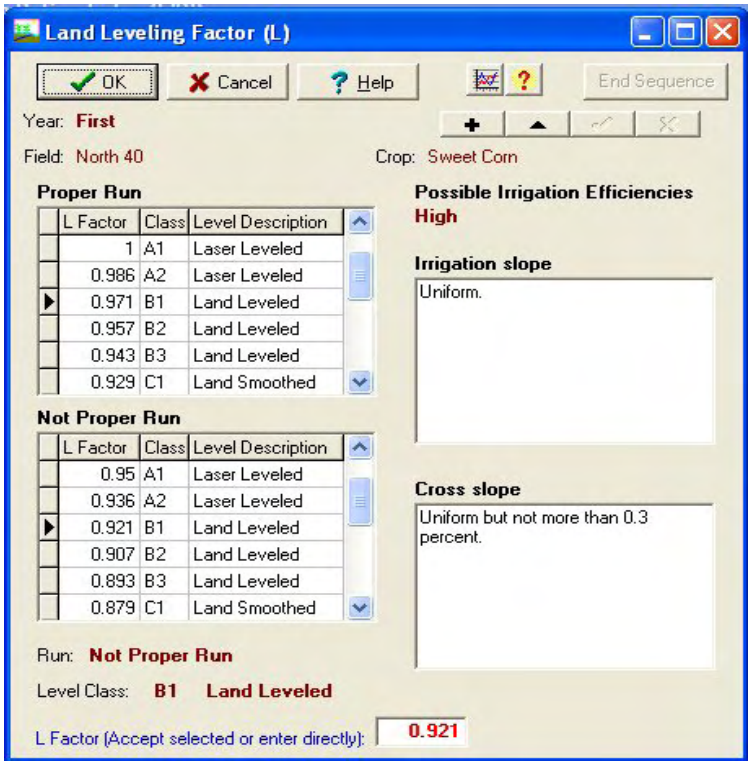


Figure 3.14

There are two selection boxes in this dialog. Select an appropriate factor from either the top or bottom selection box as appropriate. The top box is for proper irrigation runs. The bottom box is for situations where length of run is not appropriate for efficient irrigation. See the Irrigation Guide for an explanation of land leveling classes.

- **Tailwater Reuse (R) dialog**

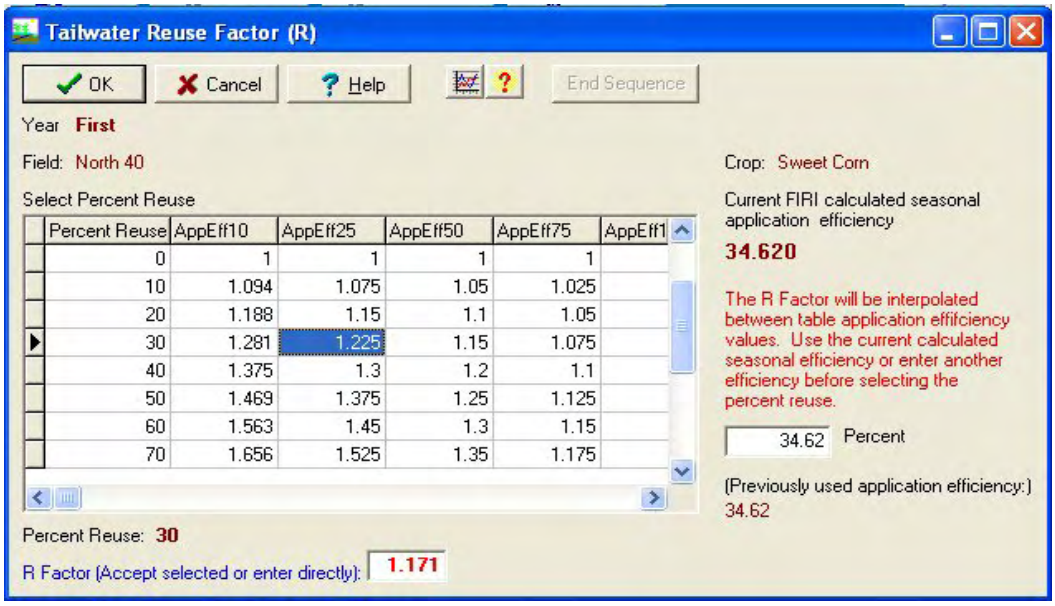


Figure 3.15

The FIRI factors entered up to the point of selecting the tailwater reuse factor are used to calculate a tentative seasonal application efficiency. This efficiency is used to interpolate an R factor from FIRI table application efficiency ranges. The user may accept the efficiency or enter one directly.

