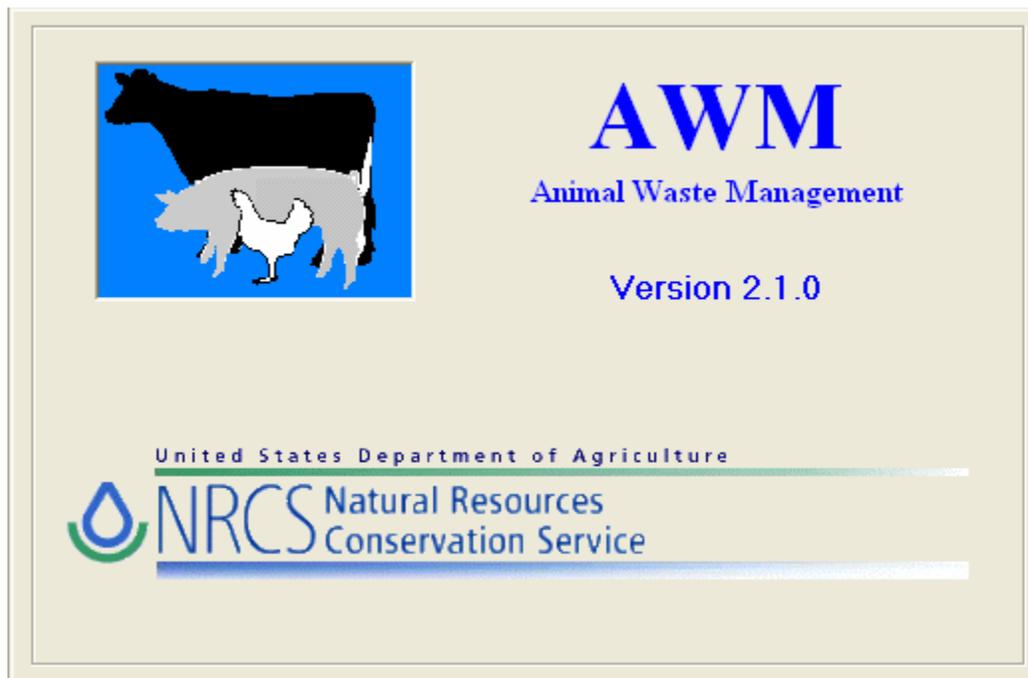




AWM

User Guide



September 2004

Acknowledgements

Animal Waste Management (AWM) is a tool developed by Natural Resources Conservation Service (NRCS) for its employees and others to use in planning and sizing of structural components for agricultural waste management systems. The program results from a team effort with leadership provided by the NRCS National Water and Climate Center. AWM is a complete revision of a 1995 DOS program with the same name that was developed by Clint W. Liezert, Civil Engineering Specialist, NRCS, Medina, Ohio (now retired). The AWM development team members included:

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Anteon Corporation provided contract computer programming services under the leadership of James Dana, Portland, OR. Dipesh Patel, computer programmer, Portland, OR, wrote the code for AWM.

Special thanks to Vantha Sok-Cham for developing the scgrid component used throughout AWM.

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Chapter 1 – Overview of AWM

What AWM Does

AWM is a planning/design tool for animal feeding operations that can be used to estimate the production of manure, bedding, process water and determine the size of storage/treatment facilities. The procedures and calculations used in AWM are based on the USDA-NRCS Agricultural Waste Management Field Handbook.

AWM uses the concepts of “Manure Master” to produce a gross nutrient balance but does not track mass or concentration of nutrients for determining land application rates or for other utilization components.

Features of AWM

- Provides manure characteristics for eight animal types with the ability to modify these characteristics and add animal types as necessary.
- Accounts for bedding, wastewater, flush water and other additions to the waste stream.
- Tracks liquid and solid wastes produced in multiple locations through multiple waste streams.
- Develops separation, storage, and treatment components for liquid and solid wastes that are defined as “Management Trains”.
- Estimate precipitation and runoff entering the “Management Train”.
- Sizes storage facilities using a defined storage period or drawdown dates specified by the user.
- Develops a monthly water and waste budget for each treatment/storage component.
- Provides a calculator for converting units and performing computations.
- Produces a gross nutrient balance from target yields and crop acreage specified for crops listed in the crop database.
- Provides a schematic drawing for each treatment/storage component.
- Generates a standard or custom report to document the system design.

User Support

User support can be obtained from USDA-NRCS National Water and Climate Center or the National Water Management Center. Contact either Bruce Wilson at (503) 414-3076/ bwilson@wcc.nrcs.usda.gov, William Boyd at (501)210-8917/ William.Boyd@ar.usda.gov or Dave Moffitt at (817) 509-3315/ dmoffitt@ftw.nrcs.usda.gov.

Future Enhancements

USDA-NRCS solicits the input of users to help determine the priority of potential enhancements to AWM. Please contact user support to let us know what enhancements would be of value to you.

Chapter 2 – Installing and Starting AWM

What You Need to Use AWM

System requirements:

- Any IBM-compatible machine with at least a 400 Mhz processor.
- Microsoft Windows 2000/XP
- Microsoft Access 2002
- At least 128 megabytes of memory
- At least 100 megabytes of hard drive storage space

Installation on CCE and Non-CCE Machines

AWM may be installed on both USDA Common Computing Environment (CCE) machines and non-CCE machines. The AWM installation program will detect whether your machine is a CCE machine and make necessary adjustments to the installation process. System administrator privileges will be needed to install AWM.

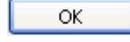
Installing AWM

AWM is available from the NRCS National Water and Climate Center

1. Download the following files from the USDA-NRCS National Water and Climate Center, Animal Waste Management webpage:
www.wcc.nrcs.usda.gov/awm/awm.html to a temporary directory on your computer's hard drive:

- ❑ The AWM installation program,  AWM210inst.exe .
- ❑ The AWM database file,  AWM210mdb#.exe where # is the version number.
- ❑ AWM User Guide in MS Word (doc) or Portable Document Format (PDF).

Note: The installation files for the AWM computer program are fairly large so unless you are connected to a high speed internet connection it strongly recommended that you request the program be sent to you on CD. Please submit your request to Bruce Wilson by phone at (503) 414-3076 or by email at bwilson@wcc.nrcs.usda.gov.

2. Execute the installation program by either:
 - ❑ Double clicking on  AWM210inst.exe in Windows Explorer, or
 - ❑ Clicking **Start**, select **Run**, browse to the location of the installation file, select  AWM210inst.exe , and click the  button.

Note: You must have system administrator privileges to install AWM.

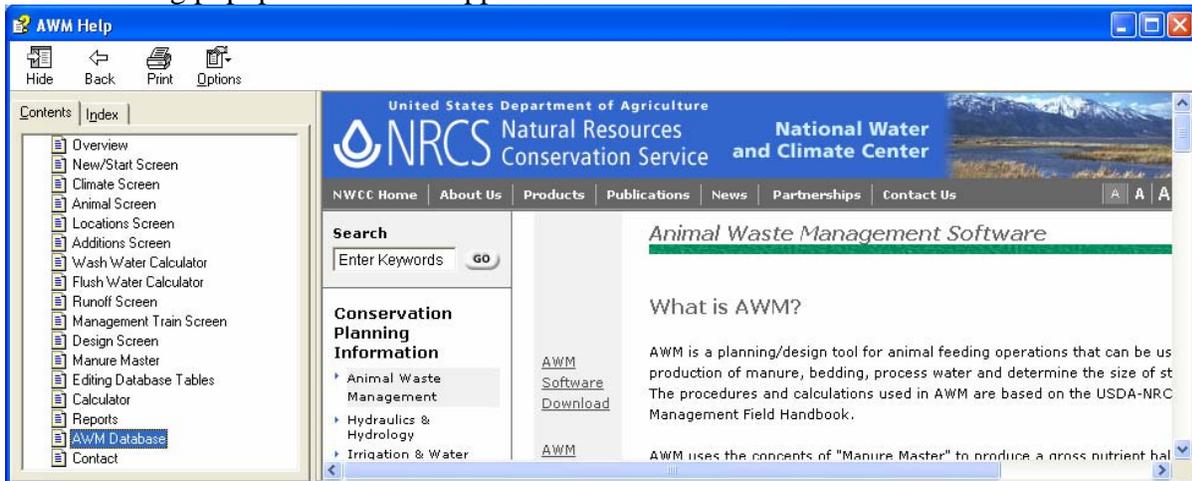
3. After installing AWM be sure to follow the instructions on the next page to install the current database so the most up-to-date information is used in the program.

Installing the AWM Database

When AWM is installed it also installs a database containing animal, bedding, climate, and separator data for each state. The most up-to-date database is located on the AWM website and should be downloaded and installed to ensure the most up-to-date data will be used in developing designs. To download the most current database for AWM, click on Help->Contents in the AWM main menu as shown below:

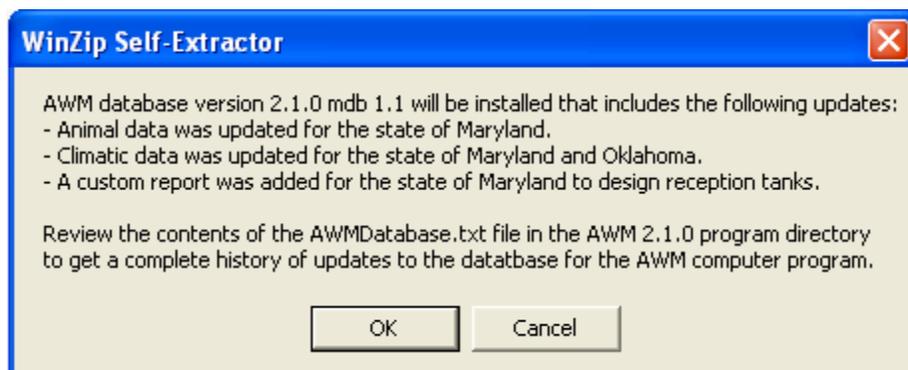


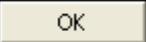
The following popup window will appear:

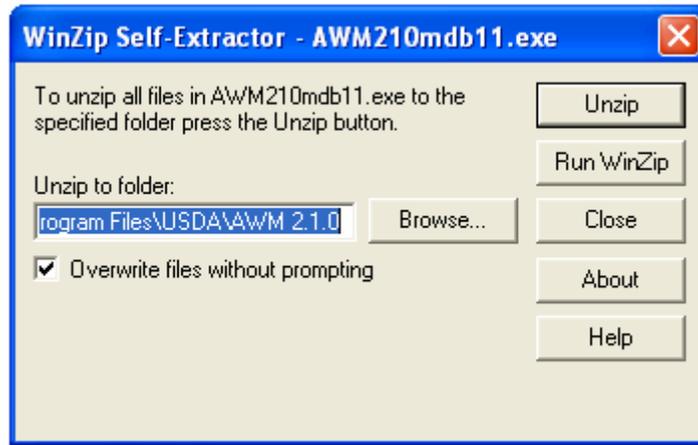


Click on "AWM Database" in the Contents window to access the AWM database download site as shown above. Click on [AWM Database](#) link to download the most current version of the AWM database. After downloading the database perform the following steps to install the database file for use with the AWM program:

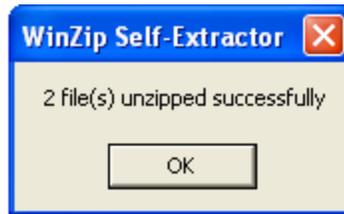
1. Execute the self extracting WinZip database file by either:
 - ❑ Double clicking on AWM210mdb#.exe in Windows Explorer, or
 - ❑ Clicking **Start**, select **Run**, browse to the file location, select AWM210mdb#.exe, and click the button.
2. The follow popup screen will appear that explains what version of the database is being installed and the changes it contains:

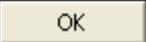


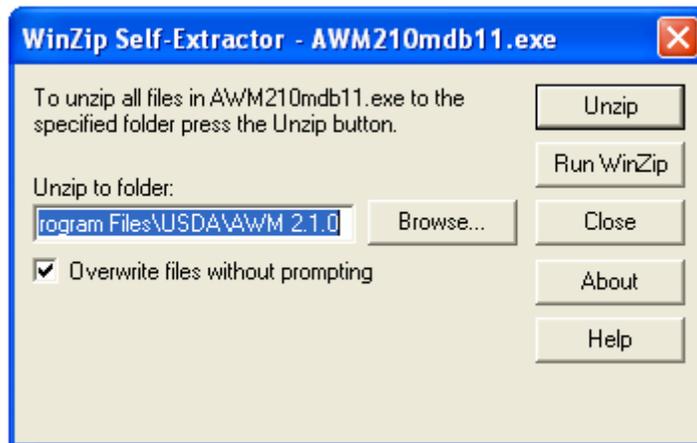
3. Click on the  button to continue installing the database. The following popup screen will appear:



4. Click on the  button to install the database in the default AWM program directory. The following popup screen will appear:



5. Click on the  button to continue. The following popup screen appears:

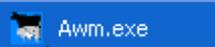


6. Click on the  button to finish. The database is now ready to be used with the program.

Starting AWM

The following instructions explain a few of the ways to start the AWM program:

Any Computer

AWM may be started by clicking on     . This will open the program without opening any saved client files.

From Windows Explorer

A previously saved design file may be used to open AWM. From within Windows Explorer, locate and double-click on a previously saved design file. These files will have the extension *awm* (e.g., *Elmer_Farms.awm*)

From the Customer Service Toolkit Client List

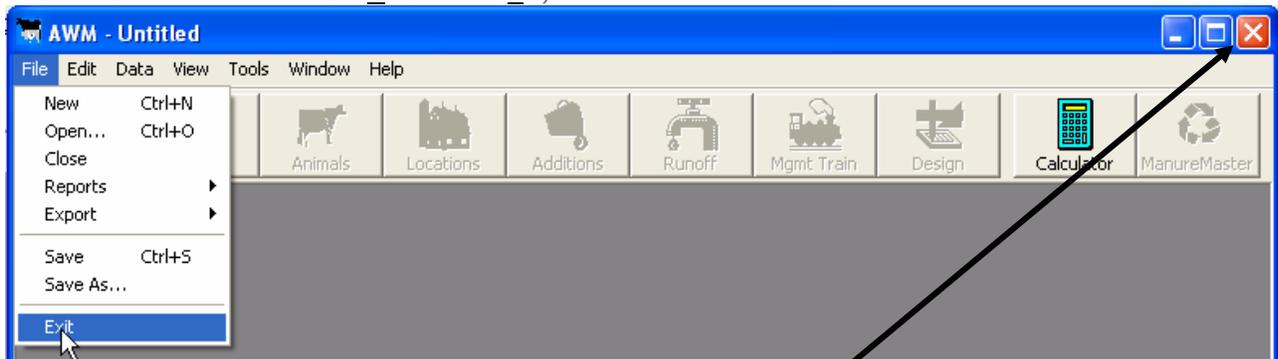
Within the USDA Customer Service Toolkit you can browse the client list in Outlook and determine if the client files include any AWM design files. These will be identifiable by the *.awm* extension. Clicking on these files will open AWM with the previously saved design file.

From the Customer Service Toolkit

Anytime you are working within Customer Service Toolkit on a client you may click on Tools in the menu bar, click on Engineering Tools, and select AWM. AWM will open with the client's name automatically entered. Upon exiting AWM the file will be saved with the files for that client.

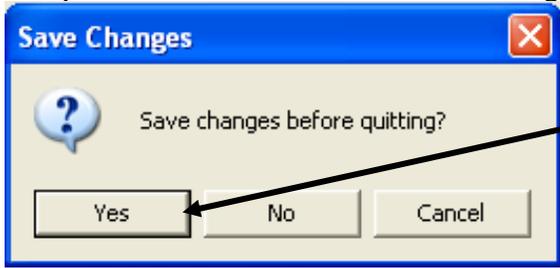
Quitting AWM

From the file menu click on File then Exit,



or press the [Alt] [F] [X] keys on the computer keyboard, or click on the  in the upper right-hand corner to exit AWM.

- The previous action results in the following popup screen:

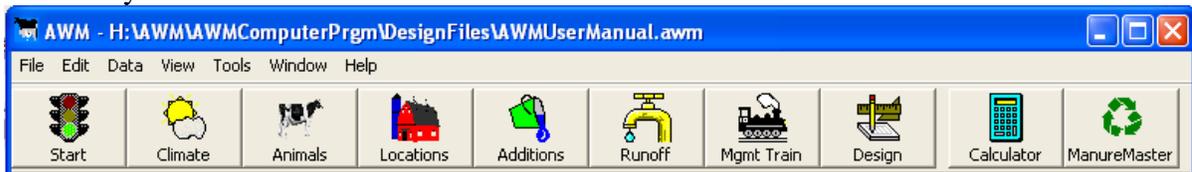


Press the [Enter] key to select or click on the appropriate button.

Chapter 3 – Navigating Within AWM

Overview

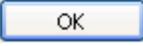
The process of designing treatment/storage facilities using AWM involves a step-by-step sequence of screens. When developing an initial design, the sequence of screens in the order shown on the toolbar must be followed with the exception of the calculator that can be used within any of the screens.



The screens and their function are as follows:

-  **Start** - On this screen the user defines the client, defines the designer, selects the data source (NRCS, MWPS, etc.), and sets up the operating period(s).
-  **Climate** - On this screen the user defines the monthly climate parameters, the 25-year, 24-hour precipitation, and other climate-related factors.
-  **Animals** - On this screen the user selects animal types and enters the number and average weights. Animal characteristics may be modified and new animal types can be defined within this screen.
-  **Locations** - On this screen the user defines locations where wastes are generated. Wastes from different locations may have different additions to the waste stream and the wastes may be routed through different management trains.
-  **Additions** - On this screen the user defines any additions to the waste streams such as from bedding, waste water, and flush water.
-  **Runoff** - On this screen the user may elect to allow AWM to calculate runoff volumes or to enter volumes calculated outside the program.
-  **Management Train** - On this screen the user selects a sequence of treatment/storage components for each waste stream.
-  **Design** - On this screen the user specifies the parameters used to size and calculate the dimensions of treatment/storage components. A monthly waste stream budget is displayed on this screen.
-  **Calculator** - This is a popup screen that can be used within any of the design screens to calculate unit conversions and perform other calculations. The calculator is not available within the ramp design screen. The calculator must be selected from a separate button within the soil liner design screen.
-  **Manure Master** - On this screen the user can generate a gross nutrient budget by selecting crops and entering acres and yield data.

Moving Between Screens

During the initial entry of information the user is moved from screen to screen in sequence by clicking on the  button on each screen.

At any time the user may move to a previously completed screen by clicking on the large navigation buttons;



When a screen has been completed and the user clicks the  button, the next navigation button will change from gray to colored.

When a navigation button is in color;



it may be used to move immediately to that screen by clicking on the associated button.

The popup calculator screen is available in any screen so it is always in color.

Any changes to information on a screen will immediately modify values on later screens if the change affects calculated values.

HELP

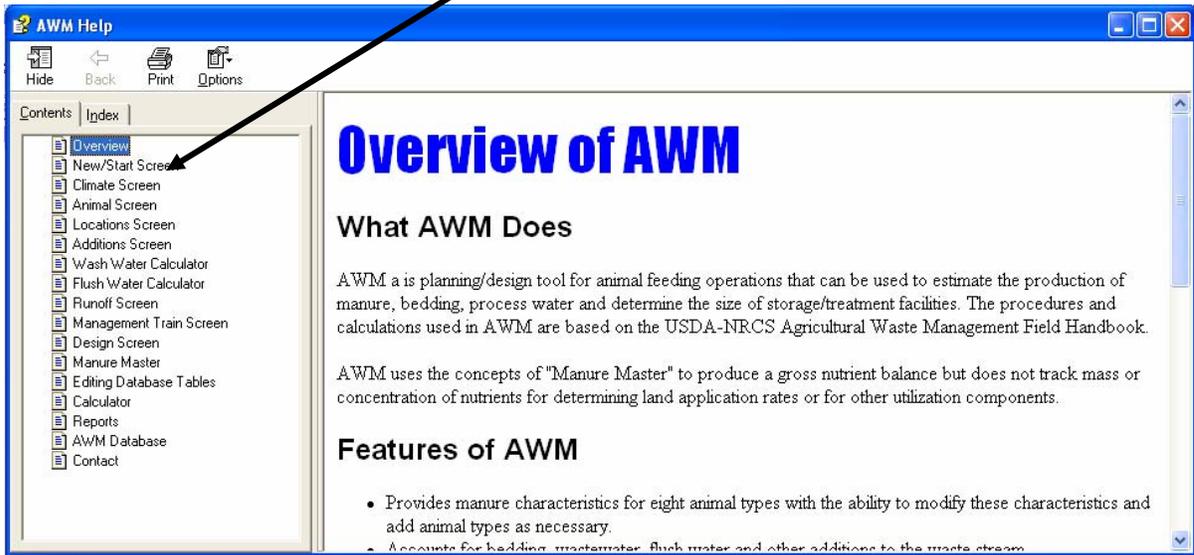
Help messages providing information on data entry and the operation of AWM can be accessed from the main menu or by pressing the [F1] key on the keyboard.



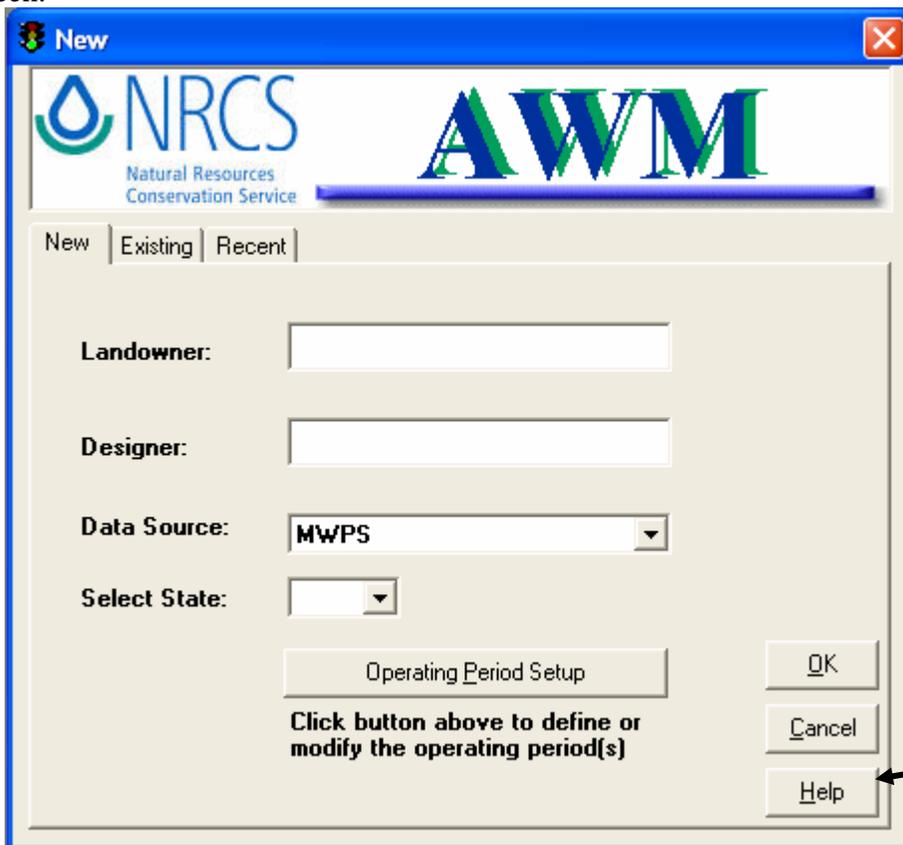
Click on  and then either click on 

Clicking on **Contents...** or the [F1] key reveals the following menu.

