WorksheetMaker Version 5.00
User Guide

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WHAT'S NEW

Bug Fixes

Fixed a formula bug in chronic HQ section of the AqToxSumV5 worksheet that is used to generate Worksheet G03 (HQs for aquatics).

Corrected the code for triclopyr-BEE in Worksheet G03. A discussed in the risk assessment for triclopyr, the acute concentrations for aquatic species are based on the ester while the acute concentrations for terrestrial species is based on the acid. See the triclopyr risk assessment (Section 4.2.4).

Other Changes

If you are doing multiple applications, the program now adds a warning message concerning the concentration of the pesticide in water to the title page. If you are doing multiple applications, you will need to check the risk assessment to determine if water concentrations are given for the specific number of applications and application interval that you are using. If not, you will need to run Gleams-Driver or some other model to estimate the concentrations of the pesticide in surface water.

The worksheet templates **WatDumpAmnt** and **WatDumpAllo** are used only for accidental spills of a granular formulation into a small pond. In previous versions of WorksheetMaker, the amount dumped was considered a.i. or a.e. This is not consistent with the spill scenarios for liquid applications, which are based on the concentration of the a.i. or a.e. in the field solution.

Modified the program code so that accidental dermal exposures in workers are not included if the formulation is granular and is not mixed with water.

Added a new templates, **WaterSumAqPpmAcN**, to accommodate multiple applications of endothall. These are used even if only one application is specified, in which case the mathematics for multiple applications reduces to that for a single application.

Implemented "Airblast" as an option for ground broadcast applications.

Add worksheets to elaborate the risks from consumption of water by a carnivore, large mammal and large bird:

F05c,d,e: Contaminated water from a spill
F06c,d,e: Contaminated water based on expected peak concentrations
F07c,d,e: Contaminated water based on longer-term average concentrations

Also modified the summary worksheets for terrestrial organism (temple **G01V5)** to include these new worksheets.

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ATTACHMENT(S)

ACRONYMS, ABBREVIATIONS, AND SYMBOLS

a.e.	acid equivalents
a.i.	active ingredient
bw	body weight
CI	confidence interval
EA	Environmental Assessment
EEC	Expected Environmental Concentration
EIS	Environmental Impact Statement
FH	Forest Health
g	gram
HQ	hazard quotient
kg	kilogram
L	liter
lb	pound
mg	milligram
mg/kg/day	milligrams of agent per kilogram of body weight per day
mL	milliliter
ppm	parts per million
SERA	Syracuse Environmental Research Associates
U.S.	United States
USDA	U.S. Department of Agriculture
U.S. EPA	U.S. Environmental Protection Agency
VBA	Visual Basic for Applications

1. INTRODUCTION

As part of a series of Human Health and Ecological Risk Assessments prepared for the USDA/Forest Service, Excel workbooks (i.e., groups are used to detail calculations relating to exposure scenarios and risk characterization. The workbooks were originally developed in WordPerfect (Versions 1 and 2) and later ported to EXCEL (Versions 3 and 4).

The EXCEL workbooks created by WorksheetMaker may be used in and accompany Forest Service risk assessments or may be used in the preparation of Environmental Assessments (EAs) or Environmental Impact Statements (EIS). This documentation covers the use of the WorksheetMaker program (Section 2) as well as the use of the EXCEL workbooks that are created by WorksheetMaker (Section 3).

WorksheetMaker 5 replaces WorksheetMaker 4 and WorksheetMaker 4 is no longer supported – i.e., no additional development of or modifications to WorksheetMaker 4 will be made. Nonetheless, there are no known errors in the most recent version of WorksheetMaker 4 – i.e., Version 4.10 (SERA 2007a). Existing analyses that are based on Version 4 worksheets can still be used.

2. USING WORKSHEETMAKER PROGRAM

2.1. Installation

WorksheetMaker program is distributed in a standard zip file and installation is extremely simple – just unzip the zip file in an otherwise empty directory on your computer. The zip file contains the EXCEL workbook with WorksheetMaker as well as some additional files that are needed to run WorksheetMaker. You can install WorksheetMaker in as many directories on your PC as you want. WorksheetMaker does not make any changes to the Windows Registry.