After the efficiency is entered, click on an appropriate percent reuse in the selection list. The R factor will be interpolated based on the entered application efficiency. Click the ***OK*** button to accept and proceed.

- **Climate Factor (C) dialog**

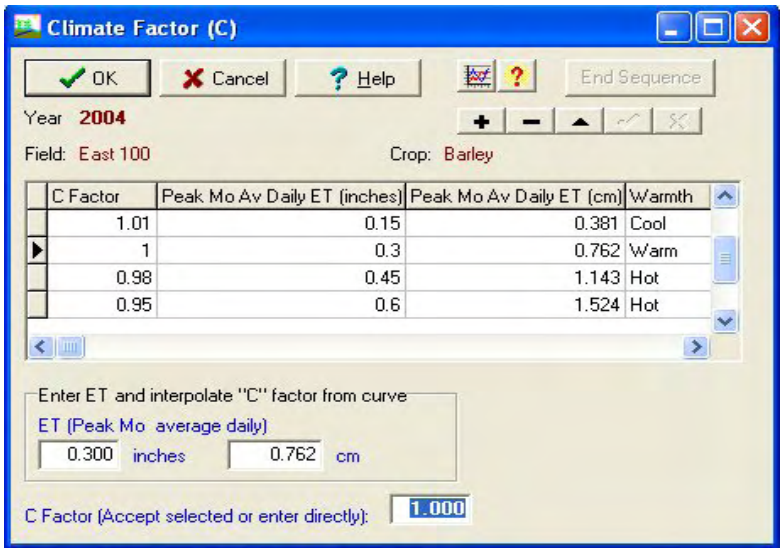


Figure 3.16

There are three ways to enter the climatic (C) factor.

1. Enter the climatic factor directly in the C factor entry field.

2. Select the C factor from the selection list.

3. Enter an appropriate evapotranspiration (ET) value in the *Enter ET* entry field. ET depends on climatic and crop characteristics, and may be determined from the local Irrigation Guide or by running the IWR program.

Click the ***OK*** button to accept and proceed.

- **Wind Factor (W) dialog**

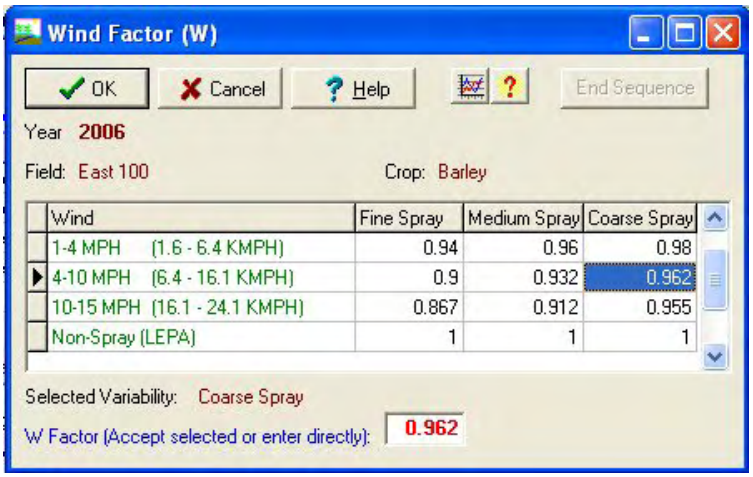


Figure 3.17

Selection from this selection box is accomplished by clicking in the appropriate cell. The W factor may also be entered directly in the W entry field.

Click the ***OK*** button to accept and proceed.