Click on window topic (book) on which help information is needed.



Help can also be accessed on each screen by clicking on the **Help** button or pressing the [F1] key on the keyboard. Help accessed in this manner gives information about the current screen.



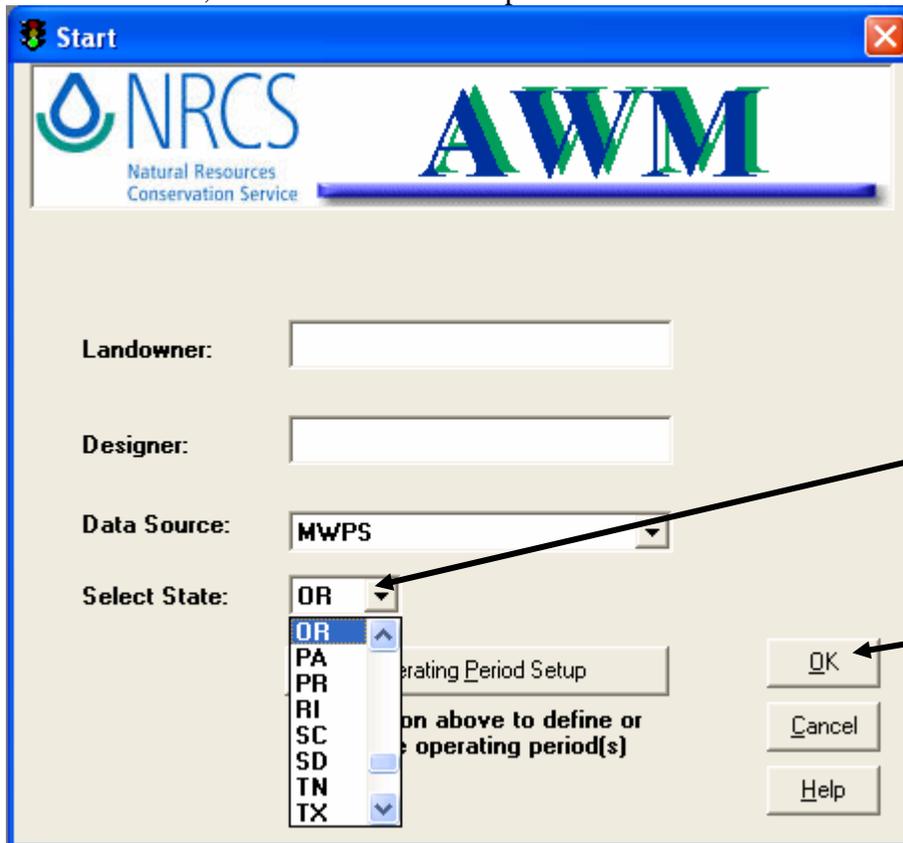
Entering Data into AWM

The following provides general guidance on how to enter data into the input fields used in AWM screens:

1. Clicking on an input cell within a screen activates the edit mode. The edit mode is indicated by the cursor blinking at the end of any value or by the text that is already in the cell.
2. Double clicking on an input cell within a screen activates the edit mode and highlights the data in the cell so that it can be replaced.
3. Using the arrow keys will exit the edit mode and move the focus rectangle to a new input cell.
4. Typing any value or text in an input cell that is not in edit mode (cursor is not blinking and is highlighted with the focus rectangle) replaces whatever data is in the cell.
5. Pressing [Enter] in an input cell causes the focus rectangle to move to the next input cell while remaining in the edit mode.

Using the above guidance for entering data into AWM input fields is demonstrated with the following example of changing the precipitation and evaporation values in the AWM Climate Screen.

1. Start AWM, select a state and then press the  button on the **Start** screen,



2. Click in the January precipitation cell. This action activates the edit mode, and the cursor will be blinking after the value to be edited:

**Click on January
Prec input cell.**

Climate Selection

Select Climate Data Source

Use AWM Database
 Enter custom climate data for this job

Options for Evaluating Monthly Net Prec - Evap

If prec-evap < 0 then set net value to 0
 Always set net value to prec-evap
 Ignore evap value, and use prec. only

Select County:

Select Station:

25 Yr. - 24 Hr. Storm Precipitation: inches

Lagoon Loading Rates:

Rational Design Method

Barth KVAL:

Load Rate for Odor, OCY: lbs VS/cu. ft/day

LRV Max: lbs VS/cu. ft/day

NRCS Design Method

Anaerobic Load Rate: lbs VS/1000 cu. ft/day

	Prec (in)	Evap (in)
January	6.17	0.48
February	4.39	0.81
March	3.99	1.57
April	2.64	2.39
May	2.17	3.74
June	1.73	4.33
July	0.70	5.40
August	0.94	4.93
September	1.84	3.36
October	3.11	1.71
November	6.03	0.76
December	7.09	0.43
Total	40.80	29.91

Help OK

3. Highlight the value with the cursor and mouse or clear the cell by backspacing and then type in a new value followed by pressing [Enter]. This exits the edit mode and moves the focus rectangle to the February precipitation input cell.
 4. Pressing [Enter] in step 3 above allows one of two actions to be taken in the February precipitation input cell:
 - a.) Type in a new value replacing whatever value is in the cell or,
 - b.) Press the backspace key to activate the edit mode indicated by the cursor blinking at the end of the value or text. This allows the value in the cell to be highlighted with the mouse or use the backspace to delete the data and then type in a new value.
 5. Press [Enter] to go to the next cell.
 6. Steps 4 and 5 can be repeated for each cell that requires editing.
- See note next page.

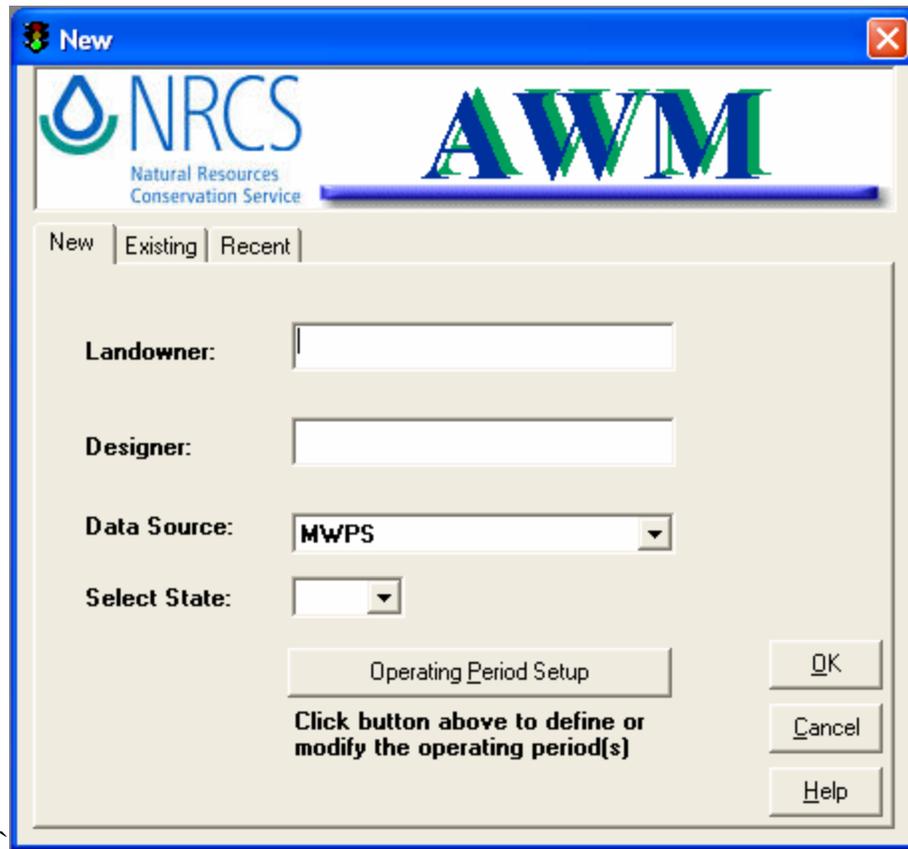
Note: An input cell is shaded red when the value in the cell is outside the range of reasonable values stored in the database. The values stored in the database can be edited by accessing the Tools -> Options menu. Cells shaded red is just a warning to the user that the data is outside the normal range and the data will still be used by the program for calculations.

Chapter 4 – Running AWM

Start Screen



AWM may be started in a number of manners as explained in Chapter 2. When AWM is opened without a specific design file it will open with the following screen.



New Existing Recent

Landowner:

Designer:

Data Source: MWPS

Select State:

Operating Period Setup

Click button above to define or modify the operating period(s)

OK Cancel Help

Start Screen



The illustration below shows the “New” tab selected. This is also the default setting.

“New” tab selected.

Type in landowner’s name.

Type in your name.

Click here to access the Data Source drop-down list and then select the preferred animal data source.

Start Screen



Click here to select a state.

Click on the **Operating Period Setup** button if the farm has more than one operating period.

Operating Periods

AWM has two options for defining operating periods. The screen shown on the next page will appear when the **Operating Period Setup** button is clicked on. Click on the radio button **1 Operating Period** for 1 operating period when the facility is operated the entire year without variation. For example this option would be selected for a dairy where animals are in confinement for the entire year. Click on the radio button **2 Operating Periods** for 2 operating periods when a facility operates in two distinct periods. An example of when this option would be selected is for a dairy that keeps its animals in confinement for a part of the year and pastures the remainder.

Start Screen



“2 Operating Periods” are selected.

Click here to access the Beginning Month drop-down list and click on the beginning month of first operating period.

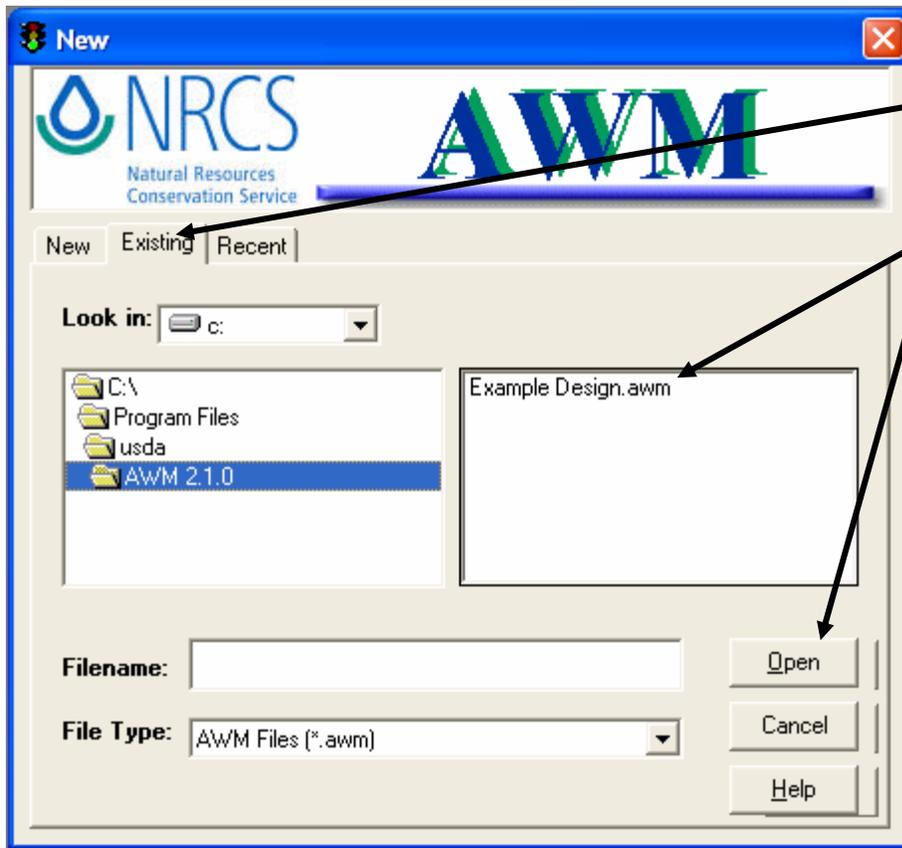
Click here to access the Ending Month drop-down list and click on the ending month of first operating period.

If “2 Operating Periods” are selected, the beginning and ending month for the first operating period must be selected. Once this period is selected, AWM uses the remaining months for the second period. The operating period is from the first day of the beginning month to the last day of the ending month.

Monthly precipitation and runoff for the entire year is used in the design of waste treatment/storage facilities regardless of the operating period.

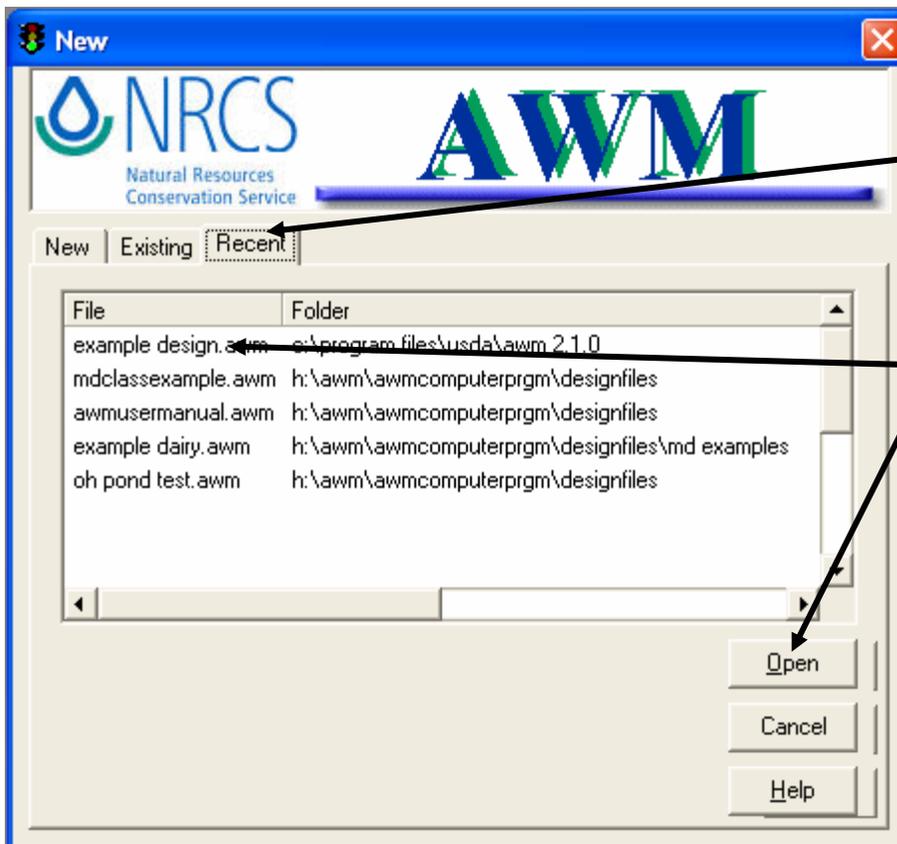
To continue work on a previously saved job/design, select either the “Existing” or “Recent” tab. Selecting the “Recent” tab will show the last ten jobs saved. Selecting the “Existing” tab will show all the previously saved jobs in a particular directory.

Start Screen



Select “Existing” tab for a list of all previously saved jobs.

Click on the desired file and click the **Open** button to load the stored data into the AWM program from the selected file.



Select “Recent” tab for a list of the last 10 jobs that were loaded when the user exited AWM.

Click on the desired file and click the **Open** button to load the stored data into the AWM program from the selected file.

Climate Screen



The climate screen allows the user to define the monthly precipitation and evaporation, the 25 year – 24 hour precipitation, and the anaerobic lagoon volatile solids loading rates. There are two options for defining the climate data used within AWM. One is to use the AWM database, which is the default option shown below, and the other is to enter custom climate data for the job. Any input cell shaded red means the data it contains is outside the range of values stored in the data validation database. The values in the data validation database define the range of expected values for an entry as a check for the user. The values in the data validation database can be edited in the Tools -> Options menu.

Climate Selection
✕

Select Climate Data Source

Use AWM Database

Enter custom climate data for this job

Options for Evaluating Monthly Net Prec - Evap

If prec-evap < 0 then set net value to 0

Always set net value to prec-evap

Ignore evap value, and use prec. only

Select County: CLACKAMAS

Select Station: N WILLAMETTE EXP STN OR6151

25 Yr. - 24 Hr. Storm Precipitation: 4 inches

Lagoon Loading Rates:

Rational Design Method

Barth KVAL: 0

Load Rate for Odor, OCV: 0 lbs VS/cu. ft/day

LRV Max: 0.0106 lbs VS/cu. ft/day

NRCS Design Method

Anaerobic Load Rate: 0 lbs VS/1000 cu. ft/day

	Prec (in)	Evap (in)
January	6.17	0.48
February	4.39	0.81
March	3.99	1.57
April	2.64	2.39
May	2.17	3.74
June	1.73	4.33
July	0.70	5.40
August	0.94	4.93
September	1.84	3.36
October	3.11	1.71
November	6.03	0.76
December	7.09	0.43
Total	40.80	29.91

Help
OK

Climate Screen



Climate data populating the screen when the Use AWM Database option is selected is based on the County and Station selected from the drop-down lists. The monthly precipitation, monthly evaporation, 25-year, 24-hour precipitation, and the lagoon loading rate may all be edited by clicking on the associate input cell for the data to be changed. Changes made in this manner will only be in effect and saved for the current job. Permanent changes can be made by clicking on Data > Edit Climate Data on the AWM main menu as shown below. For more on editing, see Chapter 6, “Modifying the AWM Database.”



All of the climate data populating the climate screen is cleared, as shown below, when the Enter custom climate data for this job option is selected. With this option the user completes all data fields manually. The data entered in this manner will be saved with the current job and is not available for future jobs. To have climate data available for future jobs it is necessary to modify the AWM database. Permanent changes to the climate database can be made by clicking on Data > Edit Climate Data on the AWM main menu as shown above. For more on editing, see Chapter 6, “Modifying the AWM Database.”

Climate Selection

Select Climate Data Source

Use AWM Database

Enter custom climate data for this job

Options for Evaluating Monthly Net Prec - Evap

If prec-evap < 0 then set net value to 0

Always set net value to prec-evap

Ignore evap value, and use prec. only

Enter County:

Enter Station:

25 Yr. - 24 Hr. Storm Precipitation: inches

Lagoon Loading Rates:

Rational Design Method

Barth KVAL:

Load Rate for Odor, OCY: lbs VS/cu. ft/day

LRV Max: lbs VS/cu. ft/day

NRCS Design Method

Anaerobic Load Rate: lbs VS/1000 cu. ft/day

	Prec (in)	Evap (in)
January	0.00	0.00
February	0.00	0.00
March	0.00	0.00
April	0.00	0.00
May	0.00	0.00
June	0.00	0.00
July	0.00	0.00
August	0.00	0.00
September	0.00	0.00
October	0.00	0.00
November	0.00	0.00
December	0.00	0.00
Total	0.00	0.00

Help OK

Climate Screen



AWM has three options for accounting for precipitation and evaporation in the design of waste treatment/storage facilities.

Options for Evaluating Monthly Net Prec - Evap

- If $\text{prec-evap} < 0$ then set net value to 0
- Always set net value to prec-evap
- Ignore evap value, and use prec. only

If $\text{prec-evap} < 0$ then set net value to 0

Select this option to consider evaporation only to the extent it does not exceed precipitation. For the example shown on the previous page, AWM would set precipitation minus evaporation to 0 inches for the month of July.

Always set net value to prec-evap

Select this option to consider evaporation even when it will cause a deficit value for precipitation minus evaporation. For the example shown on the previous page, AWM would set the value of precipitation minus evaporation to -4.7 inches for the month of July.

Ignore evap value, and use prec. only

Select this option when evaporation should be ignored. For the example shown on the previous page, AWM would set the value of precipitation minus evaporation to be 0.7 inches for the month of July. This may be an appropriate option for waste storage facilities and anaerobic lagoons where a crust will form that may impede evaporation.

Animals Screen



The following Animals screen appears when a new design file is being created within AWM so a user can select animal types and descriptions from the data file source selected on start screen. AWM allows the user to select mixed animal types and descriptions.

2. Click on the animal description in the choices list window and click the add button to select the highlighted choice.
1. Click on the drop-down list to select the animal type.
3. The animals selected are shown in the selected list window.

Click the  button to add all animal choices in the choices list window.

Click the  button when done.

Click the  button to remove highlighted animals from the selected list window.

Click the  button to remove all animals from the selected list window.

Click the  button to select the highlighted choice.

Click on the drop-down list to select the animal type.

The animals selected are shown in the selected list window.

Click the  button to remove highlighted animals from the selected list window.

Click the  button to remove all animals from the selected list window.

Click the  button when done.

Animals Screen



The following screen shows the Animals screen populated with animals selected from the AWM MWPS data file.

Enter the quantity and average weight in pounds for each animal selected.

Animals may be added at any time by clicking on the



Button.

Enter quantity and average weight of animals:

Select Animal New Animal Delete Selected Row

Animal	Animal	Quantity	Weight	Manure	VS	TS	Manure	VS	TS
	Type		lbs	cu.ft/day/AU	lbs/day/AU	lbs/day/AU	cu.ft/day	lbs/day	lbs/day
Dry	Dairy	0	0	1.30	8.10	9.50	0.00	0.00	0.00
Heifer	Dairy	0	0	1.30	7.77	9.14	0.00	0.00	0.00
Lactating Cow	Dairy	0	0	1.30	8.50	10.00	0.00	0.00	0.00
Totals		0	N/A	N/A	N/A	N/A	0.00	0.00	0.00

AU = Animal Unit
VS = Volatile Solids
TS = Total Solids

Help OK

If another animal type is needed but not shown in the AWM database, click on the



button that will result in the popup screen shown below.

Add Animal

Animal Name:

Animal Type:

Manure Volume: cu. ft/day/AU

Volatile Solids: lbs/day/AU

Total Solids: lbs/day/AU

Sludge Accum. Ratio:

Flush Water Volume: gal/day

Manure Master Only

Nitrogen: lbs/ton

Phosphorous: lbs/ton

Potassium: lbs/ton

Lactating Cow

Cancel OK

Enter the name of the animal type being added

Click on the drop-down list to select the animal type being added.

Enter the manure volume, volatile solids, total solids, sludge accumulation ratio, and flush water as appropriate.

Enter the pounds per ton of Nitrogen, Phosphorous, and Potassium that will be generated by the animal being added after all losses are accounted for.

Click on this box if animal type involves lactating cows. This associates the new animal with a flush water volume per animal.

Click the button when done.

Animals Screen



A row may be deleted from the Animals screen by selecting the row and clicking on the

Delete Selected Row

as shown on the screen below.