WorksheetMaker 5 is contained in a single EXCEL file. WorksheetMaker 5 is written in Visual Basic for Applications (VBA), the programming language that is used in EXCEL as well as other programs that are part of Microsoft Office. The file that contains WorksheetMaker 5 appears to consist of only a single worksheet with a Start Button. Behind the scenes, however, all of the program code used to implement WorksheetMaker is contained within the WorksheetMaker file. Thus, as long as MS EXCEL is installed on your PC, you do not need to install anything else. All you need to do is open the EXCEL file containing WorksheetMaker.

At the time this documentation was prepared, the file containing the code for WorksheetMaker was named **`FS WorksheetMaker Version 5.00.50.xls`**. Future releases of WorksheetMaker 5 will be named using the general designation, **`FS WorksheetMaker Version 5.NN.XX.xls`**, where **`NN`** and **`XX`** are two digit numbers.

`NN` designates the minor version number. For example, the initial release of WorksheetMaker is 5.**`00`** and the next minor release will be WorksheetMaker 5.**`01`**. Based on experience with previous versions of WorksheetMaker, additional minor releases of WorksheetMaker will be made as the program is enhanced and feedback from users is received. Each minor release of

WorksheetMaker will involve changes to the program code and the way that the program works. Consequently, each minor release will be accompanied by a new version of this documentation.

XX corresponds to the step number. WorksheetMaker is developed in discrete steps in which minor changes are made to the source code or other supporting files and the resulting files are archived. Differences in the step number will generally not require changes to this documentation. For example, if the version of WorksheetMaker that you are using is designated as **FS WorksheetMaker Version 5.00.*65*.xls**, the current documentation – i.e., for Version 5.00 – is all that you need to have.

Changes in the step number are relevant to your use of WorksheetMaker because the support files used by WorksheetMaker may be modified as new chemicals are added to the database or other minor changes or corrections are made to other support files or the program code. Specifically, changes in the step number will often involve changes to the database used by WorksheetMaker, **FS WsMkr V5-01a.mdb**, as well as changes to the worksheet template file, **FS WSMkr Templates V05-01a.xls**.

Before you start a major analysis, you should check the SERA web site (www.sera-inc.com) and download the most recent release of WorksheetMaker. At the SERA web site, click on the ***WorksheetMaker*** tab on the left hand side of the web page and then download the WorksheetMaker zip file. The name of the zip file will follow the same naming convention as the WorksheetMaker EXCEL workbook but will have a zip file extension – e.g., **FS WorksheetMaker Version 5.NN.XX.zip**. A release memo describing any changes to the WorksheetMaker files may also be posted at the SERA web site.

2.2. Supported Versions of EXCEL

Several versions of EXCEL have been released over the past several decades. While general backward compatibility is maintained in EXCEL, different versions of EXCEL have involved changes to VBA that are not backward compatible. Forest Service personnel currently use either EXCEL 2002 (Version 10) or EXCEL 2003 (Version 11). WorksheetMaker was developed using EXCEL 2003 and has been tested in EXCEL 2002. The Forest Service is currently in the process of migrating to EXCEL 2007 and WorksheetMaker has been modified to run in EXCEL 2007 (Version 12). If you are using EXCEL 2007, please pay particular attention to Attachment I, *Security Settings in EXCEL*.

2.3. Starting the Program

To start WorksheetMaker, you need to open the EXCEL file that contains the program – e.g., **`FS WorksheetMaker Version 5.00.50.xls`** or a more recent release as described in Section 2.1. The WorksheetMaker file contains a single worksheet with some notes and a button. Press on the **`"Start"`** button to activate the program. As discussed in the remainder of this subsection, however, you may need to address macro security issues.

WorksheetMaker contains macros, a term used for EXCEL code that controls how the program works. Thus, you may need to adjust your security settings in EXCEL before WorksheetMaker will run. The steps that you may need to take will vary with the version of EXCEL that you using. The specific procedures are discussed in Attachment I, *Security Settings in EXCEL*.