- **Emitter Clogging Factor (E) dialog**

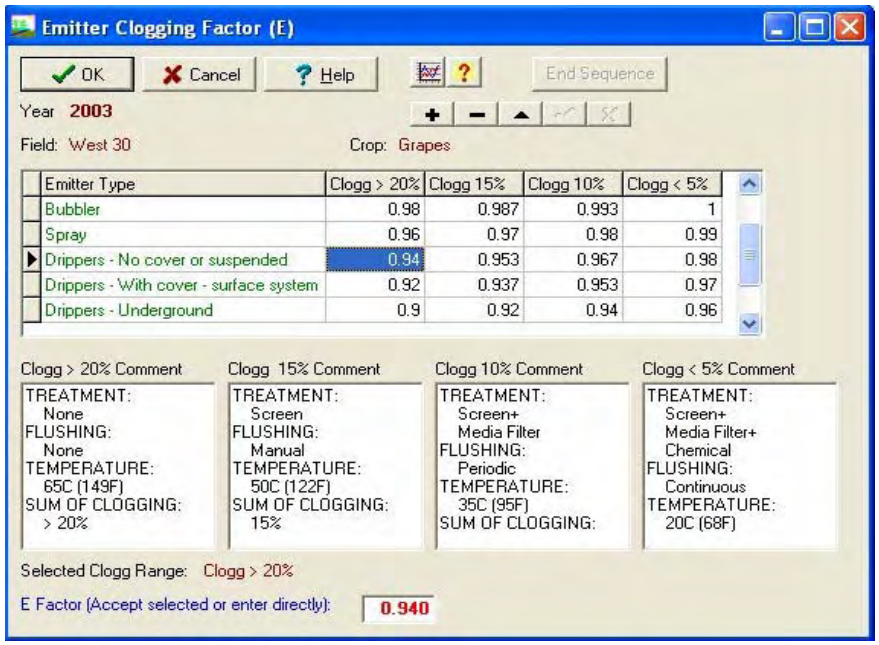


Figure 3.18

Click in the appropriate percent Clogg cell. The E factor may also be entered directly in the E entry field.

Click the ***OK*** button to accept and proceed.

- **Micro (Trickle) Design Factor (T) dialog**

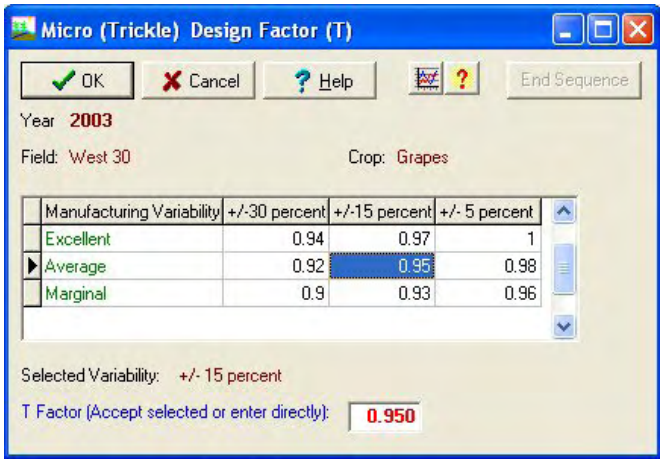


Figure 3.19

Click in the appropriate percent manufacturing variability cell. . The T factor may also be entered directly in the T entry field.

Click the ***OK*** button to accept and proceed.

Entering data for Subsequent Years

To make modifications in factors for subsequent years, click the ***Sel Field/Year*** button. Select the appropriate year from the *Select Field and Year* dialog. Note that the program has entered the first year data in all years. Modify the system type by selecting from the system list. Modify any factor by clicking the appropriate button.

Output, 4th Page

When data for all fields and all years has been entered, click the ***Continue*** button or click the *Output* tab to proceed to the *Output* page.