1. Click on the animal cell to select the row to be deleted.

2. Click on the **Delete Selected Row** button or press the [Delete] key on the keyboard to delete the selected row.

Enter quantity and average weight of animals:

Animal	Animal Type	Quantity	Weight	Manure	VS	TS	Manure	VS	TS
			lbs	cu.ft/day/AU	lbs/day/AU	lbs/day/AU	cu.ft/day	lbs/day	lbs/day
Dry	Dairy	10	1400	1.30	8.10	9.50	18.20	113.40	133.00
Heifer	Dairy	100	750	1.30	7.77	9.14	97.50	582.75	685.50
Lactating Cow	Dairy	150	1300	1.30	8.50	10.00	253.50	1657.50	1950.00
Totals		260	N/A	N/A	N/A	N/A	369.20	2353.65	2768.50

AU = Animal Unit
VS = Volatile Solids
TS = Total Solids

The Quantity, Weight, Manure, VS, and TS may be edited by clicking on the input cell and typing in the desired value as shown on the screen below.

For any of the selected animals, click on the desired input cell to edit the displayed data.

Enter quantity and average weight of animals:

Animal	Animal Type	Quantity	Weight	Manure	VS	TS	Manure	VS	TS
			lbs	cu.ft/day/AU	lbs/day/AU	lbs/day/AU	cu.ft/day	lbs/day	lbs/day
Dry	Dairy	10	1400	1.30	8.10	9.50	18.20	113.40	133.00
Heifer	Dairy	100	750	1.30	7.77	9.14	97.50	582.75	685.50
Lactating Cow	Dairy	150	1300	1.30	8.50	10.00	253.50	1657.50	1950.00
Totals		260	N/A	N/A	N/A	N/A	369.20	2353.65	2768.50

AU = Animal Unit
VS = Volatile Solids
TS = Total Solids

Animals Screen



The values for an animal type appearing on the Animals screen may also be edited by double clicking on the animal type as shown on the screen below.

Animals

Enter quantity and average weight

Animal	Animal Type	Qu
Dry	Dairy	
Heifer	Dairy	
Lactating Cow	Dairy	
Totals		

Double click on animal.

AU = Animal Unit
VS = Volatile Solids
TS = Total Solids

Modify Animal Data

Animal Name: Lactating Cow

Manure Volume: 1.30 cu. ft/day/AU

Volatile Solids: 8.50 lbs/day/AU

Total Solids: 10.00 lbs/day/AU

Sludge Accum. Ratio: 0.0730

Flush Water Volume: 100.00 gal/day

Manure Master Only

Nitrogen: 4.30 lbs/ton

Phosphorous: 1.65 lbs/ton

Potassium: 6.04 lbs/ton

Lactating Cow

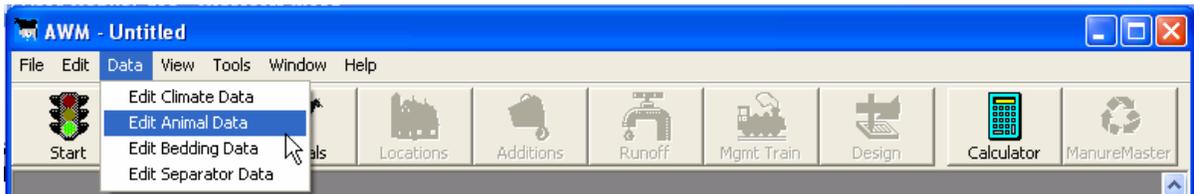
Cancel OK

Animal	Manure	VS	TS
	cu. ft/day	lbs/day	lbs/day
	18.20	113.40	133.00
	97.50	582.75	685.50
	253.50	1657.50	1950.00
	369.20	2353.65	2768.50

Revise values in resulting popup screen as necessary.

Help OK

Changes made by editing data within the Animals screen will only apply to the current job and is not available for future jobs. To have animal data available for future jobs it is necessary to modify the AWM database. Permanent changes can be made by clicking on **Data > Edit Animal Data** on the AWM main menu as shown below. For more on editing, see Chapter 6, “Modifying the AWM Database”.



Animals Screen



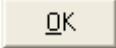
Animals [Close]

Enter quantity and average weight of animals: [Select Animal] [New Animal] [Delete Selected Row]

Animal	Animal	Quantity	Weight	Manure	VS	TS	Manure	VS	TS
	Type		lbs						
Dry	Dairy	10	1400	1.30	8.10	9.50	18.20	113.40	133.00
Heifer	Dairy	100	750	1.30	7.77	9.14	97.50	582.75	685.50
Lactating Cow	Dairy	150	1300	1.30	8.50	10.00	253.50	1657.50	1950.00
Totals		260	N/A	N/A	N/A	N/A	369.20	2353.65	2768.50

AU = Animal Unit
VS = Volatile Solids
TS = Total Solids

[Help] [OK]

Click the  button when done editing the Animals Screen.

Locations Screen



The purpose of the Locations screen is to define where the animals deposit their manure throughout a day for each operating period. It also establishes a manure waste stream from a location to which waste water, flush water, and bedding are added to form the total waste stream directed to agricultural waste management system treatment/storage components such as a waste storage facility or waste treatment lagoon.

Type in the name of a location where animals spend time.

After typing in the name of the location, click the **Add Location** button or press the [Enter] key.

Enter Location:

Enter the Percent of Manure Each Animal Deposits in Each Location:

Location	Milker(70lb Milk)
Totals	

Locations Screen



Once all the locations have been entered, the percent of manure deposited by each animal type in each location must be entered as shown on the screen below. Please note this is the percent of manure and not the percent of time. Judgement based on observation will be required for making this determination because it varies widely. The percent manure must total 100 percent for each animal type. If two operating periods were selected on the start screen, a location table will be presented for each operating period.

Location	Milker(70lb Milk)	Calf	Dry	Heifer
Milking Parlor	15			
Freestall Barn	0	100	60	60
Pasture	85		40	40
Totals	100	100	100	100

Enter the percent of manure each animal type deposits in each location.

To delete a location first select the row by clicking on the narrow cell just to the left of the location as shown on the screen below. This highlights the row. Now click on the button. Rows can only be selected and deleted from the first operating period table if more than one operating period was selected on the Start screen. This action deletes the location from the table for both operating periods.

Location	Milker(70lb Milk)	Calf	Dry	Heifer
Milking Parlor	15			
Freestall Barn	0	100	60	60
Pasture	85		40	40
Totals	100	100	100	100

To delete a row, click here to highlight the row, and then click on button or press the [Delete] key on the keyboard.

Click the button when done editing the Locations screen.

Additions Screen



The purpose of this screen is to characterize the amount of flush water, wastewater, and bedding added to the manure waste stream for each of the locations identified on the Locations screen.

To add additional locations where waste is generated, enter the name of the location and click on the  button as shown on the screen below.

Type in the name of additional waste streams. These will appear in the table in italics after clicking on the  button.

Waste Streams	Wash Water	Flush Water	Bedding Type	Amount	Amount
--- Units --->	gal/day	gal/day		lbs/day	cu. ft/day
Milking Parlor	0.00	0.00		0.00	0.00
Freestall Barn	0.00	0.00		0.00	0.00
Pasture	0.00	0.00		0.00	0.00
<i>Holding Area</i>	0.00	0.00		0.00	0.00

The additional waste stream entered is shown in italics.

Click on the  button to access the Wash Water and Flush Water calculator

The total wash water and flush water in gallons per day may be entered directly or by using the pop-up calculator. The pop-up calculator screen is selected by pressing the  button next to the Wash Water or Flush Water input cell as shown on the screen above.

Additions Screen



The calculator pop-up screen for wash water follows:

Location that wash water is being calculated for.

Enter the amount that applies to the operation in gallons per unit that is appropriate for each Source or Hose.

Type in the washes or minutes per day for each operation where an amount was entered for a Source or Hose.

Wash Water Calculator for Milking Parlor

Source	Amount	Units	Washes/Day	Total (gal/day)
Bulk Tank - Automatic Wash		gal/wash		
Bulk Tank - Manual Wash		gal/wash		
Pipeline in Milk Parlor		gal/wash		
Pail Milkers		gal/wash		
Cow Prep - Automatic		gal/wash/cow/day		
Cow Prep - Average		gal/wash/cow/day		
Cow Prep - Manual		gal/wash/cow/day		
Milk House Floor		gal/day		
Parlor Floor (w/o flush)		gal/day		
Other		gal/day		
Hoses	Amount	Units	Minutes/Day	Total (gal/day)
Hose 1		gal/minute		
Hose 2		gal/minute		
Hose 3		gal/minute		
Hose 4		gal/minute		
Wash Water Total				----->

Save Data

Help Cancel **OK**

Checking this box means the last data entering into the Wash Water screen will be saved and displayed the next time the screen is accessed.

Click the **OK** button when done editing the Wash Water screen.

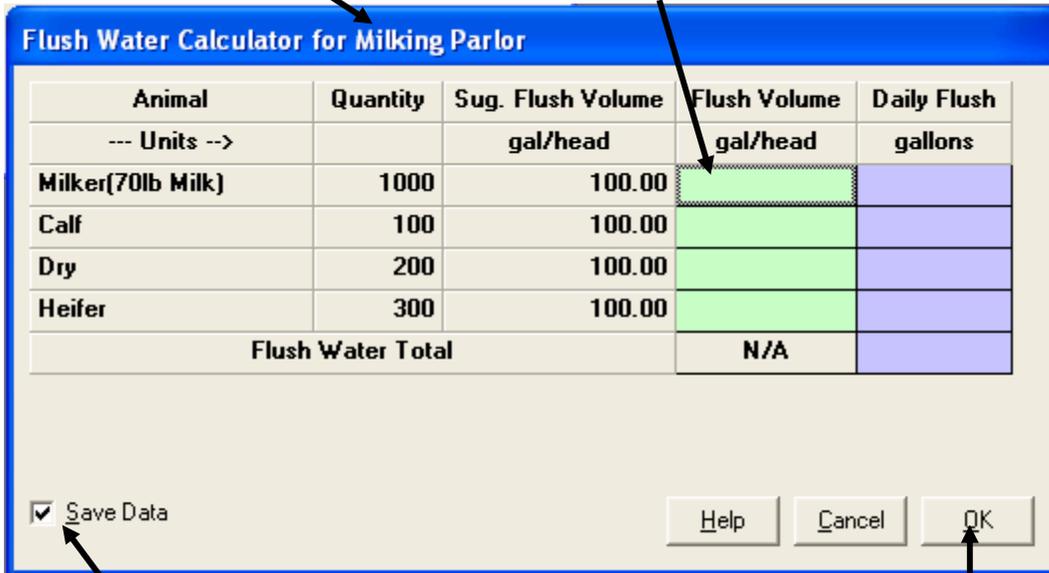
Additions Screen



The calculator pop-up screen for flush water follows:

Location that flush water is being calculated for.

Enter the amount of flush water used for each animal in gallons per head(animal).



Animal	Quantity	Sug. Flush Volume	Flush Volume	Daily Flush
-- Units -->		gal/head	gal/head	gallons
Milker(70lb Milk)	1000	100.00		
Calf	100	100.00		
Dry	200	100.00		
Heifer	300	100.00		
Flush Water Total			N/A	

Save Data

Help Cancel OK

Checking this box means the last data entering into the Flush Water screen will be saved and displayed the next time the screen is accessed.

Click the **OK** button when done editing the Flush Water screen.

Take care to indicate a flush volume for only those animals identified as spending time at the location on the Locations screen. Also please note that if recycled water is used for flushing, values entered should only be to the extent that fresh non-recycled water is added to the system.

Clicking on the Save Data check box will save the data in the Wash Water and Flush Water calculator for the current design session of AWM. All values entered into the Wash Water and Flush Water calculator will be lost once the AWM design session is closed.

Additions Screen



On the Additions screen shown below bedding is added to a waste stream by indicating the amount per day added at each location in pounds per day. If bedding is not added every day, the amount used should be converted to equivalent pounds per day.

Click here to access drop-down list of bedding, then click on bedding type used.

Type in amount of bedding added in terms of pounds per day.

The amount of bedding in cubic feet per day is automatically displayed based on the density stored in the bedding database.

Waste Streams	Wash Water	Flush Water	Bedding Type	Amount	Amount
--- Units --->	gal/day	gal/day		lbs/day	cu. ft/day
Milking Parlor	550.00	0.00		0.00	0.00
Freestall Barn	0.00	500.00	Straw (chopped)	0.00	0.00
Pasture	0.00	0.00	Soil	0.00	0.00
Holding Area	0.00	0.00	Straw - Oats (baled)	0.00	0.00
			Straw - Wheat (baled)		
			Straw (baled)		
			Straw (chopped)		
			Straw (loose)		
			Wood Chips		
			Wood Shavings		

Click the  button when done editing the Additions

Bedding volumes computed by the AWM program will be dependent on the effective bedding densities stored in the AWM database. Bedding densities can be viewed and permanently changed by clicking on Data > Edit Bedding Data on the AWM main menu as shown below. For more on editing, see Chapter 6, “Modifying the AWM Database”.

Runoff Screen



The Runoff screen estimates the contaminated runoff that must be managed by the waste management system. Runoff volumes estimated by AWM are conservative overestimates. Because of this, the user is encouraged to use a method outside the program to determine the monthly and the 25-year, 24-hour runoff volumes, especially when larger watersheds are involved.

AWM computes runoff for two types of “watersheds:”

- impervious “watersheds” such as roofs and frequently scraped concrete slabs; and
- pervious watersheds including feedlots with a manure pack..

The runoff volume from only one drainage area for each type of watershed is computed. If a system design requires evaluation of more than one drainage area in one or both types of watersheds, the runoff volumes will need to be computed outside the program and entered as demonstrated below.

Impervious watershed runoff is computed based on a Curve Number of 98 and a user input impervious area in square feet. AWM does not allow the Curve Number for this watershed type to be changed. If a different Curve Number is desired, the AWM computation should be made using the pervious watershed category or by using a method outside the program.

Pervious watershed runoff is computed on the basis of a user-input Curve Number and watershed area in acres. Feedlots having a manure pack should use this method. The user can enter a 1 day curve number and click the (1-day) radio button and the program will convert the 1 day curve entered to a 30 day curve number. The 30 day curve number computed from the 1 day curve number may be viewed by passing the mouse pointer over the (1-day) radio button. If the user enters a 30 day curve number and clicks on the (30-day) radio button, the program will use the curve number as entered to compute the runoff volumes.

AWM computes runoff by first converting the 1-day Curve Number to a 30-day Curve Number using the following equation:

$$CN_{30} = CN_1 - (CN_1 - ((CN_1^{2.365})/631.79) - 15) \log 30$$

The equations of the EFH Handbook Chapter 2 revised for a 30 day CN would be:

$$S = (1000 / CN_{30}) - 10 \quad (\text{Rearranged Equation 2-4})$$

$$Q = ((P - 0.2S)^2 / (P + 0.8S)) \quad (\text{Equation 2-3})$$

Where: Q = runoff in inches
P = rainfall in inches
S = potential maximum retention after runoff begins in inches

Runoff Screen



The following illustrates the Runoff screen when **Calculate Monthly Runoff Volumes** radio button is selected.

Click on the **Calculate Monthly Runoff Volumes** radio button.

Type in the pervious watershed area and the 1-day runoff curve number for the 25Yr-24Hr storm rainfall and the 1-day or 30-day runoff curve number.

Runoff Volumes (1000 cu. ft)

	Pervious	Impervious	Monthly Totals
January	0.00	0.00	0.00
February	0.00	0.00	0.00
March	0.00	0.00	0.00
April	0.00	0.00	0.00
May	0.00	0.00	0.00
June	0.00	0.00	0.00
July	0.00	0.00	0.00
August	0.00	0.00	0.00
September	0.00	0.00	0.00
October	0.00	0.00	0.00
November	0.00	0.00	0.00
December	0.00	0.00	0.00
Total	0.00	0.00	0.00

25 Yr-24 Hr Storm Runoff: 0.00 0.00 0.00

WARNING: The volumes computed by the program are conservative over-estimates. The user is encouraged to use a method outside of the program to compute runoff volumes for larger watersheds and where precision is vital. Methods for computing monthly runoff volumes include the NEH-4 stream gauge procedure and SPAW.

If a one day curve number is selected, passing the mouse over the (1-day) will display the 30 day curve number.

Enter the impervious watershed area.

The program will compute the runoff volumes based on the precipitation data and runoff curve numbers entered on the Climate screen.

Runoff Screen



Runoff volumes based on calculations made outside the program may be entered directly into the runoff table. To enter runoff volumes directly, select the **Enter Monthly Runoff Volumes** button as shown below.

Click on the **Enter Monthly Runoff Volumes** radio button.

Enter monthly runoff as determined by a method outside AWM.

	Pervious	Impervious	Monthly Totals
January	0.00	0.00	0.00
February	0.00	0.00	0.00
March	0.00	0.00	0.00
April	0.00	0.00	0.00
May	0.00	0.00	0.00
June	0.00	0.00	0.00
July	0.00	0.00	0.00
August	0.00	0.00	0.00
September	0.00	0.00	0.00
October	0.00	0.00	0.00
November	0.00	0.00	0.00
December	0.00	0.00	0.00
Total	0.00	0.00	0.00

25 Yr-24 Hr Storm Runoff:

WARNING: The volumes computed by the program are conservative over-estimates. The user is encouraged to use a method outside of the program to compute runoff volumes for larger watersheds and where precision is vital. Methods for computing monthly runoff volumes include the NEH-4 stream gauge procedure and SPAW.

Enter 25-year, 24-hour storm volume as determined by a method outside AWM

Click the **OK** button when done editing the Runoff

Management Train Screen



The purpose of the Management Train screen is to define the sequence of management components, as described within AWM, for each waste stream developed by the program in the Locations and Additions screens. The sequence of components is described in AWM as management “steps.” AWM is capable of evaluating up to three management steps or components for each waste stream. Solid-liquid separator components split a waste stream into two waste streams – solids and liquids. Each of these new waste streams must be followed by appropriate storage components. An uncovered stacking facility requires a liquid storage component, either a pond or a tank, be specified in the next step to store runoff. An anaerobic lagoon with external storage requires that a liquid storage component, either a pond or a tank, be specified in the next step. Multiple waste streams may be directed to a single management component

The following is a blank Management Train screen for a dairy as it would appear when AWM is run for a new waste management system design. The waste stream column lists the waste streams from (1) locations defined on the Locations screen, (2) any user-defined waste streams, and (3) runoff. Clicking on an input cell will access a drop-down list of available components as illustrated on the screen below.

Click within the input cell to access the drop-down list of available components.

Click on desired component for Step 1 of the waste stream management stream.

Waste Stream	Step 1	Step 2	Step 3
Milking Parlor	None (Clear) Solid-Liquid Separator New Storage Pond New Storage Tank New Dry Stack (Uncovered) New Dry Stack (Covered) New Anaerobic Lagoon New Anaerobic Lagoon (Ext)		
Freestall Barn			
Pasture			
Holding Area			

Component Name	Manure	Wash Water	Flush Water	Bedding	Total Waste Volume

A storage pond, storage tank, covered dry stack, or anaerobic lagoon can be a terminal component in the waste management train. However, a solid-liquid separator, uncovered dry

Management Train Screen



stack, and anaerobic lagoon with external storage all require an appropriate subsequent liquid storage component.

The first time the component drop-down list is accessed, all of the available components will be identified as “new”. Once a component is selected for a management step, it will appear on subsequent drop-down lists and is available for use in other waste stream management steps. For example, if “New Storage Pond” is selected for one management step, the next time the drop-down list is accessed this pond will appear as “Storage Pond #1”. This pond could then be selected for another waste stream. However, if a second storage pond is desired, “New Storage Pond” would be selected. Subsequent access to drop-down list would identify this pond as “Storage Pond #2.”

When the “Solid-Liquid Separator” component is selected, another drop-down list is accessed that gives a list of separator types.

Select solid-liquid separator.

Select type of separator.

The screenshot shows the Management Train software interface. At the top, there is a title bar with the text "Management Train" and a close button. Below the title bar is a table with four columns: "Waste Stream", "Step 1", "Step 2", and "Step 3". The rows are labeled "Milking Parlor", "Freestall Barn", "Pasture", and "Holding Area". The cells in the "Step" columns are currently empty. Below the table, there is a section titled "Component Volumes [cu. ft/day]" with a table that has columns for "Component Name", "Manure", "Wash Water", "Flush Water", "Bedding", and "Total Waste Volume". The cells in this table are currently empty. At the bottom right of the interface, there are "Help" and "OK" buttons. Two dropdown menus are open. The first dropdown menu is positioned over the "Step 1" column for the "Freestall Barn" row. It contains the following options: "None (Clear)", "Solid-Liquid Separator", "New Storage Pond", "New Storage Tank", "New Dry Stack (Uncovered)", "New Dry Stack (Covered)", "New Anaerobic Lagoon", and "New Anaerobic Lagoon (Ext)". The "Solid-Liquid Separator" option is highlighted. The second dropdown menu is positioned over the "Step 2" column for the "Freestall Barn" row. It contains the following options: "Decanter Centrifuge 16-30 gpm", "Screw Press", "Settling Basin", "Static Inclined Screen", "Static Inclined Screen 12 Mesh", "Static Inclined Screen 36 Mesh", "Vibrating Screen", "Vibrating Screen 16 Mesh", "Vibrating Screen 18 Mesh", "Vibrating Screen 24 Mesh", and "Vibrating Screen 30 Mesh". The "Static Inclined Screen 12 Mesh" option is highlighted. Two arrows point from the text labels above to the respective dropdown menus.

Waste Stream	Step 1	Step 2	Step 3
Milking Parlor			
Freestall Barn			
Pasture			
Holding Area			

Component Name	Manure	Wash Water	Flush Water	Bedding	Total Waste Volume

Management Train Screen



The next step after solid-liquid separation must define the components to which both the solids and liquids will be directed as shown below.

Clicking in the input cell for Step 2, for the example shown below, accesses the drop-down list of components that can be selected as a treatment/storage component for both liquids and solids.

The screenshot shows the 'Management Train' window with a table for waste stream processing. The table has columns for 'Waste Stream', 'Step 1', 'Step 2', and 'Step 3'. The 'Milking Parlor' row is selected. In Step 1, 'Solid-Liquid Separator' and 'Static Inclined Screen 12 Mesh' are listed. Step 2 is currently empty, and a drop-down menu is open over it, showing options: 'None (Clear)', 'New Storage Pond', 'New Storage Tank', 'New Dry Stack (Uncovered)', 'New Dry Stack (Covered)', 'New Anaerobic Lagoon', and 'New Anaerobic Lagoon (Ext)'. Arrows point from the text above to the Step 2 cell and the drop-down menu.

When an uncovered dry stack is selected, an appropriate liquid storage component must be selected in the next step to store its runoff as shown on the screen below.

Clicking in the input cell for Step 3, for the example shown below, accesses a drop-down list of components that can be selected to store runoff from the uncovered dry stack's facility.

The screenshot shows the 'Management Train' window with the same table as above. In Step 2, 'Storage Pond #1' and 'Dry Stack (Uncovered) #1' are selected. Step 3 is currently empty, and a drop-down menu is open over it, showing options: 'None (Clear)', 'New Storage Pond', 'New Storage Tank', 'New Anaerobic Lagoon', and 'Storage Pond #1'. Arrows point from the text above to the Step 3 cell and the drop-down menu.