2.4. Main Window

After pressing the start button, the Main Window of WorksheetMaker will open (Figure 1). The Main Window allows you to select the application method that you plan on using (Section 2.4.1), open the Application Window (Section 2.4.2), set some general program options (Section 2.4.3), and access the help system (Section 2.4.4).

Figure 1: Main Window of WorksheetMaker

2.4.1. Application Methods

The main window has a dropdown list box for specifying the type of application. The types of applications currently supported in WorksheetMaker include:

- Aerial Broadcast (Foliar)
- Aerial Broadcast (Granular)
- Aquatic
- Backpack (Directed Foliar)
- Directed Soil Applications
- Bark Applications
- Ground Broadcast Foliar
- Ground Broadcast Soil
- Soil Injection
- Stump Application

You must select the application method that you want to use before attempting to select the formulation because the application method will determine the specific pesticides and formulations that you can access in the Application Window.

Special Note on Non-Contiguous Applications

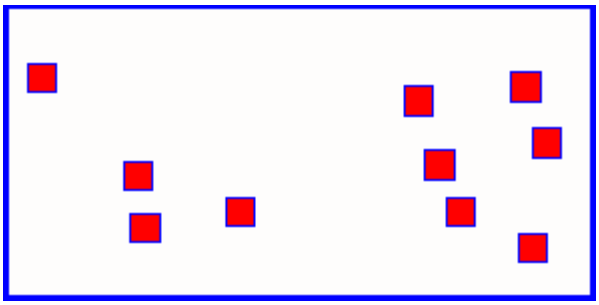
The dropdown list box also contains the following two application methods:

- Hack-and-Squirt
- Spot Applications

Hack-and-squirt and spot applications are examples of non-contiguous applications in which the pesticide is applied to small areas within a field. WorksheetMaker does not directly accommodate these types of application methods. If you select either one of these application methods, a help window will open that discusses the approach the you will need to take in using WorksheetMaker. The discussion in the help window is essentially that given the remainder of this subsection. The button labeled Note on Non-Contiguous Applications, illustrated in Figure 1, will also open the special help window.

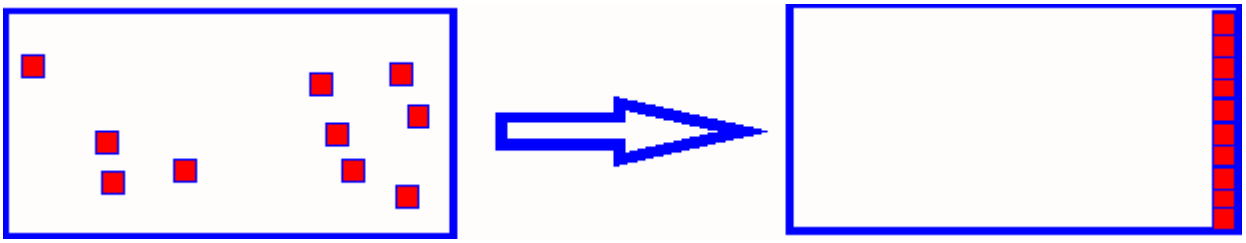
For non-contiguous applications, you will need to use one of the broadcast application methods – e.g., backpack for hack-and-squirt or soil applications for spot treatments – and then adjust the application rate as detailed below.

For example, the figure below illustrates a non-contiguous application in which 10 spot applications are made to a field.



This type of application cannot be input directly into WorksheetMaker. Instead, you need to determine or at least reasonably estimate the total number of acres that are treated (the larger area in blue) as well as the smaller area in which the treatments occur (the sum of the red squares).

The above example was constructed to illustrate 10 spot applications that are 1 square yard each and that are made in an area that is approximately 20 by 10 yards or 200 square yards. In terms of modeling this type of application in WorksheetMaker, you would basically view the treated field area as 10 square yards and the total field area as 200 square years as illustrated below:



Thus, if the applications within the red squares are made at a nominal application rate of 1 lb/acre, the adjusted application rate that you would enter into WorksheetMaker would be 0.0.05 lb/acre (1 lb/acre x 10 square yards/200 square yards).

This approach is best reserved for relatively uniform applications and judgment must be used in selecting the total area that should be considered.