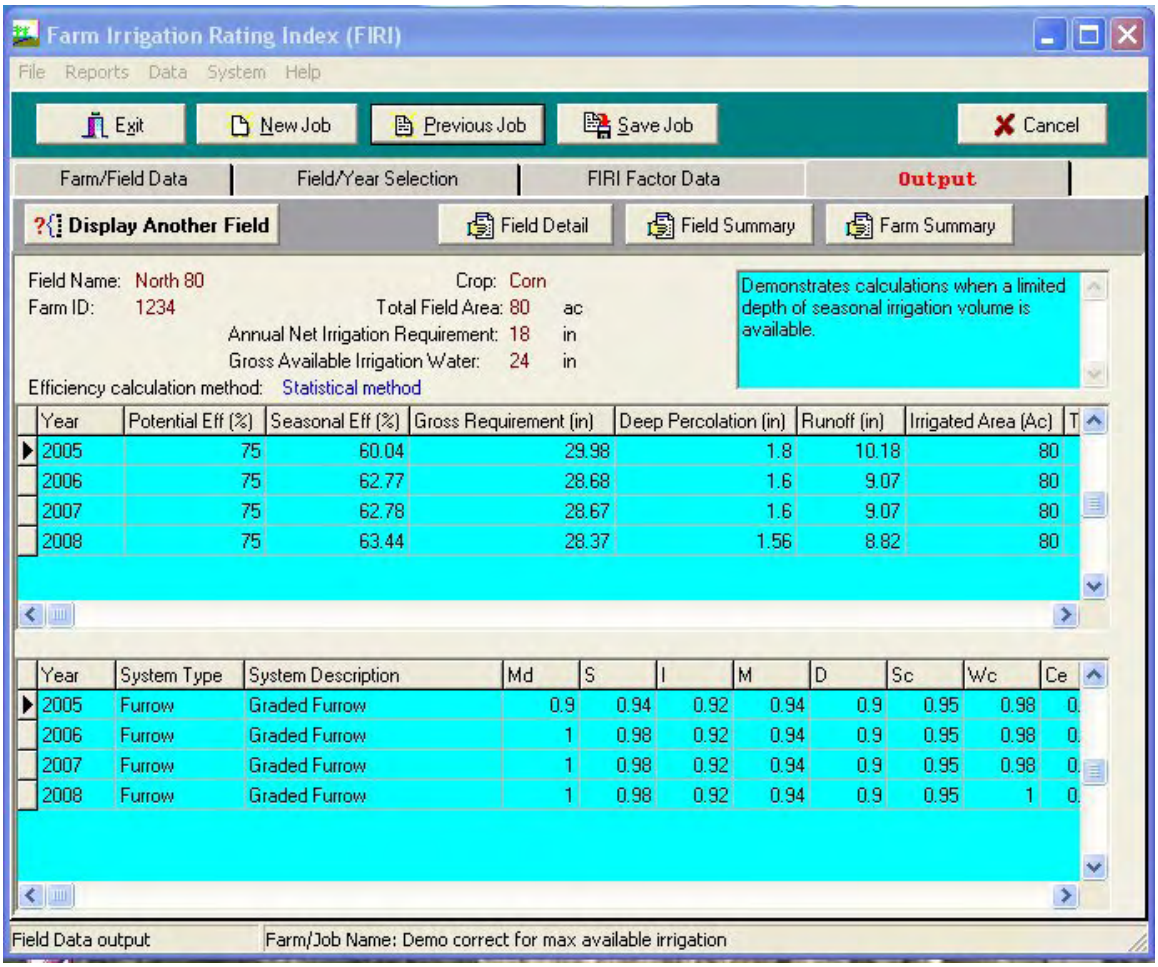


Figure 3.20

Calculations are completed and the output shows on this page as displayed in Figure 3.20.

Save the Job

If everything looks OK, click the ***Save Job*** button. If not, go back and edit the input data by clicking on the appropriate tab.

Display Field Data

Click the **Display Another Field** button to bring up the Select *Field To Display* dialog as shown in Figure 3.21

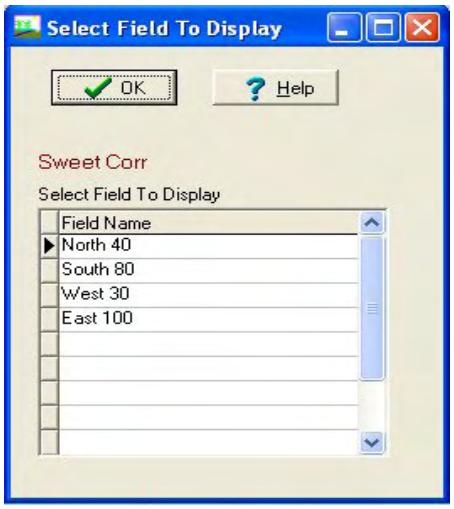


Figure 3.21

Click on the field which you wish to have displayed in the output tables.