Below the table, there is a section titled 'Component Volumes [cu. ft/day]' with the following data:

Component Name	Manure	Wash Water	Flush Water	Bedding	Total Waste Volume
Storage Pond #1	329.70	73.52	0.00	0.00	403.22
Dry Stack (Uncovered) #1	26.68	0.00	0.00	0.00	26.68

Buttons for 'Help' and 'OK' are visible at the bottom right of the window.

When an anaerobic lagoon with external storage is selected in the management train, it must be followed in the next step with an external storage component as illustrated below:

Management Train Screen



Clicking in the input cell for Step 3, in the example shown on the screen below, accesses a drop-down list of storage components that can be selected to store effluent from the anaerobic lagoon.

The screenshot shows the 'Management Train' software window. It features a table with columns for 'Waste Stream', 'Step 1', 'Step 2', and 'Step 3'. The 'Milking Parlor' waste stream is processed through a 'Solid-Liquid Separator' and 'Static Inclined Screen 12 Mesh' in Step 1, then an 'Anaerobic Lagoon (Ext) #1' and 'Dry Stack (Uncovered) #1' in Step 2. The Step 3 cell is currently empty, and a drop-down menu is open, showing options: 'None (Clear)', 'New Storage Pond', 'New Storage Tank', and 'Storage Pond #1'. Below the main table is a section titled 'Component Volumes (cu. ft/day)' with a table showing volumes for Manure, Wash Water, Flush Water, Bedding, and Total Waste Volume for three components: Dry Stack (Uncovered) #1, Anaerobic Lagoon (Ext) #1, and Storage Pond #1. At the bottom right, there are 'Help' and 'OK' buttons.

Waste Stream	Step 1	Step 2	Step 3
Milking Parlor	Solid-Liquid Separator Static Inclined Screen 12 Mesh	---Liquids---> Anaerobic Lagoon (Ext) #1 ---Solids---> Dry Stack (Uncovered) #1	Storage Pond #1
Freestall Barn			
Pasture			
Holding Area			

Component Name	Manure	Wash Water	Flush Water	Bedding	Total Waste Volume
Dry Stack (Uncovered) #1	26.68	0.00	0.00	0.00	26.68
Anaerobic Lagoon (Ext) #1	N/A	N/A	N/A	N/A	N/A
Storage Pond #1	0.00	0.00	0.00	0.00	0.00

Click the  button when done editing the Management Train

Design Screen



The Design screen will reveal tabs for each of the storage or treatment facility components, except solid-liquid separation facilities, that were selected on the Management Train screen as shown below.

Click on a Tab for the component to access the design screen.

Input Data

Storage Depth: 7.0 ft

Input Dimension: Bottom Length

Bottom Length: 40.0 ft

Freeboard: 1.0 ft

Max. Storage Volume Method

Define Withdrawal Months

Define Storage Period

Cross Section

Critical Months: Jan - Dec Bot W x L: 8.0 x 40.0 ft Top W x L: 8.0 x 40.0 ft

Facility Options

Set Wall Height

Water Budget (1000 cu ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Withdrawal Dates	<input type="checkbox"/>	<input checked="" type="checkbox"/>											
Waste	0.19	0.18	0.19	0.18	0.19	0.18	0.19	0.19	0.18	0.19	0.18	0.19	2.23
Cum. Storage Vol	0.19	0.37	0.55	0.74	0.93	1.11	1.30	1.49	1.67	1.86	2.04	2.23	

Design Screen



Dry Stack Design (Covered and Uncovered)

The AWM design of dry stacks is the same for both uncovered and covered stacks with the exception that the precipitation falling on an uncovered dry stack is directed to a waste storage pond or tank. Therefore, from a sizing standpoint, both covered and uncovered design screens are the same. Even though the design screen for a covered dry stack is illustrated, it applies to uncovered as well.

The following screen illustrates a design based on inputting the bottom width, depth and defining the withdrawal months:

Vary depth and bottom width to accommodate the site and available standard plans.

Click on drop-down list to select **Bottom Width** or **Bottom Length** to base design on.

AWM computed dimensions for the example shown below.

Water Budget (1000 cu ft)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Withdrawal Dates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Waste	0.44	0.41	0.44	0.44	0.44	0.43	0.44	0.44	0.43	0.44	0.43	0.44	5.20
Cum. Storage Vol	1.31	1.72	2.16	2.59	0.44	0.87	1.31	1.75	2.18	2.62	0.43	0.87	

Define Withdrawal Months selected for the example shown above.

Click on box to check or uncheck months when withdrawal is planned. Withdrawal is on the last day of the month checked.

Design Screen



The following screen illustrates a design based on inputting the bottom width, depth and defining the storage period:

Vary depth and bottom width to accommodate the site and available standard plans.

Click on drop-down list to select Bottom Width or Bottom Length dimension to base design on.

AWM computed dimensions for the example shown.

Input Data

Storage Depth: 7.0 ft

Input Dimension: Bottom Width

Bottom Width: 24.0 ft

Freeboard: 1.0 ft

Max. Storage Volume Method

Define Storage Period

Storage Period: 6 months

Cross Section

Critical Months: Mar - Aug Bot'W x L: 24.0 x 15.6 ft Top W x L: 24.0 x 15.6 ft

Facility Options

Set Wall Height

Water Budget (1000 cu ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Waste	0.44	0.41	0.44	0.43	0.44	0.43	0.44	0.44	0.43	0.44	0.43	0.44	5.20
Storage Volume	0.44	0.41	0.44	0.43	0.44	0.43	0.44	0.44	0.43	0.44	0.43	0.44	

Define Storage Period selected for the example shown. Use the storage period drop-down list to select the number of months to use as the storage period.

Design Screen



The following screen illustrates the set wall height design option for dry stack facilities:

Click on Set Wall Height check box to access the set wall height design screen.

Vary wall height, storage depth and side slope to desired dimensions.

Design Waste Storage Structures

Dry Stack (Uncovered) #1

Input Data

Wall Height: ft

Storage Depth: ft

Input Dimension:

Bottom Width: ft

Freeboard: ft

Sideslope Ratio:

Max. Storage Volume Method

Define Withdrawal Months

Define Storage Period

Storage Period: months

Gross Section

Critical Months: **Mar - Aug** Bot W x L: 24.0 x 26.8 ft Top W x L: 8.0 x 4.8 ft

Facility Options

Set Wall Height

Water Budget (1000 cu ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Waste	0.44	0.41	0.44	0.43	0.44	0.43	0.44	0.44	0.43	0.44	0.43	0.44	5.20
Storage Volume	0.44	0.41	0.44	0.43	0.44	0.43	0.44	0.44	0.43	0.44	0.43	0.44	

Help OK

Design Screen



Setting the wall height to zero allows a dry stack slab to be designed.

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Waste	9.80	0.49	0.47	0.49	0.47	0.49	0.49	0.47	0.49	10.14	10.48	44.76
Storage Volume	9.80	0.49	0.47	0.49	0.47	0.49	0.49	0.47	0.49	10.14	10.48	

If a one month storage period is selected, the program allows the user to select less than thirty one days for the storage period.

Click the  button when done the design screens.

Design Screen



Storage Pond Design

The design of storage ponds in AWM allows the user to define a rectangular or circle type pond. AWM bases the design on the storage depth, bottom width or length, permanent additional storage, freeboard, sideslope ratio and maximum storage volume method inputs made by the user.

The following screen illustrates a rectangular storage pond design based on defining withdrawal months:

Vary depth and bottom length to accommodate the site.

Click on drop-down list to select the shape of the pond to base design on.

Click on drop-down list to select **Bottom Width** or **Bottom Length** dimension to base design on.

Water Budget (1000 cu ft)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Withdrawal Dates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Waste	32.20	30.13	7.69	7.44	7.69	7.44	7.69	7.69	7.44	7.69	3.16	32.20	186.45
Runoff	14.94	8.91	7.64	3.69	2.49	1.52	0.11	0.26	1.75	4.98	14.44	18.19	74.97
Prec-Evap	27.56	17.93	13.32	3.99	-3.07	-7.26	-15.97	-13.15	-3.28	8.65	25.89	32.10	
Cum. Storage Vol	250.01	306.98	335.62	350.74	7.11	8.81	0.63	0.00	5.91	21.31	92.81	175.3	

Define Withdrawal Months selected for the example shown.

Click on box to check or uncheck months when withdrawal is planned. Withdrawal is on the last day of the month checked.

AWM computed dimensions for the example shown.

AWM User Guide

Design Screen



For a storage pond design is based on a storage period or withdrawal months, AWM determines which set of consecutive months during the year requires the greatest storage volume and sizes the facility accordingly.

The following screen illustrates a circular storage pond design based on defining a storage period:

Vary depth to accommodate the site.

Click on drop-down list to select shape of the pond to base the design on.

Input Data

Shape: **Circle**

Total Depth: **10.0** ft

Permanent Add'l Storage: **0** cu. ft

Sideslope Ratio: **3**

Max. Storage Volume Method

Define Withdrawal Months

Define Storage Period

Storage Period: **6** months

Cross Section

Critical Months: **Oct - Mar** Bot Dia.: 175.7 ft Top Dia.: 235.7 ft

Facility Options

Include Soil Liner

Water Budget (1000 cu ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Waste	32.20	30.13	7.69	7.44	7.69	7.44	7.69	7.69	7.44	7.69	31.16	32.20	186.45
Runoff	14.94	8.91	7.64	3.69	2.49	1.52	0.11	0.29	1.75	4.98	4.44	18.19	78.97
Prec-Evap	21.12	13.74	10.21	3.06	-2.35	-5.56	-12.23	-10.07	-2.51	6.63	19.74	24.60	
Storage Volume	68.26	52.78	25.54	14.19	7.83	3.40	0.00	0.00	6.68	19.29	65.45	75.00	

Define Storage Period option selected for the example shown.

Click on drop-down list to access a list of months(1-12) to select a storage period from.

AWM computed dimensions for the example shown.

Storage depth is the total depth of the pond less freeboard, depth of 25-yr., 24-hr. precipitation, depth of 25-yr., 24-hr. storm event runoff, and depth of precipitation less evaporation option selected on the Climate screen. Permanent additional Storage may be required to meet management goals or regulatory requirements (see NRCS Practice Standard 313, Waste Storage Facility).

Design Screen



The following screen illustrates the soil liner design option for a storage pond:

Click on Include Soil Liner to access the soil liner design screen.

Enter the permeability of the soil to be used for the liner. This value is normally available from the soil mechanics report.

Enter the allowable specific discharge. This value may be based on regulatory requirements.

The screenshot shows the 'Design Waste Storage Structures' software interface. The 'Include Soil Liner' checkbox is checked. A 'Soil Liner Design' dialog box is open, showing a diagram of a pond cross-section with a liner depth of 1.0 ft. The dialog box contains input fields for Permeability (k) and Allowable Specific Discharge (v), and calculated fields for Liquid Depth (H), Calculated Liner Depth (d), and Liner Depth. A calculator window is also open, showing a conversion from centimeters per second to feet per day.

Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
7.69	7.44	7.69	7.44	7.69	7.69	7.44	7.69	31.16	32.20	186.45
7.64	3.69	2.49	1.52	0.11	0.29	1.75	4.98	14.44	18.19	78.97
12.66	3.83	-2.82	-6.79	-15.02	-12.36	-3.03	8.23	24.56	30.44	
27.99	14.96	7.35	2.17	0.00	0.00	6.16	20.90	70.16	80.83	

Click on to access the conversion calculator. The calculator can be used to convert centimeters per second to feet per day. See the Calculator section in this chapter for more information.

The liquid depth AWM uses for designing the soil liner is based on the total depth of the pond less freeboard, depth of 25-yr., 24-hr. precipitation, and the depth of the 25-yr., 24-hr. storm event runoff.

Design Screen



The following screen illustrates the parallel ramp design option for a storage pond:

Click on the drop-down list to select the type of ramp to design. Choices are Parallel and Perpendicular.

Enter the preferred slope ratio and width of the ramp.

Click on Include Ramp to access the ramp design screen.

AWM computes the length of the ramp and shows the dimensions of the ramp on the schematic drawing of the storage pond.

Note: The parallel ramp design screen is not available for circular ponds.

Design Screen



The following screen illustrates the perpendicular ramp design option for a storage pond:

Click on the drop-down list to select the type of ramp to design. Choices are Parallel and Perpendicular.

Enter the preferred slope ratio and width of the ramp.

Click on Include Ramp to access the ramp design screen.

AWM computes the length of the ramp and shows the dimensions of the ramp on the schematic drawing of the storage pond.

Note: The perpendicular ramp design screen is not available for circular ponds.

Design Screen



Design Waste Storage Structures

Storage Pond #1

Input Data

Shape: **Rectangle**

Total Depth: **10.0** ft

Input Dimension: **Bottom Width**

Bottom Width: **150.0** ft

Permanent Add'l Storage: **0** cu. ft

Sideslope Ratio: **3**

Max. Storage Volume Method

Define Withdrawal Months

Define Storage Period

Storage Period: **6** months

Cross Section

Critical Months: **Oct - Mar** Bot W x L.: 150.0 x 197.0 ft Top W x L.: 210.0 x 257.0 ft

Facility Options

Include Soil Liner Include Ramp

Water Budget (1000 cu ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Waste	32.20	30.13	7.69	7.44	7.69	7.44	7.69	7.69	7.44	7.69	31.16	32.20	186.45
Runoff	14.94	8.91	7.64	3.69	2.49	1.52	0.11	0.29	1.75	4.98	14.44	18.19	78.97
Prec-Evap	26.13	17.02	12.66	3.83	-2.82	-6.79	-15.02	-12.36	-3.03	8.23	24.56	30.44	
Storage Volume	73.28	56.05	27.99	14.96	7.35	2.17	0.00	0.00	6.16	20.90	70.16	80.83	

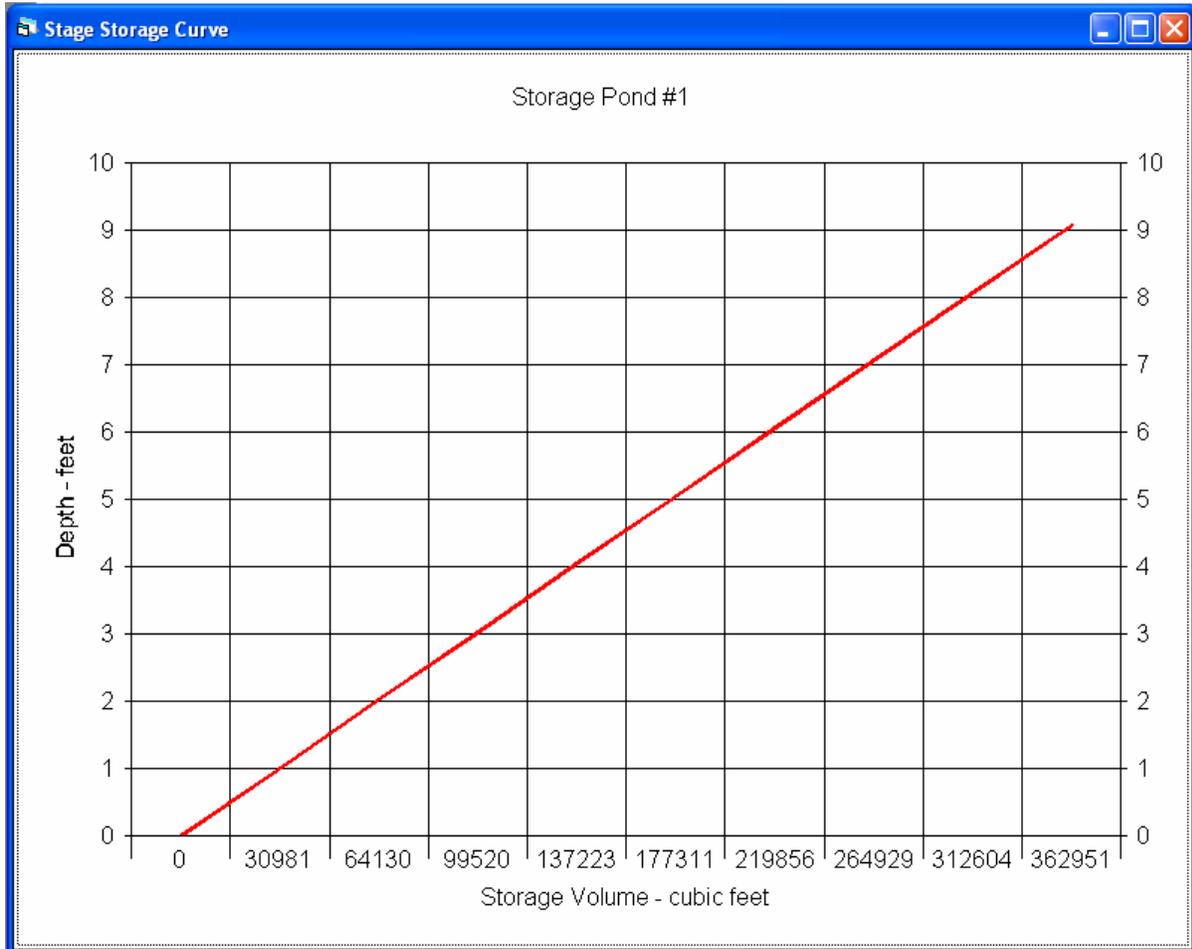
Stage Storage Curve | Help | OK

Click on **Stage Storage Curve** button to access the stage storage curve for the storage pond design.

Design Screen



The following screen illustrates the stage storage curve for the example storage pond design:



Design Screen



Storage Tank Design

The design of tanks in AWM allows the user to define a rectangular or circular type tank. AWM bases the design on the storage depth, bottom width or length, permanent additional storage, freeboard, precipitation excluded or not and maximum storage volume method inputs made by the user.

The following screen illustrates a rectangular tank design based on defining withdrawal months:

Click on the Tank Covered: **check box if tank is covered to exclude precipitation.**

Click on drop-down list to select shape of the tank to base the design on.

Click on drop-down list to select dimension to base design on.

Vary depth and width as needed to fit tank to site conditions and/or standard drawing.

Max. Storage Volume Method
 Define Withdrawal Months
 Define Storage Period

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Withdrawal Rates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Waste	0.83	0.78	0.83	0.80	0.83	0.80	0.83	0.83	0.83	0.83	0.80	0.83	9.79
Prec-Evap	0.87	0.55	0.39	0.07	-0.19	-0.33	-0.64	-0.54	-0.18	0.24	0.81	1.01	
Cum. Storage Vol	5.15	6.48	7.70	8.57	8.81	1.11	1.30	1.59	2.21	3.27	1.81	3.41	

Define Withdrawal Months option selected for the example shown.

Click on box to check or uncheck months when withdrawal is planned. Withdrawal is on the last day of the month checked.

AWM computed dimensions for the example shown.

Design Screen



For a tank design based on a storage period, AWM determines which set of consecutive months during the year for the storage period specified requires the greatest storage volume and sizes the facility accordingly.

The following screen illustrates a circular tank design based on defining a storage period and excluding precipitation:

Click on Tank Covered: **if tank is covered with a lid or roof to exclude precipitation.**

Vary depth to accommodate the site conditions.

Click on drop-down list to select shape of the tank to base the design on.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Waste	0.83	0.78	0.83	0.80	0.83	0.80	0.83	0.83	0.80	0.83	0.80	0.83	9.79
Storage Volume	0.83	0.78	0.83	0.80	0.83	0.80	0.83	0.83	0.80	0.83	0.80	0.83	

Define Storage Period option selected for the example shown.

Click on drop-down list to access a list of months(1-12) to select a storage period.

Dimensions computed by AWM for the example shown.

Storage depth for covered tanks excludes depth of 25-yr., 24-hr. precipitation and depth of precipitation less evaporation option selected on the Climate screen. Permanent additional Storage may be required to meet management goals or regulatory requirements (see NRCS

Design Screen



Practice Standard 313, Waste Storage Facility). Passing the mouse pointer over will generate a popup box that shows the cubic feet of storage associated with the depth of additional storage entered.

Permanent Add'l Storage:

The following screen illustrates the parallel ramp design option for a rectangular tank:

Click on the drop-down list to select the type of ramp to design. Choices are Parallel and Perpendicular.

Enter the preferred slope ratio and width of the ramp.

Click on Include Ramp to access the ramp design screen.

AWM computes the length of the ramp and shows the dimensions of the ramp on the schematic drawing of the rectangular tank.

The parallel ramp design screen is not available for circular tanks.

Design Screen

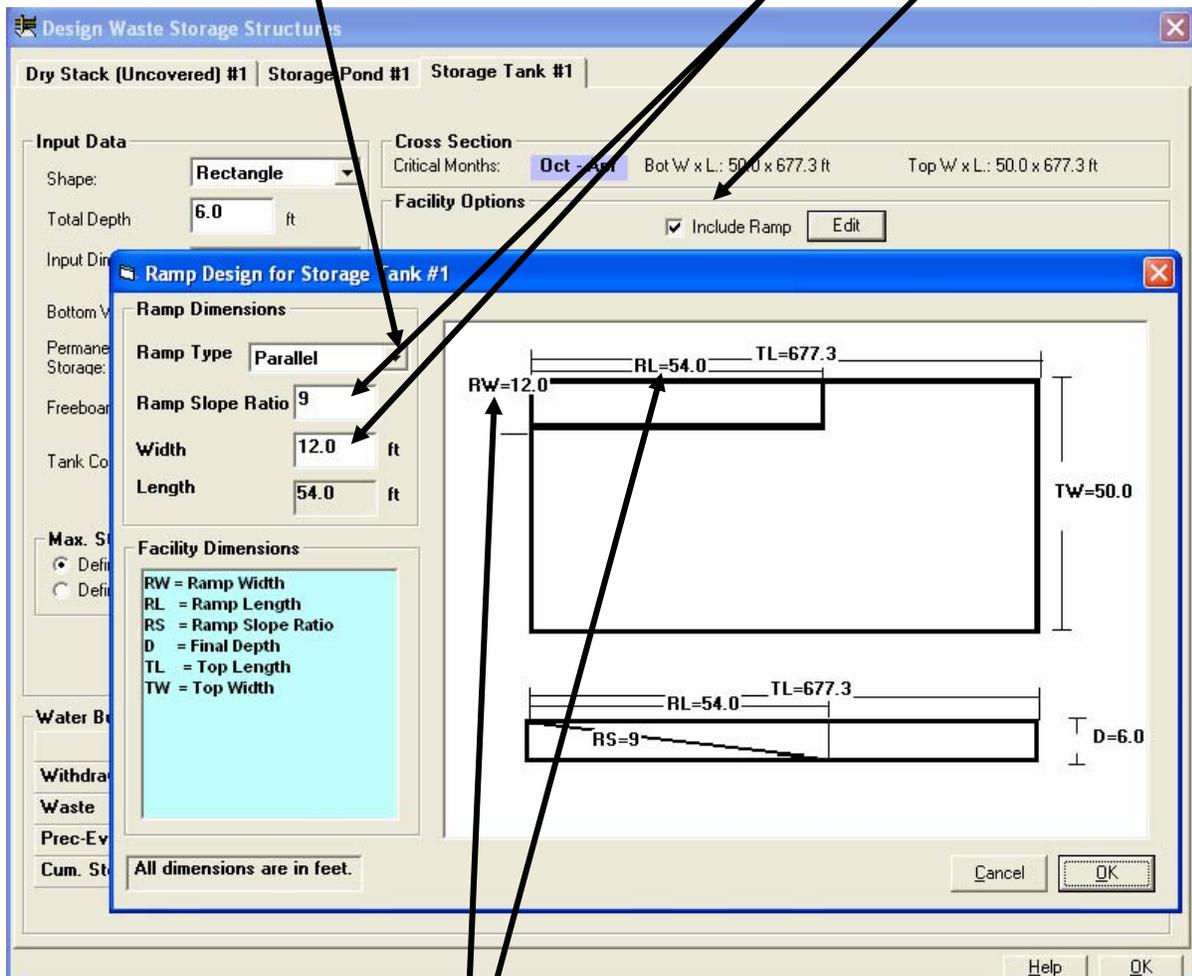


The following screen illustrates the perpendicular ramp design option for a rectangular tank:

Click on the drop-down list to select the type of ramp to design. Choices are Parallel and Perpendicular.