Also, depending on the type of pesticide that you are applying, this type of adjustment may not be applicable to all exposure scenarios. For example, most workbooks produced by WorksheetMaker have a scenario for the direct spray of an insect as well as the direct spray of a small mammal. For these scenarios, you may elect to consider only organisms within the directly treated area – i.e., the red blocks. If these seems to be a reasonable approach, you should modify the worksheets for these scenarios by changing the application rate to the higher application rate within the red blocks rather than the application rate adjusted for the total area of the treated field. These adjustments must be made manually – i.e., they are not made automatically by WorksheetMaker.

A final consideration involves the development of site-specific runs with Gleams-Driver. If you elect to develop custom Gleams-Driver runs and use the above method to calculate the effective application rate (a capability built into Gleams-Driver), you should not make any adjustment in

Gleams-Driver for the size of the treated field. In other words, in your Gleams-Driver run, the size of the treated field area should be the same as the size of the total field area. If this is not done, you will underestimate the concentration of the pesticide in surface water because the application rate would be adjusted twice, once in Gleams-Driver and again in WorksheetMaker.

2.4.2. Opening the Applications Window

The button in the Main Window that is labeled Select Pesticide Formulation will open the Application Window. You will do most of your work in the Application Window. Documentation for using the Application Window is in Section 2.5.

2.4.3. Program Options

The Main Window (Figure 1) has two check boxes that allow you to turn on New User Help and to Show Workbooks.

2.4.3.1. Help for New Users

If the New User Help checkbox is checked, the Welcome to WorksheetMaker help window (Figure 2) will open automatically when WorksheetMaker starts. The help window briefly introduces the features of WorksheetMaker and provides links to key components of the Help System. In addition, when you take certain other actions such as moving on to the Application Window, the help window will automatically change to provide help for the new action that you are taking.

If this feature is useful to you, you can keep the New User Help checkbox in a checked state. Most individuals who use WorksheetMaker regularly will find this feature irritating. If you uncheck the box, the automatic help feature will be disabled and the WorksheetMaker Help System will not be activated automatically when you start WorksheetMaker again. All other aspects of the Help System will still work (Section 2.4.4).