View and Print Detailed Reports

Click an appropriate report button. A report for the current field or job will be displayed. These reports may be printed or saved in any of several formats.

Note that if gross maximum available irrigation water has been entered for the field, and if the resulting corrected net available irrigation is less than the entered annual net irrigation requirement, the screen and reports will show corrected deep percolation and runoff. They will also show deep percolation and runoff based on annual net irrigation requirement.

- **Detailed Field Report**

Click on the ***Field Detail*** report button for a detailed report of all fields in the farm/job. The report maybe several pages long. There is one page for each field. Move between pages using the buttons at the top of the report.

- **Field Summary Report**

Click on the ***Field Summary*** report button for a single page summary report. This will show only the first six years of the analysis and will allow side by side comparison of changes. Paper size limitations restrict the number of years. Use the detailed report to view years beyond six. This report is similar to those generated in the old DOS programs.

- **Farm Summary Report**

Click the ***Farm Summary*** report button for a report that will summarize the irrigation water conserved on the farm/job when all improvements are completed.

Chapter 4-Editing System Database

Factor Base Data Editor

Selecting the Data/Base data menu item will bring up the dialog shown in Figure 4.1.

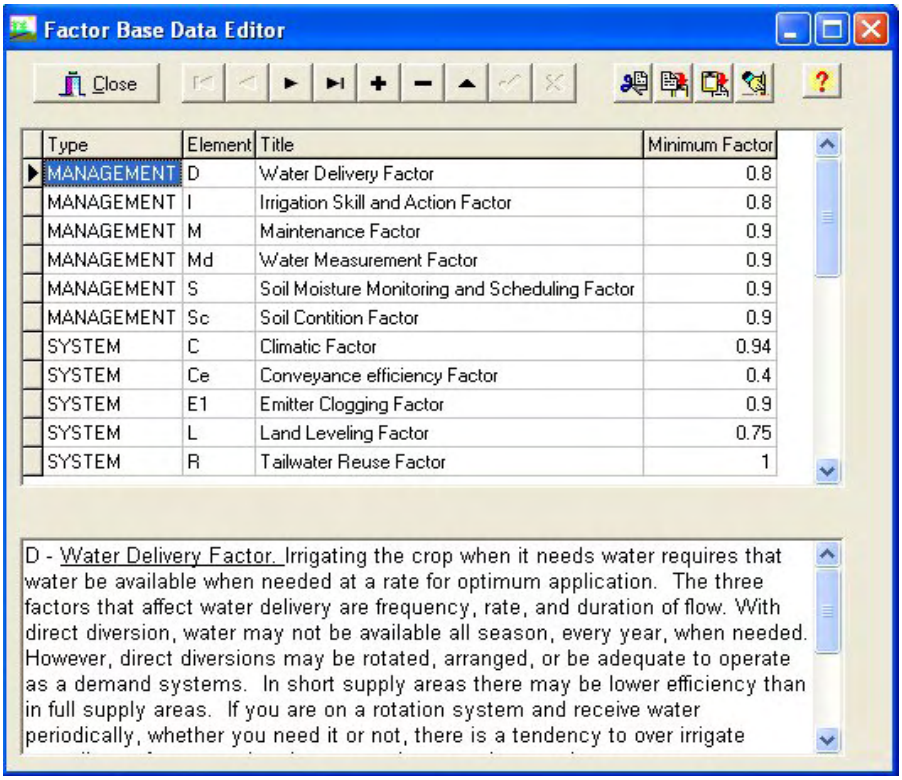


Figure 4.1

Procedure

Use the database navigation bar to edit the database. See Chapter 2 for an explanation of the navigation bar.

The most likely thing to edit will be the comments at the bottom of the dialog. These comments are used when the help button is clicked on one of the FIRI factor pop up windows.