Enter the preferred slope ratio and width of the ramp.

Click on Include Ramp to access the ramp design screen.



AWM computes the length of the ramp and shows the dimensions of the ramp on the schematic drawing of the rectangular tank.

The perpendicular ramp design screen is not available for circular tanks.

Design Screen



Anaerobic Lagoon Design

The inputs for the design of anaerobic lagoons in AWM are very similar to the design of a storage pond. AWM allows the user to define a rectangular or oval type lagoon. AWM bases the design on the storage depth, bottom width or length, permanent additional storage, freeboard, sideslope ratio, sludge accumulation period and maximum storage volume method inputs made by the user.

The following screen illustrates a rectangular anaerobic lagoon design based on defining withdrawal months:

Vary depth and bottom width to accommodate the site.

Click on drop-down list to select the shape of the lagoon to base design on. Choices are rectangular and circular.

Click on drop-down list to select Bottom Width or Bottom Length dimension to base design on.

The NRCS design methodology is used unless the Use Rational Design Method is checked.

Input Data

Shape: **Rectangle**

Total Depth: **14.0** ft

Input Dimension: **Bottom Width**

Bottom Width: **200.0** ft

Permanent Add'l Storage: **0** cu. ft

Freeboard: **1.0** ft

Sideslope Ratio: **2**

Sludge Accum. Period: **5** years

Max. Storage Volume Method

Define Withdrawal Months

Define Storage Period

Cross Section

Critical Months: **Oct - Apr** Bot'W x L.: 200.0 x 206.3 ft Top'W x L.: 256.0 x 262.3 ft

Facility Options

Include Soil Liner Use Rational Design Method

Diagram Data:

- TL = 262.3 ft
- Freeboard = 1.0 ft
- Depth of 25 Yr. 24 Hr. Storm Event = 4 in
- 25 Yr. 24 Hr. Storm Event Runoff = 0 cu. ft 0.00 ft
- Depth of Precipitation - Evaporation = 25.27 in
- Volume of Manure, bedding, wash water, flush water, normal runoff, and external storage (if any) = 104783 CF
- Minimum Treatment Volume = 0 CF
- Sludge Acc. & Perm. Add'l Storage = 407351 CF
- BL = 206.3 ft
- D = 14.0 ft
- 1.81 ft
- 0.00 ft
- 8.41 ft

Water Budget (1000 cu ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Withdrawal Dates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Waste	15.25	14.27	15.25	14.76	15.25	14.76	15.25	15.25	14.76	15.25	14.76	15.25	180.05
Prec-Evap	32.40	20.98	15.37	4.18	0.00	0.00	0.00	0.00	0.00	9.82	30.37	37.77	
Cum. Storage Vol	170.87	206.11	236.73	255.67	15.25	30.01	45.26	60.51	75.27	25.08	70.21	123.92	

Define Withdrawal Months selected for the example shown.

AWM User Guide

Click on box to check or uncheck months when withdrawal is planned. Withdrawal is on the last day of the month checked.

AWM computed dimensions for the example shown.

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Design Screen



For an anaerobic lagoon design based on a storage period, AWM determines which set of consecutive months during the year for the storage period specified requires the greatest storage volume and sizes the facility accordingly.

The following screen illustrates a circular anaerobic lagoon design based on defining a storage period and using the Rational Design Method:

Vary depth to accommodate the site.

Click on drop-down list to select shape of the lagoon to base the design on. Choices are Rectangular and Circular.

The NRCS design methodology is used unless the Use Rational Design Method is checked.

Input Data

Shape: **Circle**

Total Depth: **14.0** ft

Permanent Add'l Storage: **0** cu. ft

Freeboard: **1.0** ft

Sideslope Ratio: **2**

Sludge Accum. Period: **5** years

Max. Storage Volume Method

Define Withdrawal Months

Define Storage Period

Storage Period: **6** months

Cross Section

Critical Months: **Oct - Mar** Bot Dia.: 200.0 ft Top Dia.: 256.0 ft

Facility Options

Include Soil Liner Use Rational Design Method

Water Budget (1000 cu ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Waste	15.25	14.27	15.25	14.76	15.25	14.76	15.25	15.25	14.76	15.25	14.76	15.25	180.05
Prec-Evap	24.84	16.09	11.88	3.23	0.00	0.00	0.00	0.00	0.00	7.55	23.29	28.95	
Storage Volume	40.09	30.35	27.05	17.99	15.25	14.76	15.25	15.25	14.76	22.80	38.05	44.20	

Define Storage Period option selected for the example shown.

Click on drop-down list to access a list of months(1-12) to select a storage period.

AWM computed dimensions for the example shown.

Permanent additional Storage may be required to meet management goals or regulatory requirements (see NRCS Practice Standard 359, Waste Treatment Lagoon). At least 1 year of sludge accumulation period should be entered to account for sludge buildup in the lagoon.

Design Screen



The following screen illustrates the soil liner design option for an anaerobic lagoon:

Click on Include Soil Liner to access the soil liner design screen.

Enter the permeability of the soil to be used for the liner. This value is normally available from the soil mechanics report.

Enter the allowable specific discharge. This value may be based on regulatory requirements.

	Apr	May
25 Yr. 24 Hr. Storm Event	14.76	15.25
25 Yr. 24 Hr. Storm Event Runoff	4.09	0.00
Depth of Precipitation - Evaporation	18.85	15.25

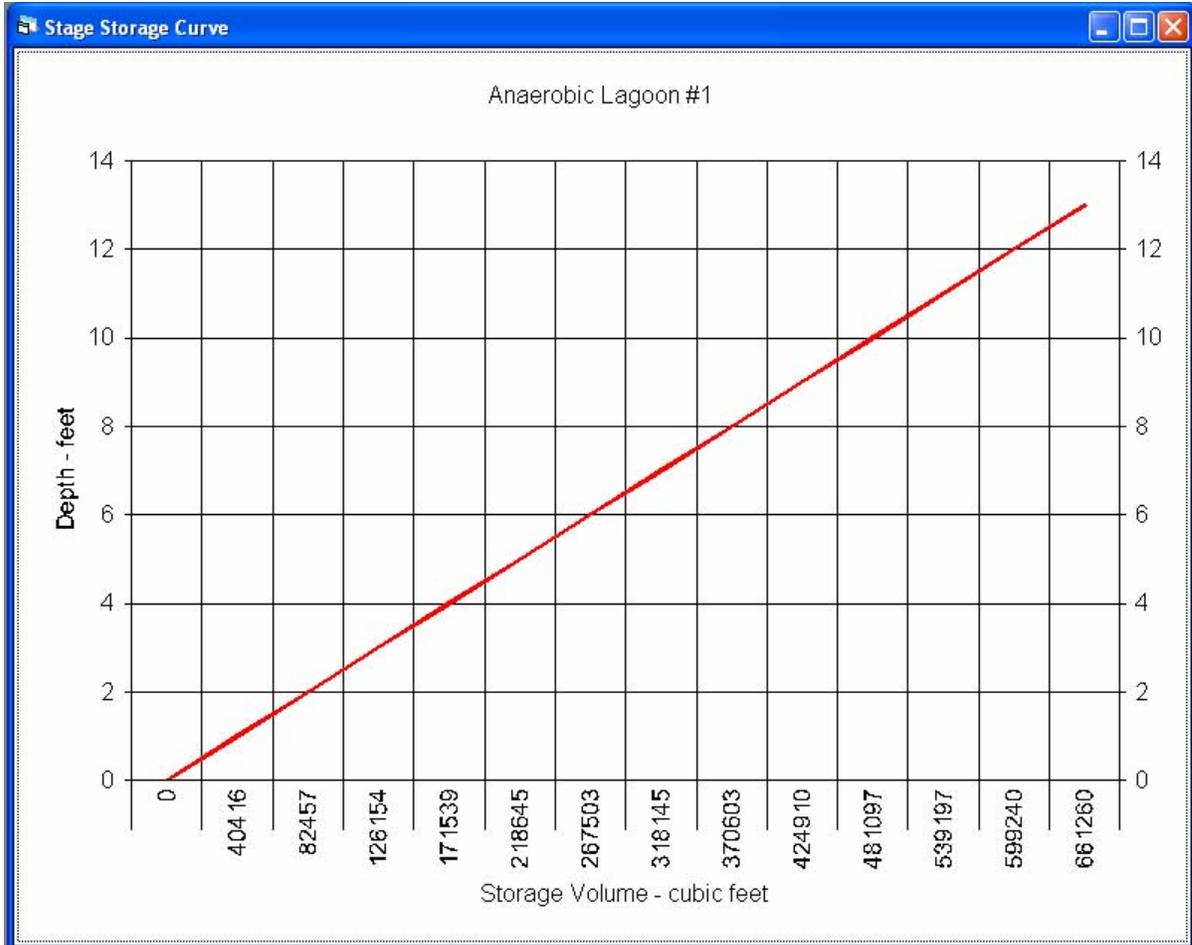
Click on to access the conversion calculator. The calculator can be used to convert centimeters per second to feet per day. See the Calculator section in this chapter for more information.

The liquid depth AWM uses for designing the soil liner is based on the total depth of the lagoon less freeboard, depth of 25-yr., 24-hr. precipitation, and the depth of the 25-yr., 24-hr. storm event runoff.

Design Screen



The following screen illustrates the stage storage curve for the example anaerobic lagoon design:



Design Screen



Anaerobic Lagoon with External Storage

The anaerobic lagoon with external storage design option utilizes an anaerobic lagoon to contain the minimum treatment volume. All other volume requirements are contained in the storage facility that must follow the lagoon in the management train. The only time this lagoon would be emptied would be for sludge removal.

The following screen illustrates a rectangular anaerobic lagoon with external storage design:

Vary depth and bottom width to accommodate the site.

Click on drop-down list to select the shape of the lagoon to base design on. Choices are rectangular and circular.

Click on drop-down list to select Bottom Width or Bottom Length dimension to base design on.

The NRCS design methodology is used unless the Use Rational Design Method is checked.

Enter the number of years for sludge accumulation. At least 1 year of sludge accumulation period should be entered to account for sludge buildup in the lagoon.

AWM computed dimensions for the example shown.

Design Screen



The following screen illustrates a circular anaerobic lagoon with external storage design based on using the Rational Design Method:

Vary depth to accommodate the site.

Click on drop-down list to select shape of the pond to base the design on. Choices are Rectangular and Circular.

The NRCS design methodology is used unless the Use Rational Design Method is checked.

Enter the number of years for sludge accumulation. At least 1 year of sludge accumulation period should be entered to account for sludge buildup in the lagoon.

AWM computed dimensions for the example shown.

Storage depth is the total depth of the lagoon less freeboard. Since lagoons with external storage do not provide storage, an additional storage component must follow this type of facility in the management train.

Design Screen



The following screen illustrates the soil liner design option for an anaerobic lagoon with external storage:

Click on
 Include Soil Liner
to access the soil liner design screen.

Enter the permeability of the soil to be used for the liner. This value is normally available from the soil mechanics report.

Enter the allowable specific discharge. This value may be based on regulatory requirements.

Click on  to access the conversion calculator. The calculator can be used to convert centimeters per second to feet per day. See the Calculator section in this chapter for more information.

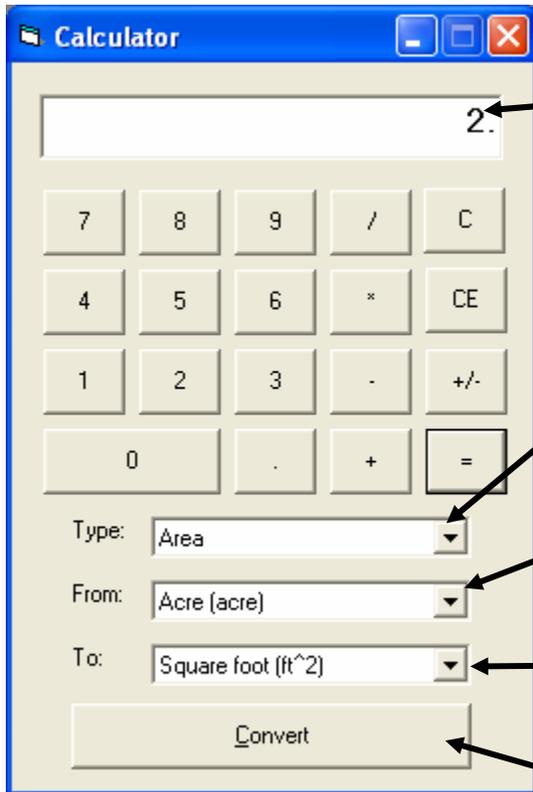
The liquid depth AWM uses for designing the soil liner is based on the total depth of the lagoon less freeboard.

Conversion Calculator



The Conversion Calculator is available within all screens in AWM and is activated by clicking on the Calculator button on the AWM tool bar or selecting the Unit Conversion Calculator from the Tools drop-down menu. The calculator can be used to perform mathematical calculations but is provided primarily for unit conversion. Select the To and From units in the combo boxes, type in the number to be converted and press the Convert button.

The following screen illustrates how the Calculator can be used to convert units:



Enter the value of the unit to convert. This example is converting 2 Acres to Square Feet.

Click on the drop-down list for unit type to select the type of unit to convert. Area is selected for this example.

Click on the "From:" drop-down list to select the unit to convert from. Acre is selected for this example.

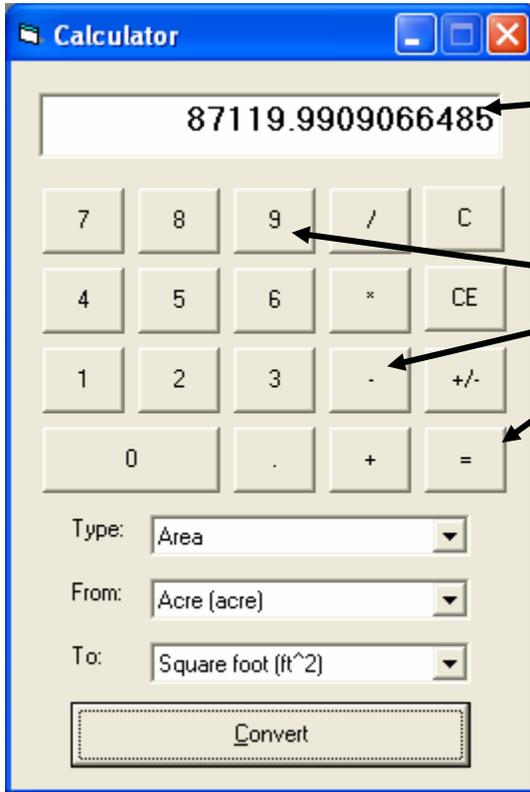
Click on the "To:" drop-down list to select the unit to convert to. Square foot is selected for this example.

Click on the Convert button to perform the conversion.

Conversion Calculator



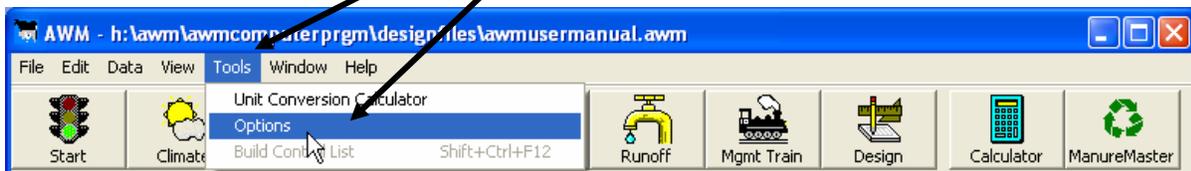
The following screen illustrates the results of the conversion of 2 acres to square feet:



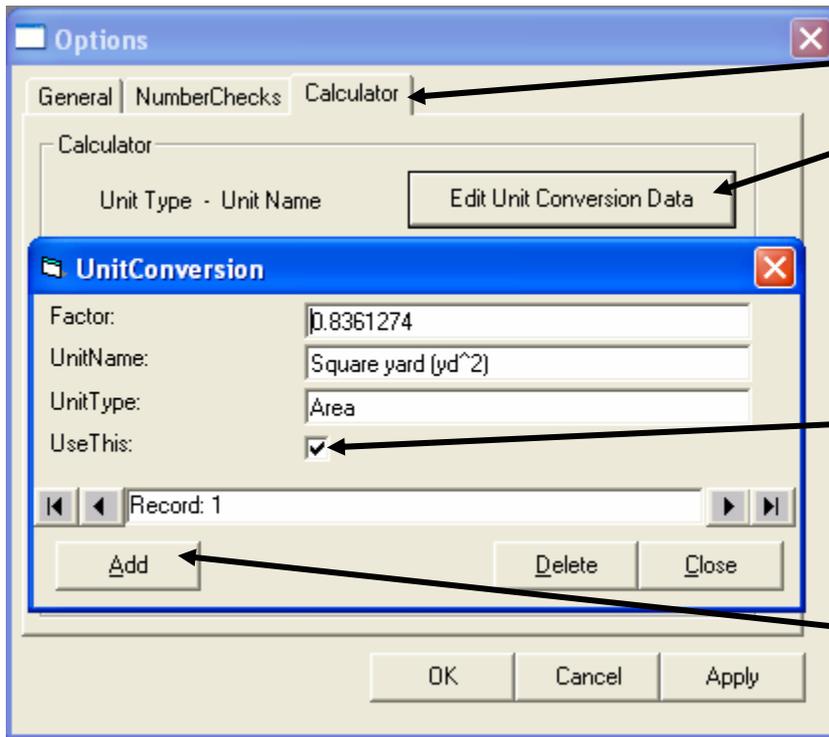
The calculator displays the value in square feet of the conversion of 2 acres shown in the previous screen.

The numeric keys on the calculator can be clicked on to perform mathematical calculations. The numeric keys on the computer keyboard can be used for this purpose as well.

The data used in the conversion calculator can be edited by selecting Tools->Options from the main menu in AWM.



Conversion Calculator



Click on the Calculator tab and the

Edit Unit Conversion Data

button to edit existing conversion data or add additional conversion data.

If the UseThis: box is checked the unit conversion factor will be available for use in the calculator.

Click on the Add button to add additional conversion factors.

The user should have a good understanding of the data format before attempting to edit or add data to the Conversion Calculator database.

Manure Master



Manure Master is a simple screening tool can help assess the relative potential for the nutrients contained in the animal manure from an animal feeding operation to meet the crop uptake and utilization requirements for those crops that receive applications of manure. Manure Master calculates a balance between the nitrogen, phosphorus, and potassium content in the manure and the quantity of these nutrients used by crops. This balance can be calculated based upon recommended fertilizer application rates, when known or upon estimated plant nutrient content, when recommended fertilizer application rates are not known. For nitrogen, the balance is calculated taking into account expected losses from leaching, denitrification, and volatilization. Manure Master is not a nutrient management planning tool, therefore criteria in the NRCS Practice Standard 590, Nutrient Management, should be referenced when developing nutrient management plans.

The following screens illustrate the use of Manure Master:

Click on the
Reset
button to clear the input table.

Click on the
Help
button to view help.

Click on the
View the Output (Nutrient Balance)
button to view nutrient balance.

Crop Name	Acres Applied	Yield Goal	Yield Unit	Manure Is Incorporated	N	P205	K20
Barley, Grain Straw Removed			Tons	<input type="checkbox"/>			
Beans, Dry			Tons	<input type="checkbox"/>			
Bentgrass for Seed			cwt	<input type="checkbox"/>			
Bluegrass for Seed			cwt	<input type="checkbox"/>			
Bluegrass Hay/Pasture			Tons	<input type="checkbox"/>			
Buckwheat, Grain			Bushels	<input type="checkbox"/>			
Buckwheat, Grain Straw Removed			Tons	<input type="checkbox"/>			
Canola			Tons	<input type="checkbox"/>			
Corn for Grain			Tons	<input type="checkbox"/>			
Corn for Grain, Stover Removed			Tons	<input type="checkbox"/>			
Corn for Silage			Tons	<input type="checkbox"/>			
Corn for Silage (As Harvested)	40.00	25.00	Tons	<input type="checkbox"/>			
Corn, Sweet			Tons	<input type="checkbox"/>			
Cotton			Bales	<input type="checkbox"/>			
Fescue Hay/Pasture			Tons	<input type="checkbox"/>			
Grass Hay			Tons	<input type="checkbox"/>			
Grass Legume Hay/Pasture	40.00	6.00	Tons	<input type="checkbox"/>			

Enter the acres of each crop that manure and waste water is applied on.

Enter the target yield goal for each crop in the units indicated next to the Yield Goal column.

Click on the check box to indicate manure and waste water are incorporated into the soil when applied. Leave blank if manure and waste water is not incorporated.

If available, enter recommended nitrogen, phosphorous, and potassium application rates in pounds per acre.



The following screen illustrates output from Manure Master based on the previous screen:

Nutrient Utilization

This report is to help evaluate the amount of nutrients your farm would produce compared to the amount of nutrients it could utilize based on the crops listed on the next page that are part of your crop management system.

The factors used to calculate manure nutrient content are developed from estimates that account for nutrient losses due to collection, storage, treatment and handling. When manure is not incorporated, an additional nitrogen loss is taken for volatilization.

According to the AWM computer program you have the following annual nutrient balance:

Nutrient	Amount Applied (Pounds)	Amount Utilized (Pounds)	Balance (Pounds)
Nitrogen – N	26,352	37,753	11,401 pounds needed
Phosphate – P ₂ O ₅	8,807	3,911	4,896 pounds of excess
Potash – K ₂ O	16,871	10,401	6,470 pounds of excess

Note: Increase or decrease the number of animals or acres of cropland intended for manure application if you wish to adjust the nutrient balance based on N, P₂O₅, or K₂O.

If your balance for phosphorus exceeds the amount utilized by the crops grown, you may be accumulating phosphorus in the soil. Phosphorus is known to contribute to water quality problems. As the amount of available phosphorus in the soil increases, the potential for it to move by the processes of erosion, runoff, or leaching increase. The Phosphorus Index may be used to determine the relative risk for phosphorus to become a water quality problem on your farm.