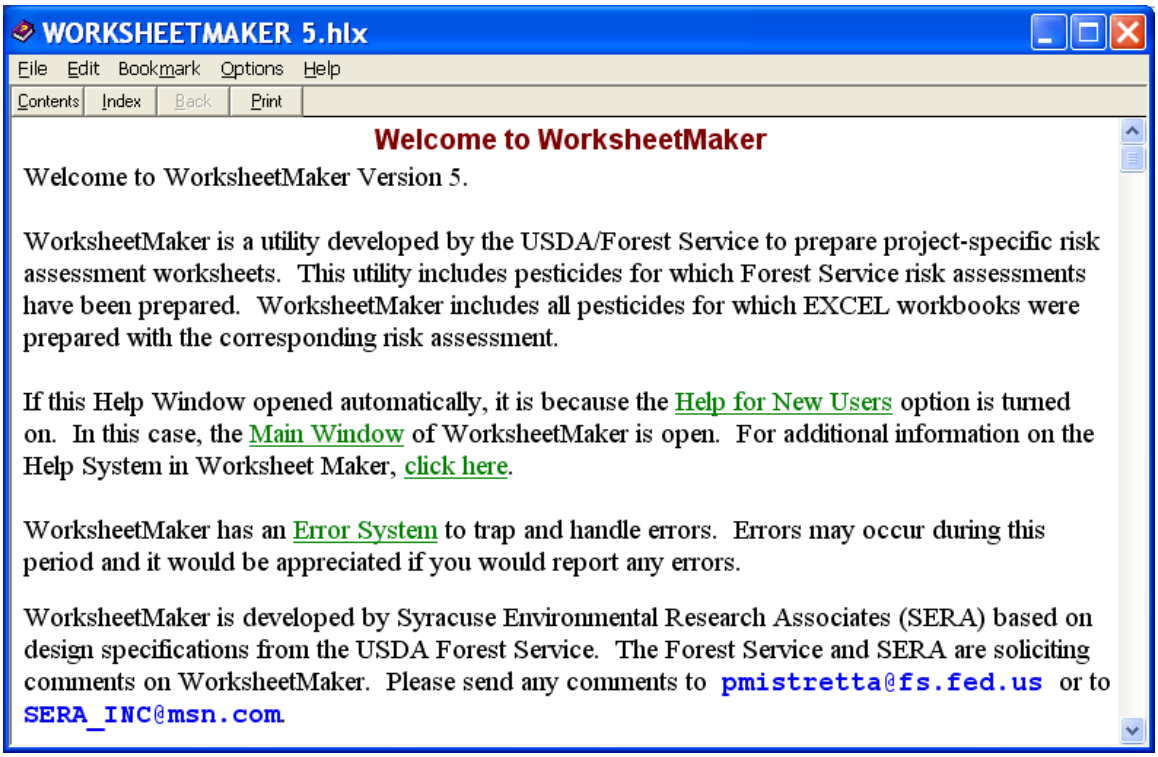


Figure 2: Help for New Users

2.4.3.2. Show Workbooks Option

Show Workbooks is the other option in the Main Window. This is a carryover from WorksheetMaker 4 which would automatically display the new workbook as it is being created. WorksheetMaker 5 is much faster than the previous version and showing the new workbook as it is being made may be irritating and could be a migraine trigger. By default, WorksheetMaker 5 will not display the new workbook as it is being made. During testing, a request was made to reinstate this feature and the Show Workbooks option was added.

2.4.4. Help System

The Help System in Worksheet Maker is relatively simple. The Help System is contained in help files that are included in the zip file containing the Worksheet Maker program. Currently, the help files are:

- WORKSHEETMAKER 5.HLP
- WORKSHEETMAKER 5.CNT

For the Help System to work, these files must be in the same directory as the WorksheetMaker EXCEL file (Section 2.1). If these files are missing, you will still be able to run WorksheetMaker but the Help System will not work.

Most forms contain a button labeled Help as well as one or more buttons with a question mark (**?**). Pressing either of these buttons will open a help window that should be relevant to what you

are doing. In addition, some labels for text boxes and dropdown list boxes have a white rather than gray background. Clicking on the labels that have a white background will open up a help window that should be relevant to the text or dropdown list box.

The help screens in WorksheetMaker have an appearance that is different from the help screens generated by EXCEL. EXCEL uses HTML help and WorksheetMaker uses WinHelp, the help system that was developed prior to HTML help. Thus, you can have WorksheetMaker help windows open at the same time as EXCEL help windows and the two types of help windows will not be in conflict.

2.5. Application Window

The application window allows you to select the pesticide and formulation that you want to evaluate and enter other details concerning the application. Application Windows will vary slightly with the different application methods. A sample Application Window for a ground broadcast application of a 2,4-D formulation, Amine 4, is illustrated in Figure 3.

The Application Window contains a number of data entry fields and dropdown list boxes (detailed below) as well as buttons to make the workbook, show additional options, or access the Help System. As the name implies, the Make Workbook button will initiate the process of making the EXCEL workbook for your application. The Show Options button is discussed further in Section 2.5.5.