Note the editing buttons at the top right of the dialog. 
These may be used to cut and paste formatted text from a word processor. The original text was scanned from the FIRI publication, run through an OCR text interpreter, formatted in a word processor and cut and pasted to the FIRI comment in this screen. The user may directly edit the text in the database.

Irrigation System Potential Efficiency Editor

Selecting the Data/Irr System Data menu item will bring up the dialog shown in Figure 4.2.

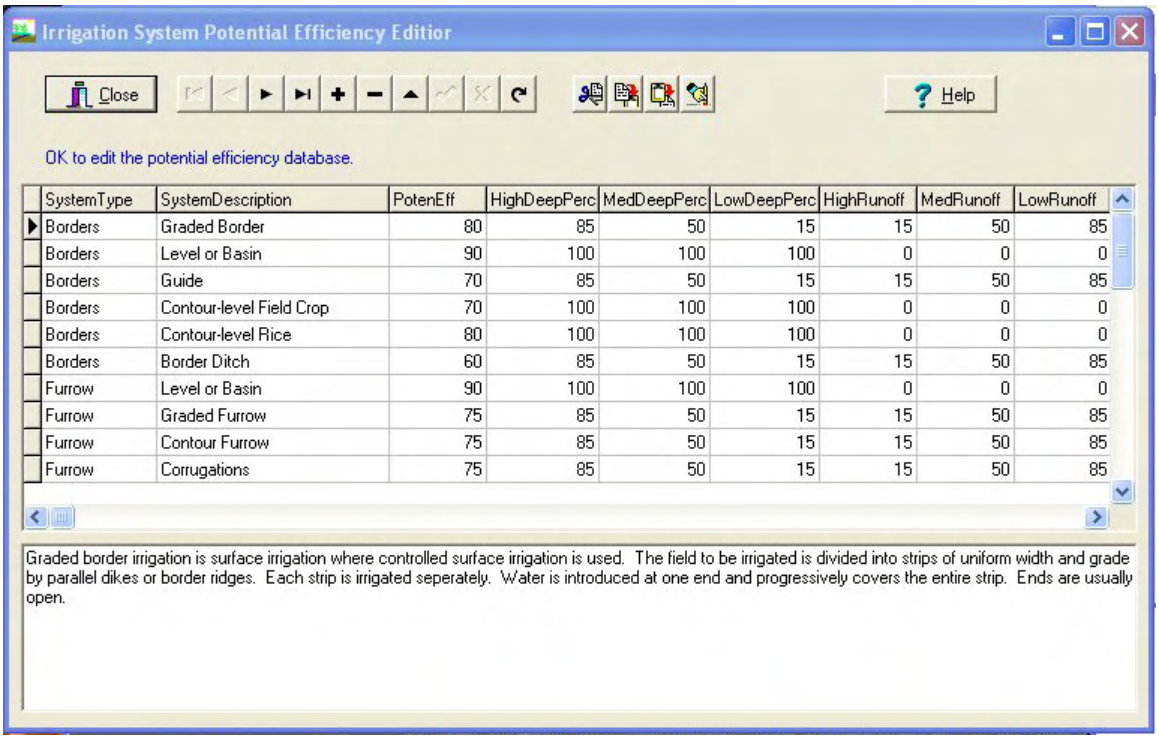


Figure 4.2

General

Potential efficiency values are critical to the success of the FIRI process. These values are seasonal efficiencies that are not the same as the potential efficiency of a particular system for a single irrigation. Seasonal efficiencies take into account scheduling, water measurement, irrigator skill and other factors that will impact irrigation water use efficiency over an entire irrigation season.

Trained, experienced personnel should only change potential efficiency factors after careful deliberation.

Edit procedure

The data in this database is password protected. See Chapter 2 for procedures for setting system default values.

Use the database navigation bar to edit the database. See Chapter 2 for an explanation of the navigation bar.

Adding systems to the database

Only the **system type** names that are currently in the database may be used. These types are hard coded into the program. All cells in the database must be populated. Type in a description of the system.

Appendix A

Program Flow Chart

Running FIRI