There are many assumptions that were used to create this report that make it too general to use for detailed nutrient management planning. This report is intended to be used as a decision support screening tool to allow you to make a quick evaluation as to whether the quantity of nutrients applied exceeds the quantity of nutrients utilized by the crops grown on your farm. When nutrients applied exceed the nutrients utilized, potential increases for nutrients to leach or runoff from fields and become pollutants of ground and surface waters.

Since this report is general in nature, **do not** assume you have met the total nutrient requirements of your crop management system, even when the nutrient content in the manure exceeds the nutrient utilization of the crops grown. You are strongly encouraged to seek the services of a professional nutrient management specialist to determine actual applications rates of nitrogen, phosphorus and potassium to meet the needs of the crops grown in your crop management system.

Contact Natural Resources Conservation Service, Cooperative Extension or Soil and Water Conservation District staff at your local USDA Service Center for assistance in addressing questions you may have related to manure and nutrient management on your farm.

Manure Master



The following screen illustrates options for Manure Master output:

The screenshot shows the Manure Master software window titled "AWM - h:\awm\awmcomputer\prgm\designfiles\awmusermanual.awm - [Manure Master Output]". The menu bar includes File, Edit, Data, View, Tools, Window, and Help. The toolbar contains icons for Start, Climate, Animals, Locations, Additions, Runoff, Mgmt Train, Design, Calculator, and ManureMaster. Below the toolbar are buttons for Print, Export to Rich Text Format, Zoom (set to 50), Page (set to 1), and Help. The main window displays a report titled "Nutrient Utilization" with the following content:

Nutrient Utilization

This report is to help evaluate the amount of nutrient your farm would produce compared to the amount of nutrients it could utilize based on the crops listed on the next page that are part of your crop management system.

The factors used to calculate manure nutrient content are developed from estimates, but account for nutrient losses due to feedlot, storage, treatment and handling when manure is not incorporated, and additional nitrogen loss is taken for volatilization.

According to the AWM computer program you have the following annual nutrient balance:

Nutrient	Amount Applied (Pound s)	Amount Utilized (Pound s)	Balance (Pound s)
Nitrogen - N	132414	37705	94709 pounds of excess
Phosphate - P ₂ O ₅	121540	7030	114510 pounds of excess
Potash - K ₂ O	225045	19222	205823 pounds of excess

Note: Increase or decrease the number of animals or acres of cropland intended for manure application until you wish to adjust the nutrient balance based on N, P₂O₅ or K₂O.

If your balance for phosphorus exceeds the amount utilized by the crops grown, you may be accumulating phosphorus in the soil. Phosphorus is known to contribute to water quality problems. As the amount of available phosphorus in the soil increases, the potential for ill effects by the processes of erosion, runoff or leaching increase. The Phosphorus Index may be used to determine the relative risk for phosphorus to become a water quality problem on your farm.

There are many assumptions that were used to create this report that make it too general to use for detailed nutrient management planning. This report is intended to be used as a decision support or screening tool to allow you to make a quick evaluation as to whether the quantity of nutrients applied exceeds the quantity of nutrients utilized by the crops grown on your farm. When nutrients applied exceed the nutrients utilized, potential increases for nutrient loss to runoff fields and become pollutants of ground and surface waters.

Since this report is general in nature, do not assume you have met the total nutrient requirements of your crop management system, even when the nutrient content in the manure exceeds the nutrient utilization of the crops grown. You are strongly encouraged to seek the services of professional nutrient management specialists to determine actual application rates of nitrogen, phosphorus and potassium to meet the needs of the crops grown in your crop management system.

Contact Natural Resources Conservation Service, Cooperative Extension or Soil Water Conservation District staff at your local USDA Service Center for assistance in addressing questions you may have related to manure and nutrient management on your farm.

AWM Nutrient Utilization Page 1

Press F1 for Help on Any Screen 6/23/2004 10:33 AM

Annotations on the screenshot:

- Click on the **Help** button to view help.
- Click on the **Export to Rich Text Format** button to create a rich text format (.RTF) file of the output form.
- Click on the **Print** button to print the Manure Master output form.
- Click the **X** button to close the output form window.

Chapter 5 – Reports

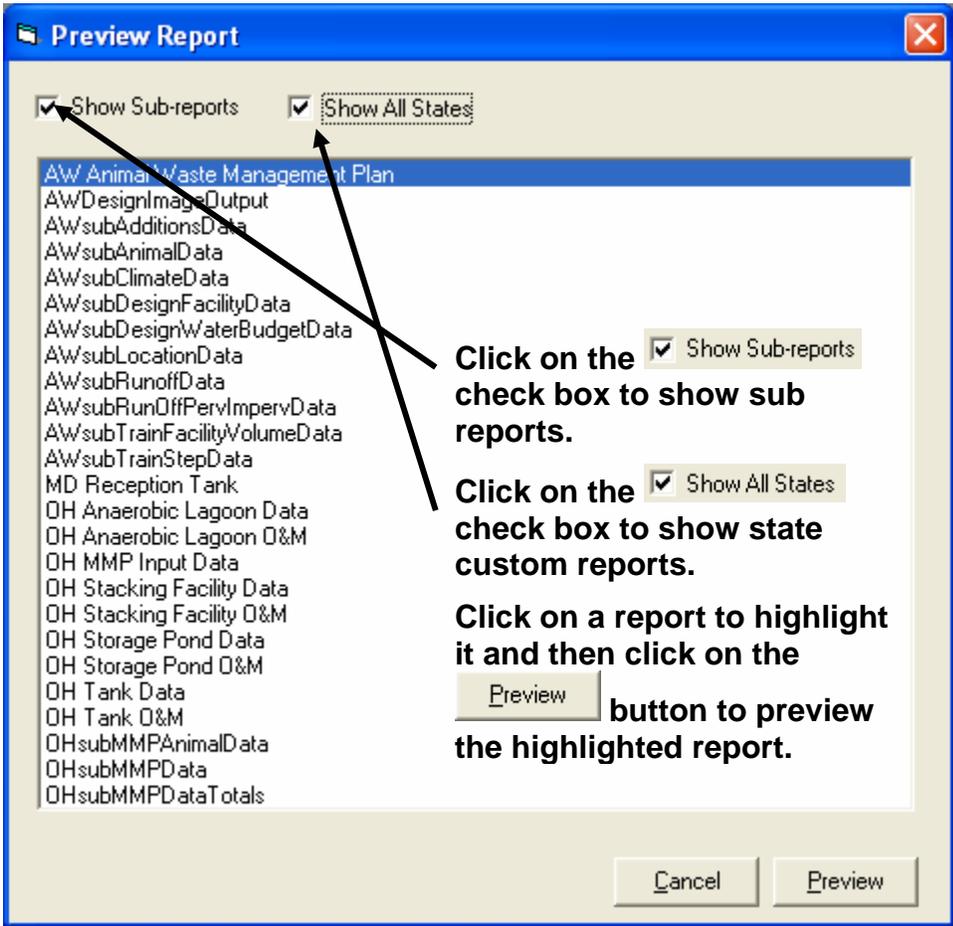
AWM generates several different report formats to document the system design. The reports are generated from File->Reports on the main AWM menu as shown below:



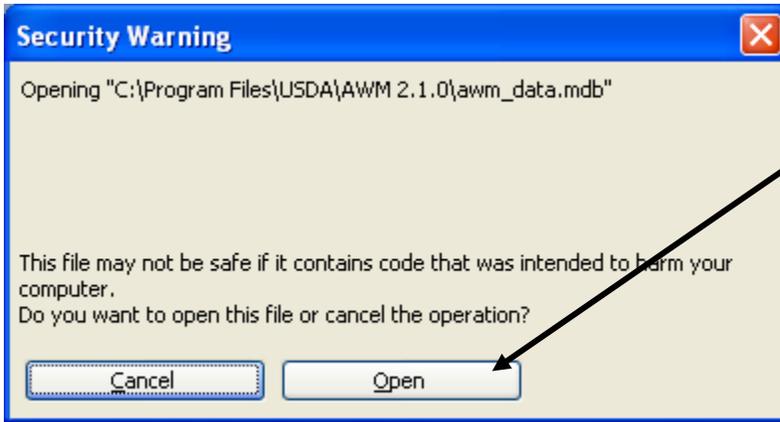
Click on the preferred menu item in the drop-down list to print, preview or export a report.

Previewing and Printing a Report

Selecting the Preview Report results in the following screen for the example design:

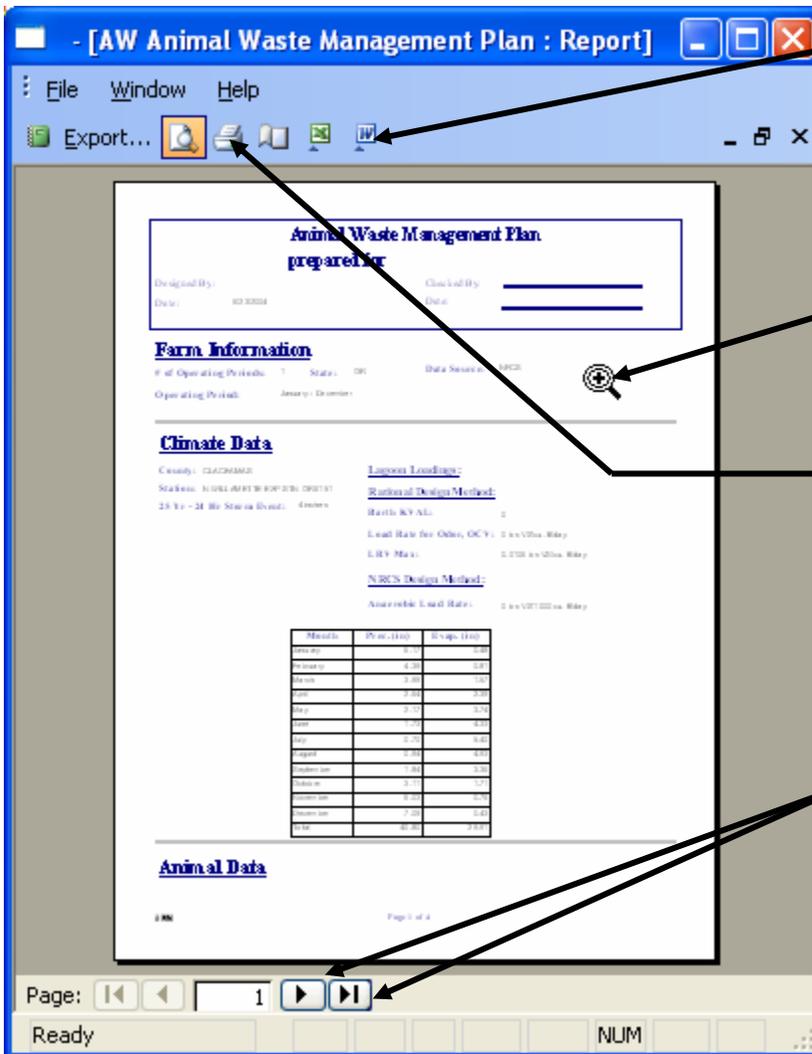


Selecting the Animal Waste Management Plan report to preview results in the following screen for the example design:



A security warning popup may appear. Simply click on the  button to view the report.

Clicking on the button will produce the following results:



Click on the  button to view the report as a rich text format (.RTF) file in Microsoft Word. The report can also be saved as a rich text format or document (.doc) file using Microsoft Word.

Use the zoom  tool to click on the report to zoom in or out on the report.

Click on the  button to print the report to the default Windows printer. Use the File menu or press the [Ctrl] + [P] to select a different printer to print the report with.

Use the  buttons to preview different pages of the report. The  button previews the next page and the  button previews the previous page. The  button goes to the last page in the report and the  button goes to the first page in the report.

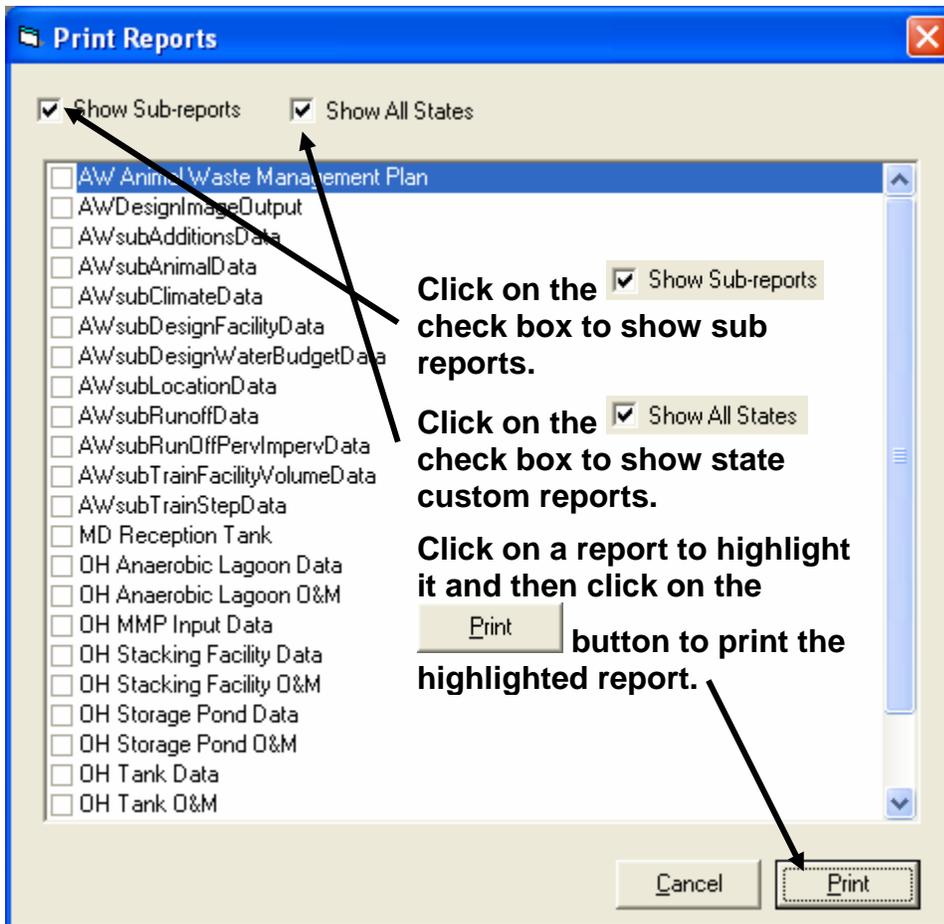
The AWM program uses Microsoft Access to preview and print a report. Using the export tools within Microsoft Access the user can export a report to a Microsoft Word or Excel file so it can be formatted and saved by the user. The only limitation to creating custom reports

for use in the AWM program is the user's knowledge level on how to create and edit reports using Microsoft Access.

To print a report, select the Print Reports from the Reports menu as shown on the following screen:



Selecting the Print Reports results in the following screen for the example design:

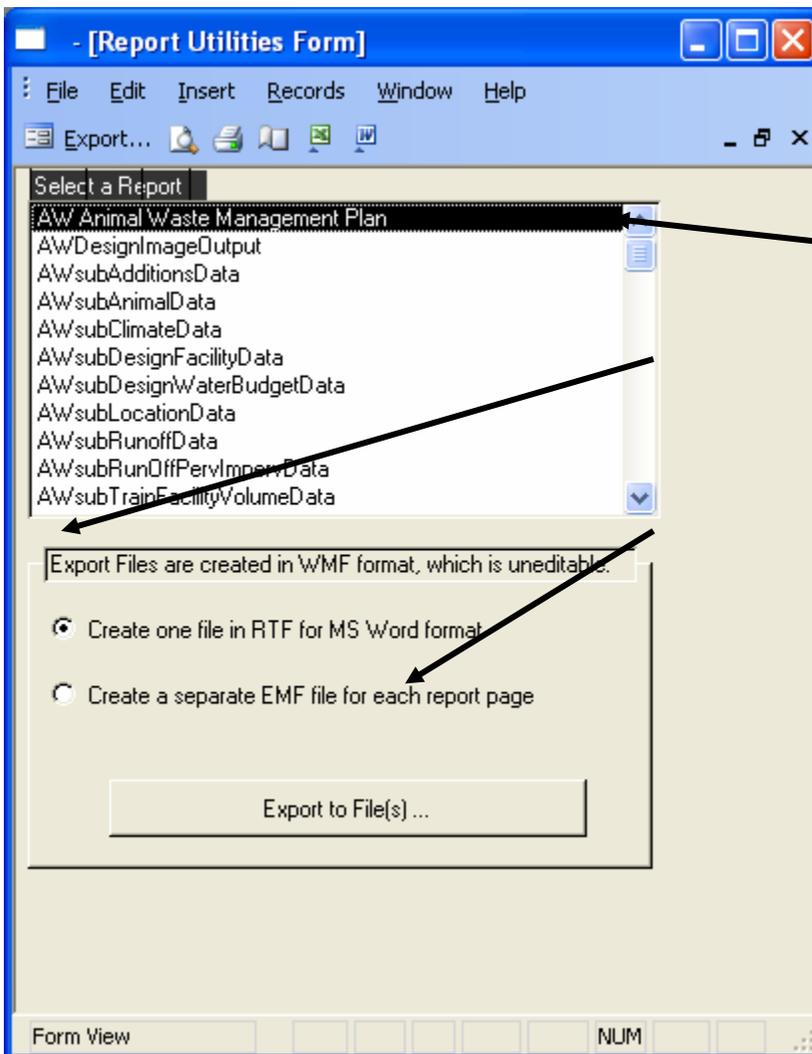


Exporting a Report

To export a report to a Microsoft Word rich text format(.RTF) file, select the Export Reports from the Reports menu as shown on the following screen:



Selecting the Export Reports results in the following screen for the example design:

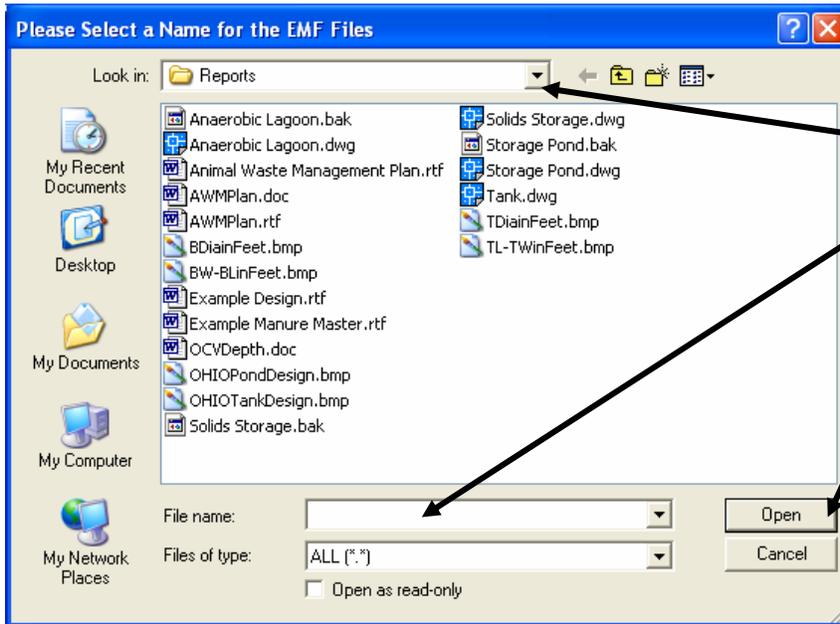


Click on a report to select it for exporting.

Click on the appropriate  button to select a Microsoft Word rich text format (.RTF) file or EMF file.

Click on the  button to export the selected file.

Clicking on the  button results in the following screen for the example design:

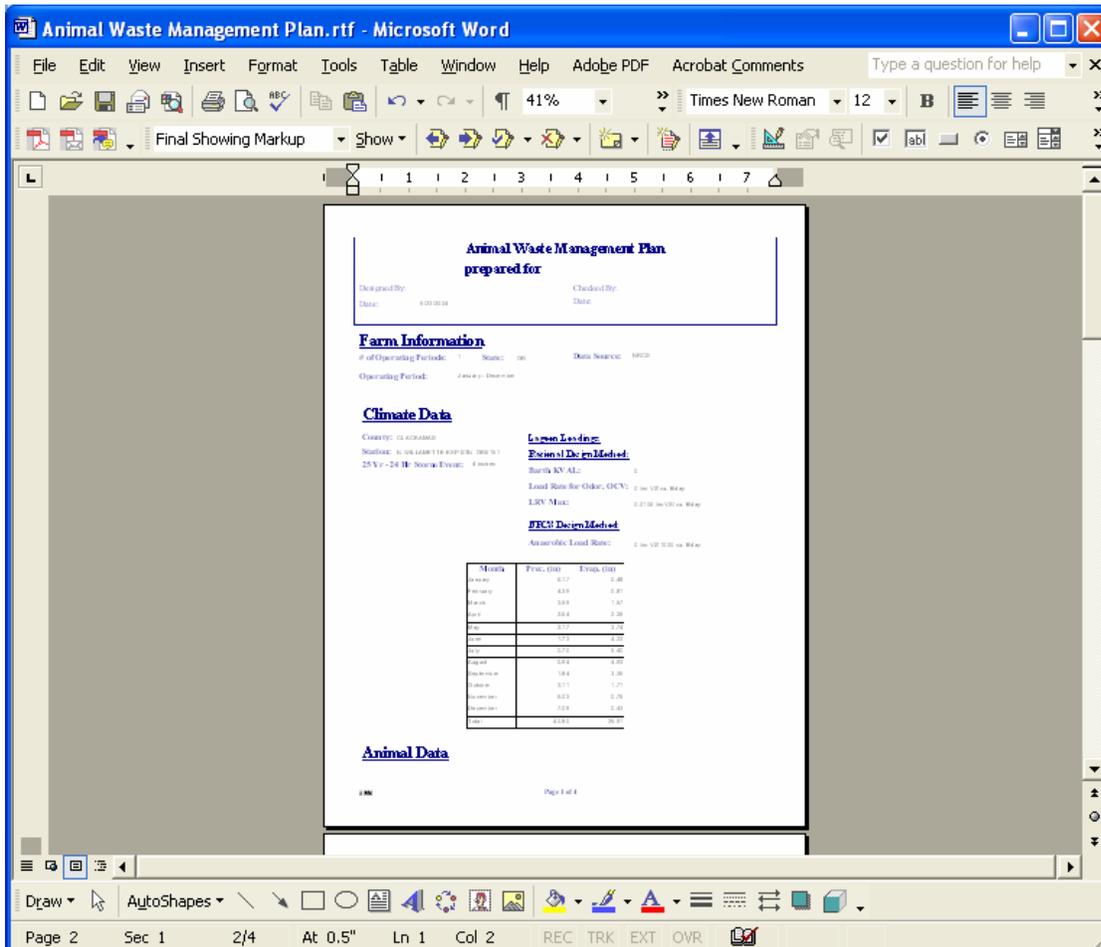


Select the directory to store the exported report file in.

Enter the file name of the exported report file.

Click on the  button to open the report in the selected export file format.

Clicking on the  button results in the following screen for the example design:



Use the features of the selected program to edit and save the custom report.