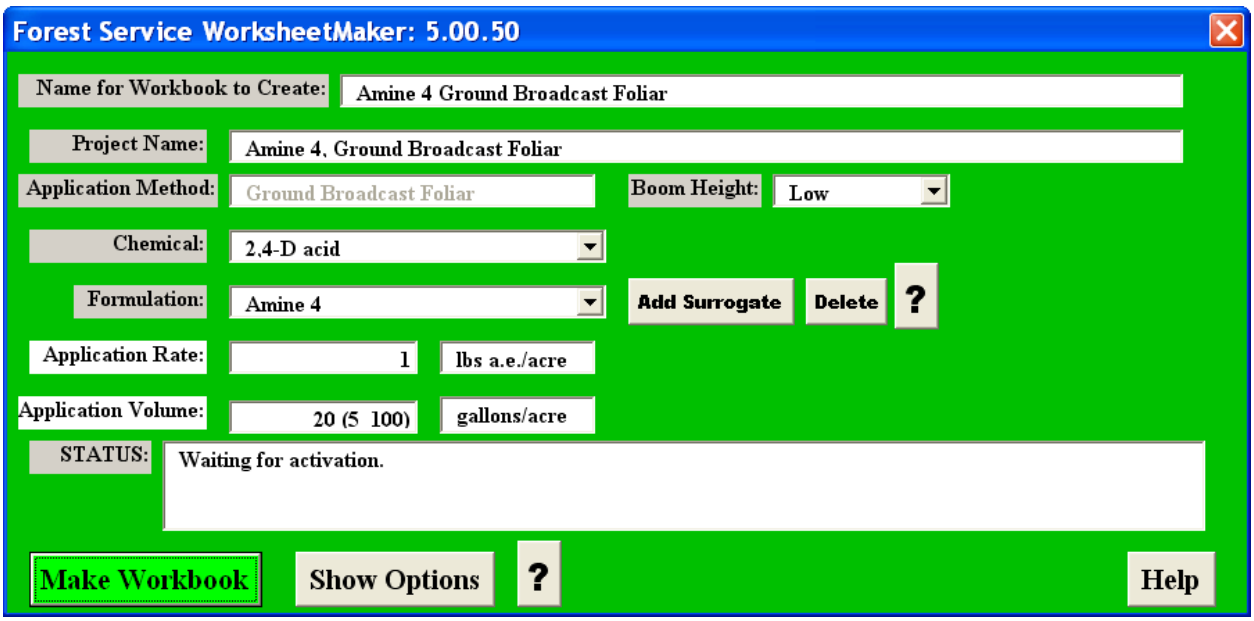


Figure 3: Sample of Application Window

2.5.1. General Information

The top section of all Application Windows will contain text boxes with the name of the workbook that WorksheetMaker will create and the name of the project that will be entered on the title page of the workbook. These are set automatically by WorksheetMaker based on the chemical and formulation that you select. As you select different chemicals and formulations,

the contents of these text boxes will change. You can select and modify the names that are in these text boxes as you see fit. Once you modify the names in either or both of these text boxes, WorksheetMaker will not automatically modify the contents of either of the text boxes for the run you doing. If close and then reopen the application window, WorksheetMaker will be reset and will automatically assign names until you manually set the names.

A text box labeled Application Method is immediately below the text box labeled Project Name. The Application Method text box will specify the application method that you selected from the Main Window. If this application method is not the one that you plan on using, just close the Application Window and select the desired application method in the Main Window.

2.5.2. Chemicals and Formulations

Dropdown lists labeled Chemical and Formulation are immediately below the Application Method text box. As the names imply, these dropdown lists are used to select the pesticide that you want to apply as well as the formulation that you want to use.

The names of formulations that are used by the Forest Service change over time either because the pesticide supplier elects to use a new name or because new formulations become available from other suppliers. Thus, the formulation names in the WorksheetMaker database may be different from the name of the formulation that you want to use. In addition, the WorksheetMaker database may contain formulations that are no longer available or formulations that you do not intend to use.

If a new formulation is available that is essentially identical to one of the formulations listed in the formulation selection box, select the existing formulation from the formulation dropdown list box. Then, you can add a surrogate formulation by pressing the Add Surrogate button. This will open an Add New Formulation Window that will allow you to add the name of the new formulation to the WorksheetMaker database. The characteristics of the new formulation will be identical to whatever formulation you had selected in the Application Window. A sample of the Add New Formulation window is given in Figure 4.

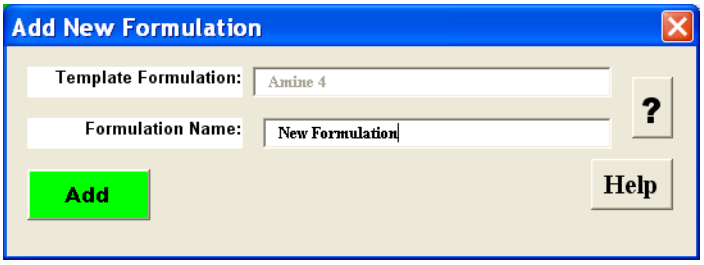


Figure 4: Add New Formulation Window

Before adding a new formulation, you should make certain that the two formulations are functionally identical. Check the Product Labels and Material Safety Data Sheets for the original formulation and new formulation. Once this is done, you should type the name of the new formulation into the text box labeled Formulation Name.