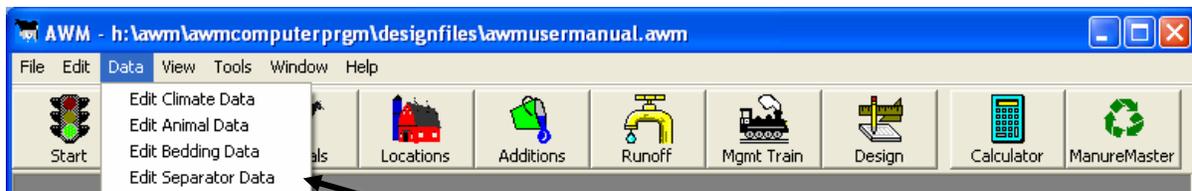
Chapter 6 – Modifying the AWM Database

The AWM database has four tables, all of which can all be modified. They are:

- Climate
- Animals
- Bedding
- Separators

Note: Changes made to the database do not take affect until AWM is exited and then restarted.

The tables within the AWM database are accessed from the main AWM menu by first clicking on Data and then clicking on the table to be modified as illustrated in the following screen:



Select the data table to edit by clicking on the data element.

If AWM is being used for the first time, the database may not be the most up-to-date database available. Refer to Chapter 2, Installing and Starting AWM for instructions on how to download the current database from the NRCS National Water and Climate Center webpage.

Editing Climate Data

There are several ways that climate data can be edited or added to the climate data table. Each method is described in the following instructions.

To edit existing climatic data, select the Data -> Edit Climate Data and the following screen will appear:



Click on the **OK** button to view the following screen.

Column Header Descriptions and Units

- 25-Yr: 25-Yr 24 Hr. Storm Event (inches)
- JanP - DecP : January to December precipitation values (inches)
- JanE - DecE : January to December evaporation values (inches)
- Kval: K value for Clyde Barth Method
- Anload : Anaerobic Load Rate (lbs VS/1000 cu. ft/day)
- LRO: Load Rate for Odor (lbs VS/cu. ft/day)
- LRVMax: Max. Load Rate Volume (lbs VS/cu. ft/day)

Add Climate Station(s) to Database

State:

County:

Station:

	State	County	Station	25-yr	JanP	FebP	MarP	AprP	MayP	JunP	JulP	
	OR	BAKER	HALFWAY OF	0	3.28	2.31	1.92	1.4	1.37	1.31	0.4	
	OR	BAKER	HUNTINGTON	0	1.78	1.36	1.27	0.81	0.91	0.94	0.3	
	OR	BAKER	MASON DAM	0	1.91	1.43	1.55	1.09	1.56	1.76	0.8	
	OR	BAKER	RICHLAND D	0	1.53	0.92	0.91	0.96	1.22	1	0.6	
	OR	BAKER	UNITY OR87	0	1.23	0.69	0.76	0.68	1.08	1.14	0.4	
	OR	BENTON	CORVALLIS S	0	6.82	5.04	4.55	2.56	1.95	1.23	0.5	
	OR	BENTON	CORVALLIS W	0	12.02	8.75	8	3.94	2.5	1.38	0.4	
	OR	CLACKAMAS	ESTACADA 2	0	8.53	6.4	6.27	4.77	3.73	2.58	1.0	
	OR	CLACKAMAS	GOVERNMENT	0	13.65	10.02	8.94	7.15	4.64	3.42	1.1	
	OR	CLACKAMAS	HEADWORKS	0	11.04	8.74	8.36	6.67	5.04	3.81	1.5	
	OR	CLACKAMAS	N WILLAMET	4	6.17	4.39	3.99	2.64	2.17	1.73	0.	
	OR	CLACKAMAS	OREGON CITY	0	7.13	5.2	4.78	3.41	2.54	1.91	0.7	
	OR	CLACKAMAS	SCOTTS MILL	0	11.97	9.14	9.23	6.21	4.87	3.23	1.2	
	OR	CLACKAMAS	THREE LYNX	0	11.37	8.31	7.85	5.36	3.95	2.67	0.	
	OR	CLATSOP	ASTORIA WS	0	10.01	7.59	7.07	4.61	3.02	2.4	1.1	
	OR	CLATSOP	SEASIDE OR	0	10.91	9.13	8.14	5.13	3.56	2.78	1.5	
	OR	COQUIMBIA	VERNONIA 2	0	7.51	5.72	5.33	3.28	2.26	1.62	0.6	

Click on cell to be edited and then type in new value.

The following screen illustrates how to add a climate station to the climate database:

Enter State Abbreviation.

Enter County Name.

Enter Climate Station Name.

Click on the Add button.

Click on the OK button to continue.

Enter climatic data for the new station.

State	County	Station	25-yr	JanP	FebP	MarP	AprP	MayP	JunP	JulP
OR	East	New	0	0	0	0	0	0	0	0
AK	ALASKA	ADAK AK002	0	5.43	4.11	4.97	4.33	3.06	2.6	2.7
AK	ALASKA	ANGOOD								
AK	ALASKA	GLACIE								
AK	ALASKA	GUSTAV								
AK	ALASKA	SKAGW								
AK	ALASKA	YAKUTA								
AK	Aleutians East	COLD B								
AK	Aleutians East	ST PAUL								
AK	Aleutians West	ATTUNAU	0	4.15	3.71	3.37	3.55	2.54	2.83	
AK	Aleutians West	DUTCH HARE	0	5.46	6.13	4.24	2.17	2.13	1.64	1.3
AK	Aleutians West	SHEMYA USA	0	2.38	1.88	1.86	1.79	1.65	1.69	2.
AK	Anchorage	ALYESKA AK	0	8.65	5.27	4.42	4.5	2.96	2.52	2.
AK	Anchorage	ANCHORAGE	0	0.78	0.79	0.7	0.68	0.73	1.14	1.7
AK	Anchorage	ELMENDORF	0	0.82	0.86	0.79	0.71	0.73	1.18	1.9
AK	Bethel	BETHEL WSC	0	0.59	0.43	0.6	0.71	0.79	1.44	1.9
AK	Bethel	CAPF NFWFN	0	1.82	1.06	1.46	1.69	1.85	2.88	3.7

After completing data entry for new climate stations, close the Edit Climate Data screen by clicking on the in the upper right hand corner of the screen. After exiting and restarting AWM, the new climate station will have been positioned in alphabetical order by state, county, and climate station.

Importing Climate Data

You can import climate data from a file that is in comma delimited format. The file must have all of the fields in the same order as they appear in the climate data table. The file should not have a header row and should have one climate station per line. The file can have as many lines as desired. When importing data, if a value already exists in the table, a dialog box will popup and ask if it is OK replace the value that is in the database.

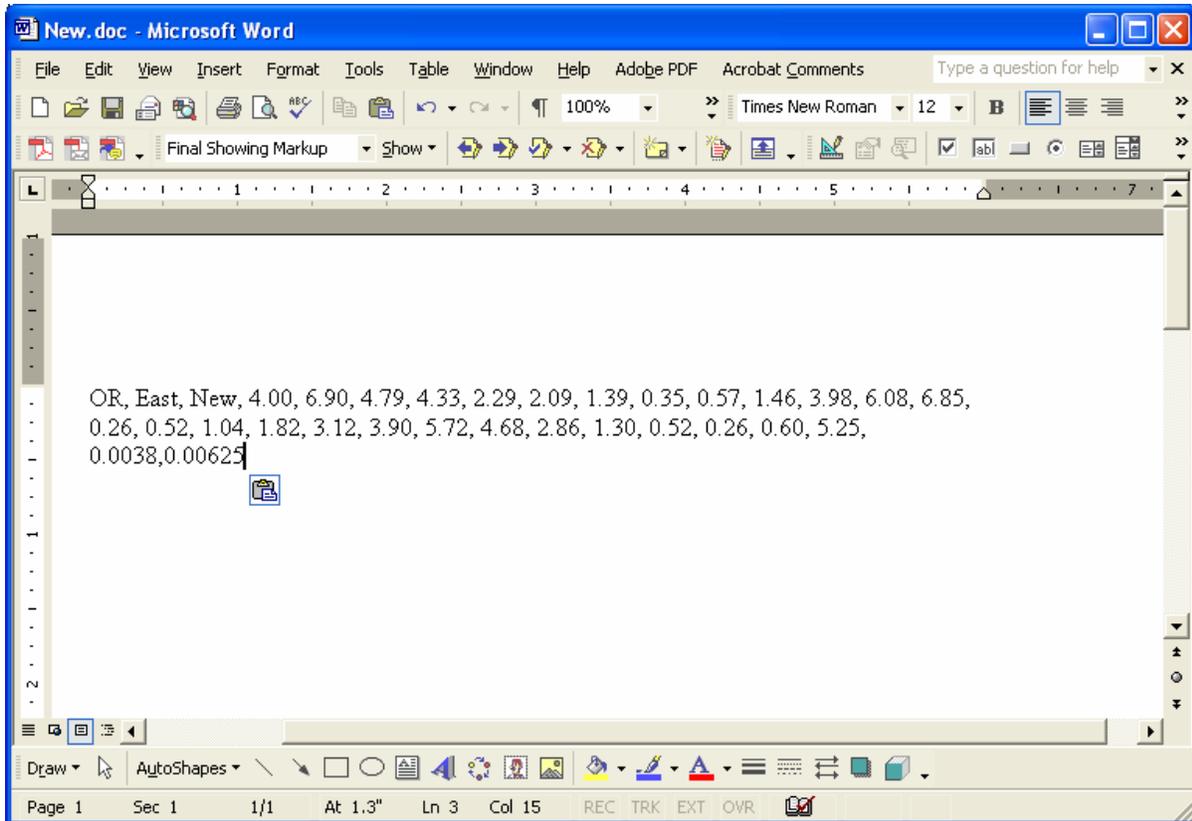
There are several ways to build a data file for import into AWM. One way is to use Microsoft Word to develop the data and then save it as a text file(.txt). Another way is to use Microsoft Excel to develop the data and then save it as a comma delimited file(.csv). The order of data is State, County, Station, 25-year 24-hour precipitation, January precipitation, February precipitation, March precipitation, April precipitation, May precipitation, June precipitation, July precipitation, August precipitation, September precipitation, October precipitation, November precipitation, December precipitation, January evaporation, February evaporation, March evaporation, April evaporation, May evaporation, June evaporation, July evaporation, August evaporation, September evaporation, October evaporation, November evaporation, December evaporation, Barth's Kval, anaerobic lagoon volatile solids loading rate, volatile solids loading rate for odors and Rational Method maximum anaerobic lagoon volatile solids loading rate.

An example of one line of climatic data follows:

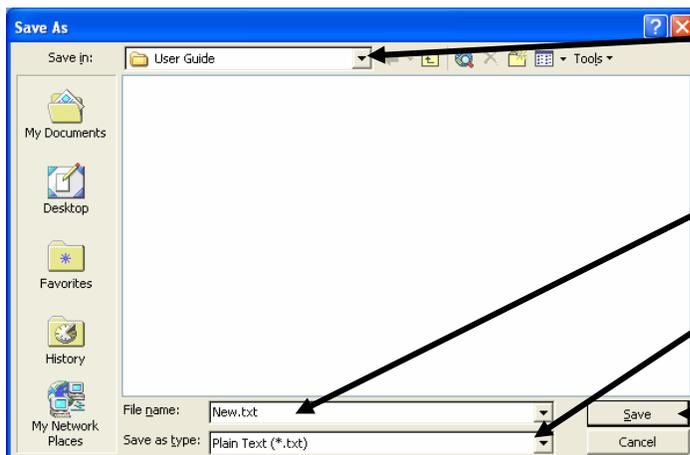
OR, East, New, 4.00, 6.90, 4.79, 4.33, 2.29, 2.09, 1.39, 0.35, 0.57, 1.46, 3.98, 6.08, 6.85,
0.26, 0.52, 1.04, 1.82, 3.12, 3.90, 5.72, 4.68, 2.86, 1.30, 0.52, 0.26, 0.60, 5.25,
0.0038,0.00625

Each line of the file should have 34 pieces of data separated by commas. The import will fail if this convention is not precisely followed. A space after the commas may be included or not used.

The following demonstrates saving the above line of data entered into Microsoft Word as a text file:



From the Microsoft Word main menu click on File -> Save As and the following window will appear:



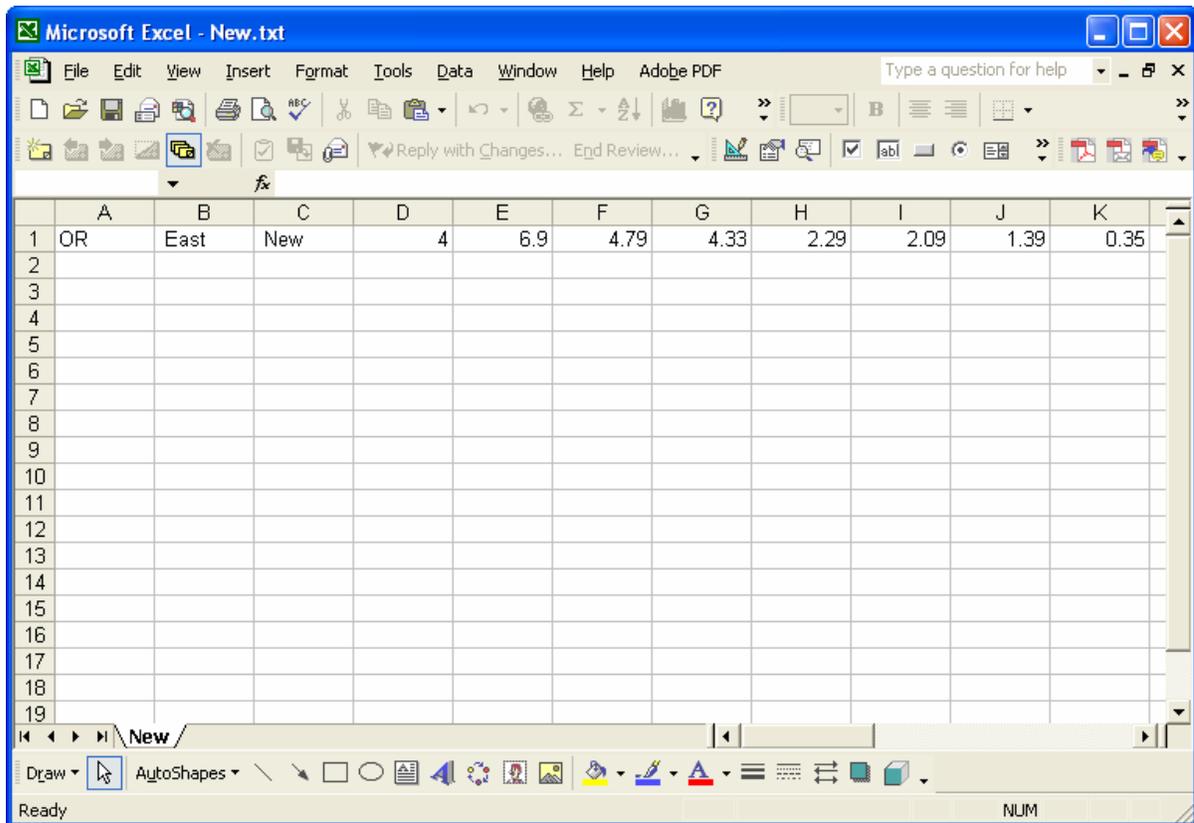
Select a directory in which to save the file.

Type in file name.

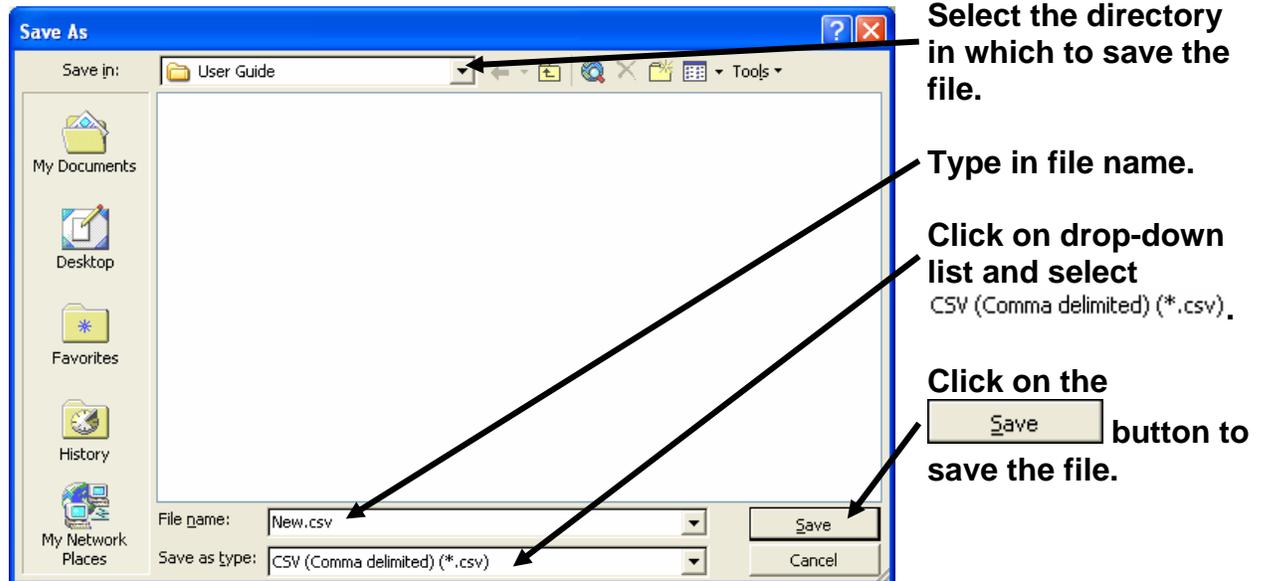
Click on drop-down list and select Plain Text (*.txt).

Click on the **Save** button to save the file.

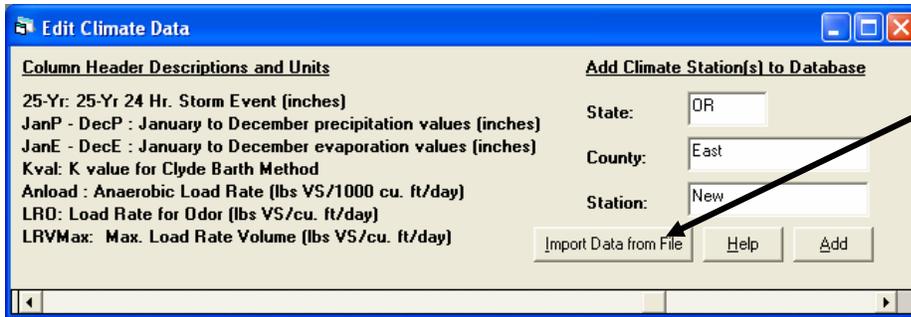
The following demonstrates saving the above line of data entered into Microsoft Excel as a comma delimited text file:



From the Microsoft Excel main menu click on **F**ile -> **S**ave **A**s and the following window will appear:

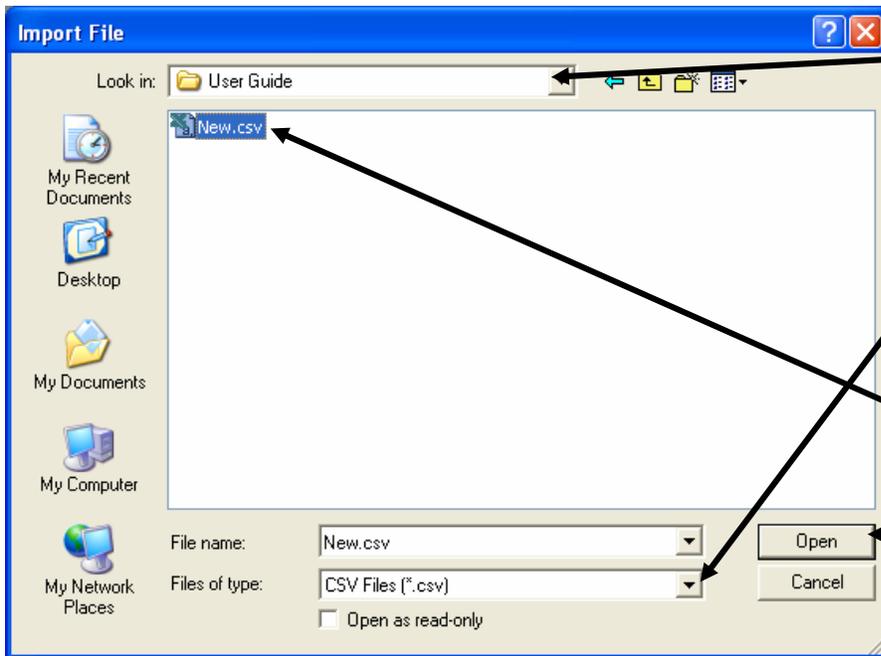


The following demonstrates importing a climate data .csv file into the AWM database:



Click on **Import Data from File** button.

This action results in the following screen:



Change to the directory where the file to import is stored.

Click on drop-down list and select CSV Files (*.csv)

Select the file to import.

Click on the **Open** button to import the file.

The following dialogue box will appear if the file was successfully imported:



Click **OK** button.

The imported file will appear as the first line for the State in the climate data table. After exiting and restarting AWM, the records will be resorted into alphabetical order by state, county and weather station.

A climate file developed in Microsoft Word can also be imported using the same procedure described for a text file but instead of selecting a CSV (Comma delimited) (*.csv) file type you select Text Only (*.txt) file type.

Deleting Climate Data

The following demonstrates how to delete a line of climate station data from the climate data table:

Edit Climate Data

Column Header Descriptions and Units

25-Yr: 25-Yr 24 Hr. Storm Event (inches)
 JanP - DecP : January to December precipitation values (inches)
 JanE - DecE : January to December evaporation values (inches)
 Kval: K value for Clyde Barth Method
 Anload : Anaerobic Load Rate (lbs VS/1000 cu. ft/day)
 LRO: Load Rate for Odor (lbs VS/cu. ft/day)
 LRVMax: Max. Load Rate Volume (lbs VS/cu. ft/day)

Add Climate Station(s) to Database

State:
 County:
 Station:

Import Data from File Help Add

	State	County	Station	25-yr	JanP	FebP	MarP	AprP	MayP	JunP	JulP
▶	OK	Woodward	MUTUAL OK	0	0.62	1.1	2	2.43	4.08	3.31	2
	OR	East	New	4	6.9	4.79	4.33	2.29	2.09	1.39	0.3
	OR	BAKER	BAKER FAA A	0	1.03	0.62	0.84	0.82	1.26	1.38	0.5
	OR	BAKER	HALFWAY OF	0	3.28	2.31	1.92	1.4	1.37	1.31	0.4
	OR	BAKER	HUNTINGTON	0	1.78	1.36	1.27	0.81	0.91	0.94	0.3
	OR	BAKER	MASO				1.55	1.09	1.56	1.76	0.8
	OR	BAKER	RICHL				0.91	0.96	1.22	1	0.6
	OR	BAKER	DNITY				0.76	0.68	1.08	1.14	0.4
	OR	BENTON	CORV.				4.55	2.56	1.95	1.23	0.5
	OR	BENTON	CORV.				8	3.94	2.5	1.38	0.4
	OR	CLACKAMAS	ESTA				6.27	4.77	3.73	2.58	1.0
	OR	CLACKAMAS	GOVE				8.94	7.15	4.64	3.42	1.1
	OR	CLACKAMAS	HEAD				8.36	6.67	5.04	3.81	1.5
	OR	CLACKAMAS	N WIL				3.99	2.64	2.17	1.73	0.
	OR	CLACKAMAS	OREG				4.78	3.41	2.54	1.91	0.7
	OR	CLACKAMAS	SCOT				9.23	6.21	4.87	3.23	1.2
	OR	CLACKAMAS	THRF				7.85	5.36	3.95	2.67	0

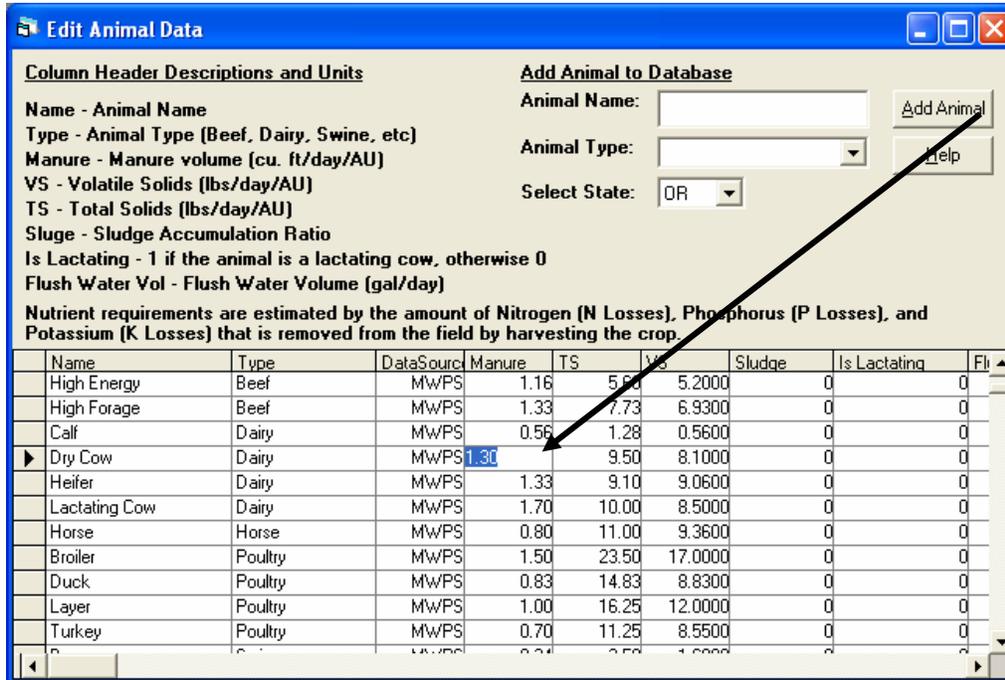
Click here to highlight the line of climate station data to be deleted.

Press the [Delete] key on the computer keyboard to remove the line of data.

Editing the Animal Data

The animal data table can be edited two ways. One way is to edit data that already exist in the table and the other is to add data. The animal table does not have an import feature.

The following screen illustrates how to edit data in the animal data table:

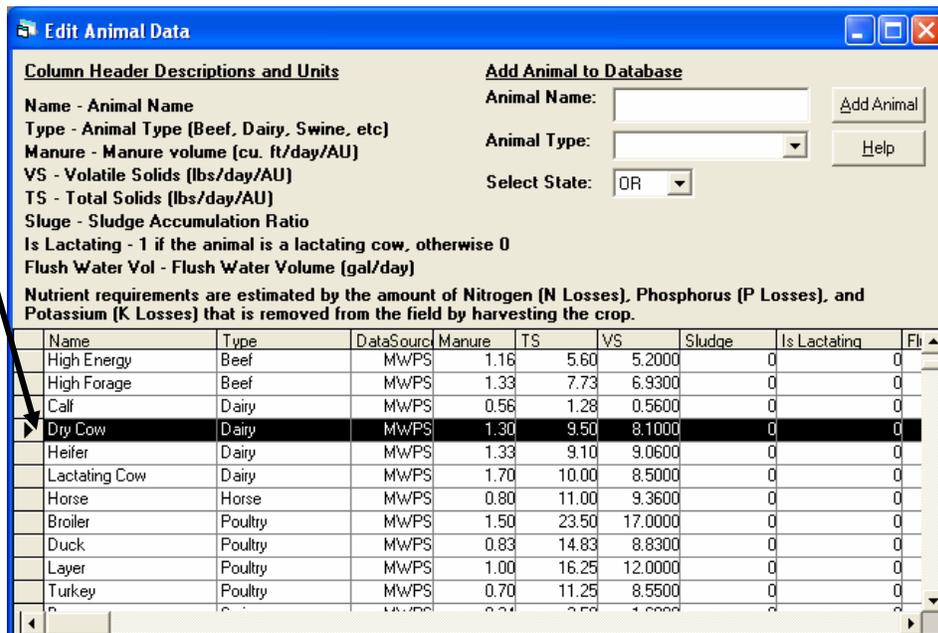


Click on the input cell and then edit or replace the existing data.

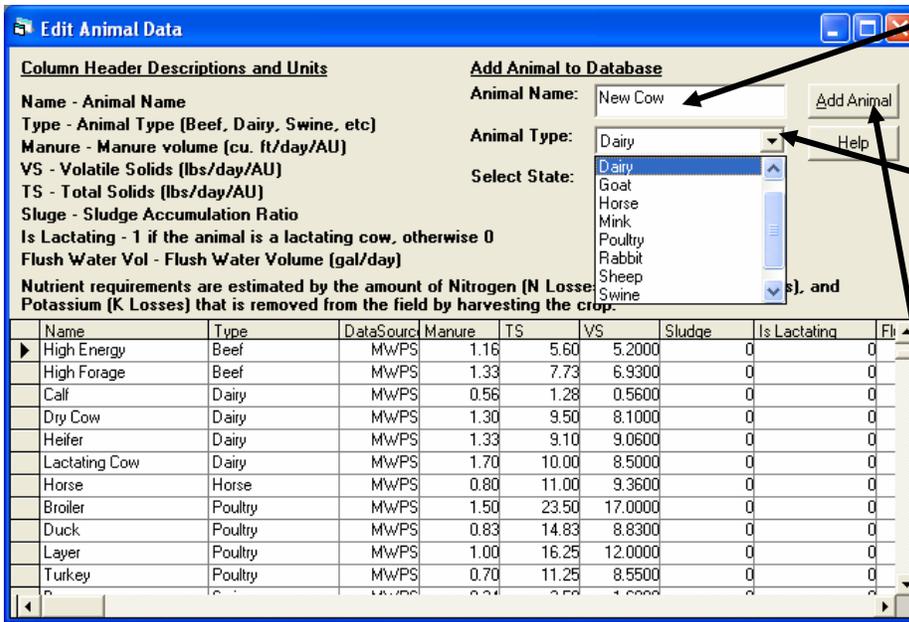
The following screen illustrates how to delete an animal from the animal data table:

Click here to highlight animal line to be deleted.

Then press the [Delete] key on computer keyboard to remove the line of data from the database.



The following screen illustrates how to add animal data to the animal data table:

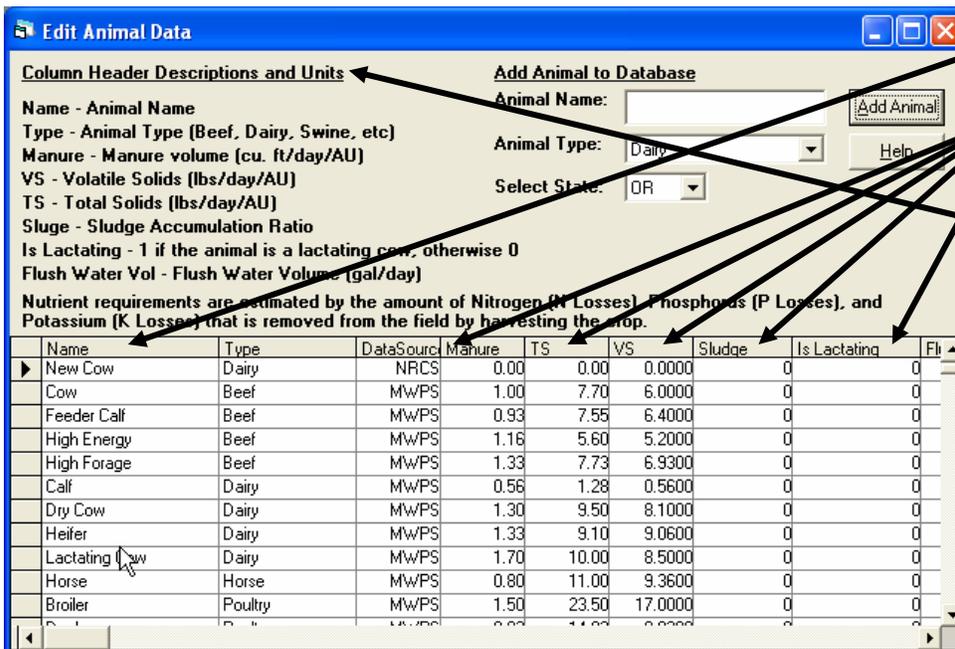


Enter the name of the animal to add.

Click here to access the drop-down list of animal types. Click on an animal type to select it.

Select a State from the dropdown list and click on **Add Animal** button to add the animal type selected to the data table.

The added animal is placed on the first line in the data table. The following screen illustrates an animal named “New Cow” added using the procedure above. Animal data for the “New Cow” is added by clicking on the appropriate input cell and entering the data.



Animal added.

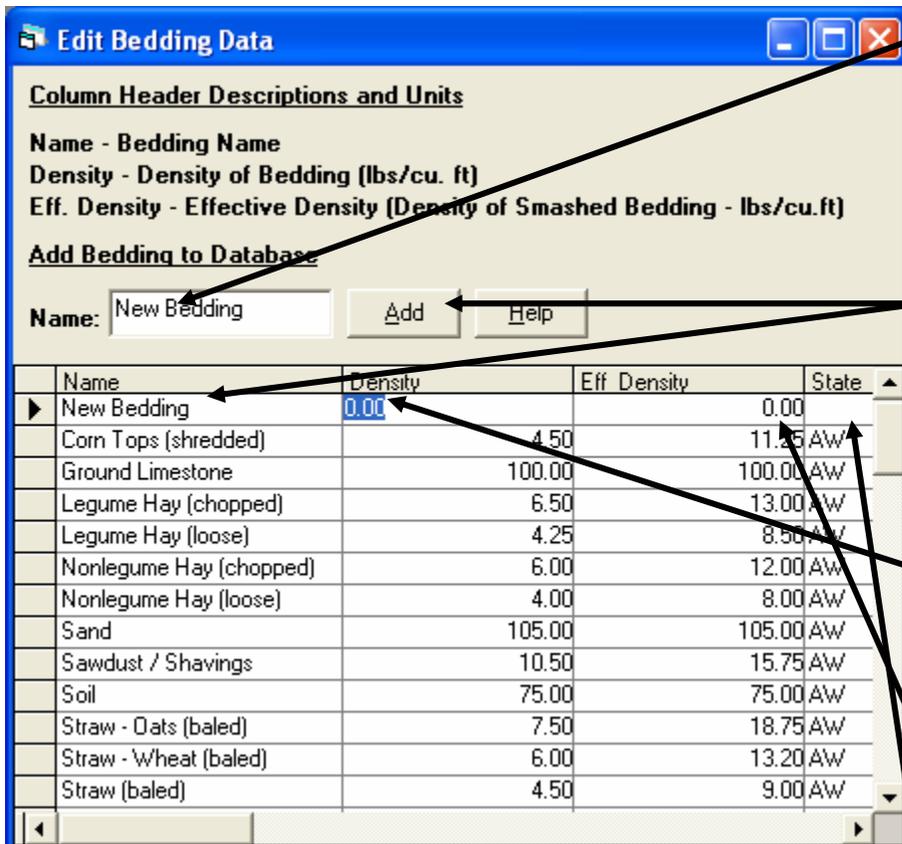
Enter animal data in accord with descriptions and units shown on the table.

After quitting and restarting the program, the new animal added will be sorted into alphabetical order by Name and Data Source.

Animals added that are lactating are indicated with a one (1) in the “Is Lactating” column. This is to associate the animal with a flush water volume indicated in the “Flush Water Vol” column in the Flush Water Calculator on the Additions Screen.

Editing the Bedding Data

Editing the bedding data table is very similar to the editing the animal data table. Data may be edited within the data table or new bedding data can be added or existing bedding data deleted. The following screen illustrates how to add bedding data called “New Bedding”:



Enter the name of the bedding data to be added. In this example “New Bedding” is being added.

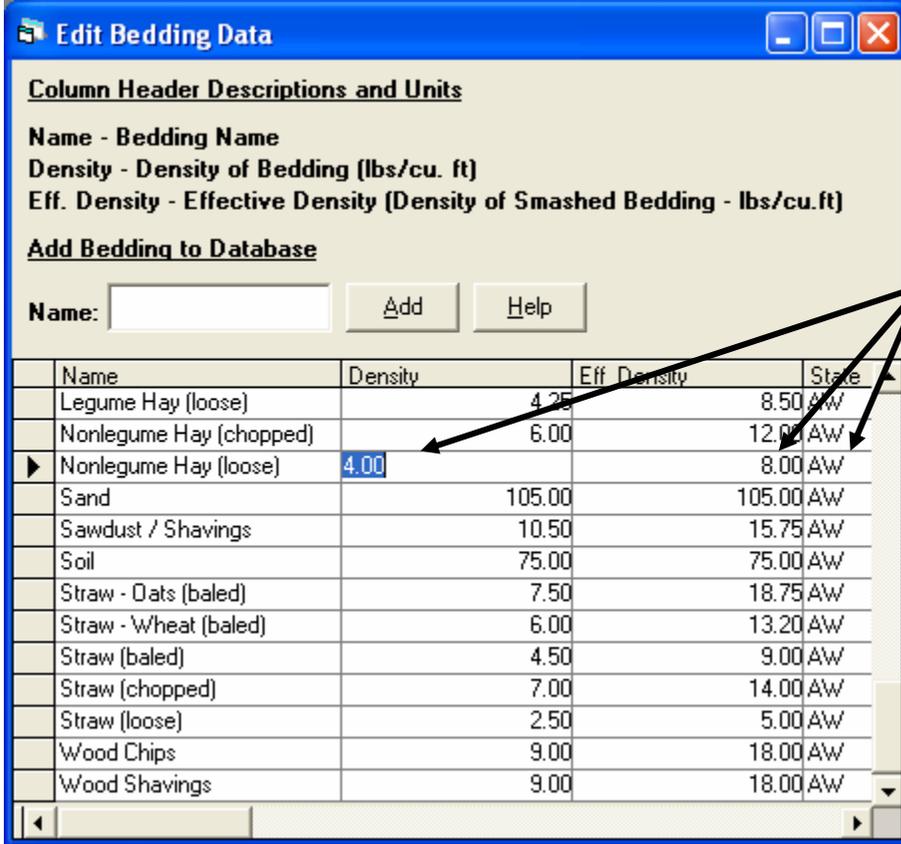
Click on button to add the “New Bedding” data. The “New Bedding” data appears on first line.

Enter the density in pounds per cubic foot of the “New Bedding”.

Enter the effective density of the “New Bedding” in pounds per cubic foot.

Enter the State for which the “New Bedding” data is for.

The following screen illustrates how to edit existing bedding data:

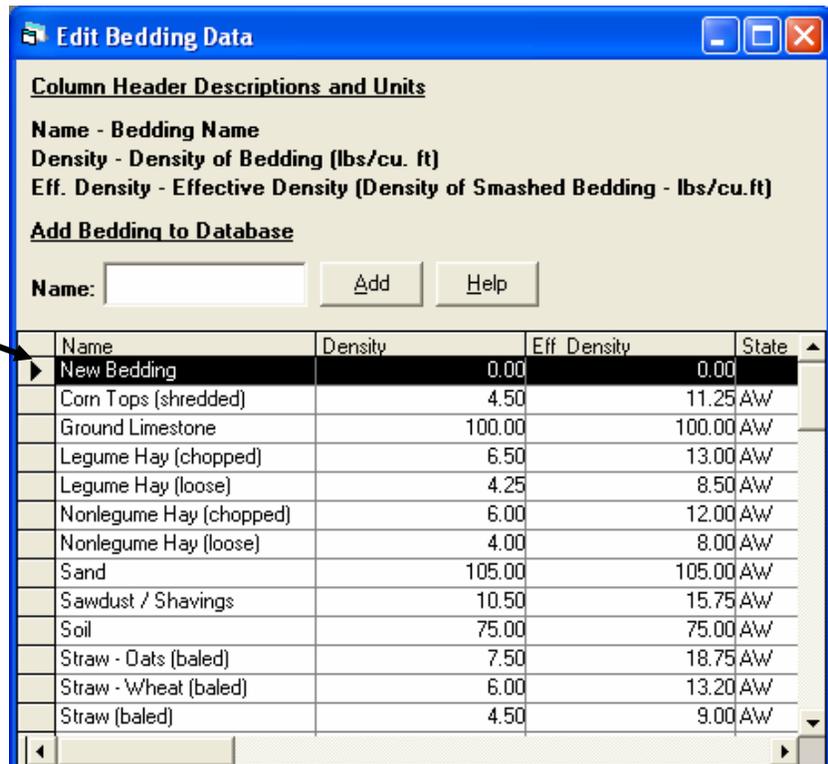


Click on the input cell and then edit or replace the existing data.

The following screen demonstrates deleting bedding material from the bedding data table:

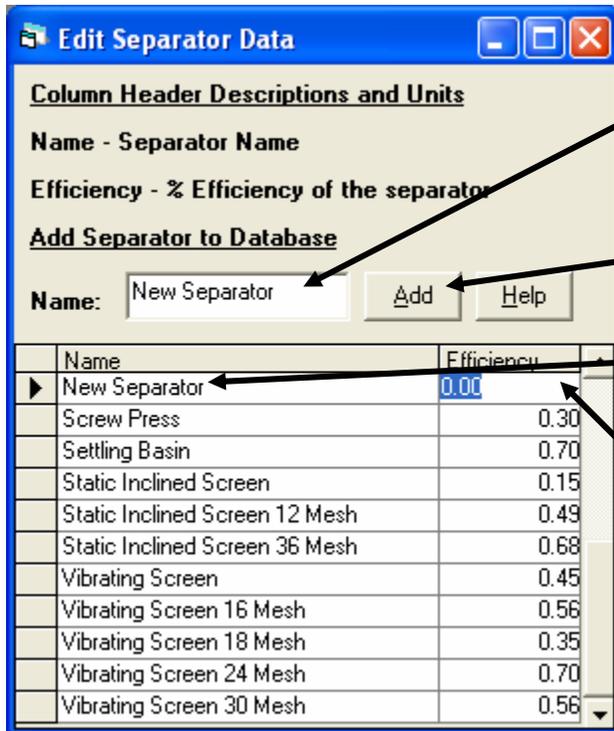
Click here to highlight the row of the bedding data to be deleted.

Press the [Delete] key on the computer keyboard to remove the line of bedding data.



Editing the Separator Data

The separator data table contains efficiency values for liquid/solid separators by the type of separator. Data may be edited within the data table, a new separator can be added, or an existing separator can be deleted. Adding a separator called “New Separator” is demonstrated on the following screen:



The screenshot shows the 'Edit Separator Data' window. At the top, there are window control buttons. Below them is the section 'Column Header Descriptions and Units' with 'Name - Separator Name' and 'Efficiency - % Efficiency of the separator'. Underneath is the 'Add Separator to Database' section, which includes a text input field containing 'New Separator', an 'Add' button, and a 'Help' button. Below this is a table with two columns: 'Name' and 'Efficiency'. The first row of the table is 'New Separator' with an efficiency of '0.00'. The following rows are: 'Screw Press' (0.30), 'Settling Basin' (0.70), 'Static Inclined Screen' (0.15), 'Static Inclined Screen 12 Mesh' (0.49), 'Static Inclined Screen 36 Mesh' (0.68), 'Vibrating Screen' (0.45), 'Vibrating Screen 16 Mesh' (0.56), 'Vibrating Screen 18 Mesh' (0.35), 'Vibrating Screen 24 Mesh' (0.70), and 'Vibrating Screen 30 Mesh' (0.56).

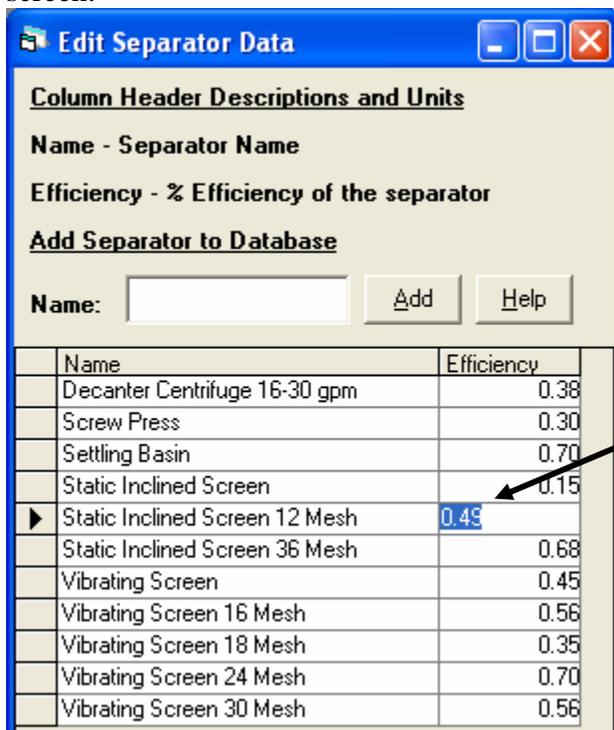
Enter the name of the separator to be added. In this example “New Separator” is being added.

Click on the button to add the “New Separator” to the data table.

The “New Separator” will be added to the data table and will appear on first line.

Enter the separator efficiency as a decimal for the “New Separator”.

Editing the efficiency value for a separator in the data table is illustrated on the following screen:



The screenshot shows the 'Edit Separator Data' window. The 'Name' input field is empty. The table below has the following data:

Name	Efficiency
Decanter Centrifuge 16-30 gpm	0.38
Screw Press	0.30
Settling Basin	0.70
Static Inclined Screen	0.15
Static Inclined Screen 12 Mesh	0.49
Static Inclined Screen 36 Mesh	0.68
Vibrating Screen	0.45
Vibrating Screen 16 Mesh	0.56
Vibrating Screen 18 Mesh	0.35
Vibrating Screen 24 Mesh	0.70
Vibrating Screen 30 Mesh	0.56

The 'Static Inclined Screen 12 Mesh' row is selected, and the '0.49' in the 'Efficiency' column is highlighted in blue, indicating it is being edited.

Click on the input cell and then edit or replace the existing data.

Deleting a line of separator data is illustrated on the following screen:

Click here to highlight the row of the separator data to be deleted.

Press the [Delete] key on the computer keyboard to remove the line of separator data.