The new formulation name must be unique – i.e., the formulation name must not already be in use. If it is, you will see an error message. Otherwise, the new formulation name will be added to the WorksheetMaker database and you can select the formulation from one of the project windows in WorksheetMaker. You will be able to use the new formulation in all future sessions with WorksheetMaker.

If you want to delete an existing formulation from the WorksheetMaker database, select the formulation from the formulation dropdown list box and press the delete button in the Application Window (Figure 3). **Deletions to the database are permanent** so you may want to make a backup copy of the WorksheetMaker database before deleting a formulation.

2.5.3. Application Rates and Volumes

The applications rate and application volume are entered in the textboxes immediately below the formulation name. The application rate must be entered as a single number. If you want to assess other application rates, you will need to run WorksheetMaker again or change the application rate in Worksheet A01 of the workbook that is created by WorksheetMaker (Section 3.1.2. Preparation of EA's or EIS's). If you do change the application rate in Worksheet A01, all of the other worksheets (both Calculation Worksheets and Summary Worksheets) will be changed as well.

If you select either a liquid or granular formulation that is mixed with water and/or other material, you should enter an application volume. The application volume is entered as the number of gallons of liquid that will be applied per acre. The application volume can be entered as a single number or a range in the form of Central (Lower Upper). The application volume is used by WorksheetMaker only to calculate the concentration of the pesticide in the field solution. Unless you are uncertain about the field concentrations that will be applied, you should enter the application volume as a single number rather than a central estimate with a range.

If you are involved in a granular application – i.e., the application of a granular formulation that is not mixed in water prior to application – the application volume textbox will not be displayed. Similarly, if you have selected a formulation that is used in ULV (ultra low volume) applications, dilution volumes are not relevant and the dilution volume text box will not be displayed.

2.5.4. Other Application Details

Depending on the type of application that you are conducting, other options may appear in the Application Window. As illustrated in Figure 3, ground broadcast applications will have a dropdown list that allows you to specify low boom or high boom applications. These options will impact the default estimates of drift. As detailed in Section 3.3.2, the use of drift modeling packages such as AgDrift or AgDisp will allow you to more fully customize the worksheets to your application.

Some formulations allow for multiple applications. If the formulation that you selected is labeled for multiple applications, textboxes will appear that allow you specify the number of

applications and the application interval. Currently, WorksheetMaker will accept only a single application interval and this interval is applied to all of the applications that you specify.

Aquatic applications require somewhat different inputs than other application methods. Depending on the pesticide, application rates may be expressed in units of pounds per acre of water surface or in units of ppm (mg a.i./Liter). Thus, if you select an aquatic application, the appearance of the Application Window will depend on how the label for the formulation which you selected expresses the application rate. The information, such as the volume of water to be treated, the depth of the body of water, and the dissipation halftime for the pesticide, should be self-explanatory. If not, you can access the Help System (Section 2.4.4).

2.5.5. Additional Options

The workbooks created by WorksheetMaker use a large number of input parameters and most of these parameters are used in several different worksheets. Clicking on the Show Options button will expand the Application Window and allow you to change the options used by Worksheet Maker.

The Expanded Application Window is illustrated in Figure 5. The upper area of the Additional Options sections – i.e., the area immediately below the Make Workbook button – allows you to specify the name of an output file from Gleams-Driver (SERA 2007c). All you need to do is press the Set button to the right of the text box labeled Gleams-Driver File. A standard Windows file selection box will open. Use the file selection box to identify an output file from Gleams-Driver. This output will be incorporated into Worksheet B04. If you do not use this option, you will still be able to incorporate Gleams-Driver data at a later time by using the utility that is available in Worksheet B04 of the workbook that is created by WorksheetMaker. This utility is discussed further in Section 3.1.2.

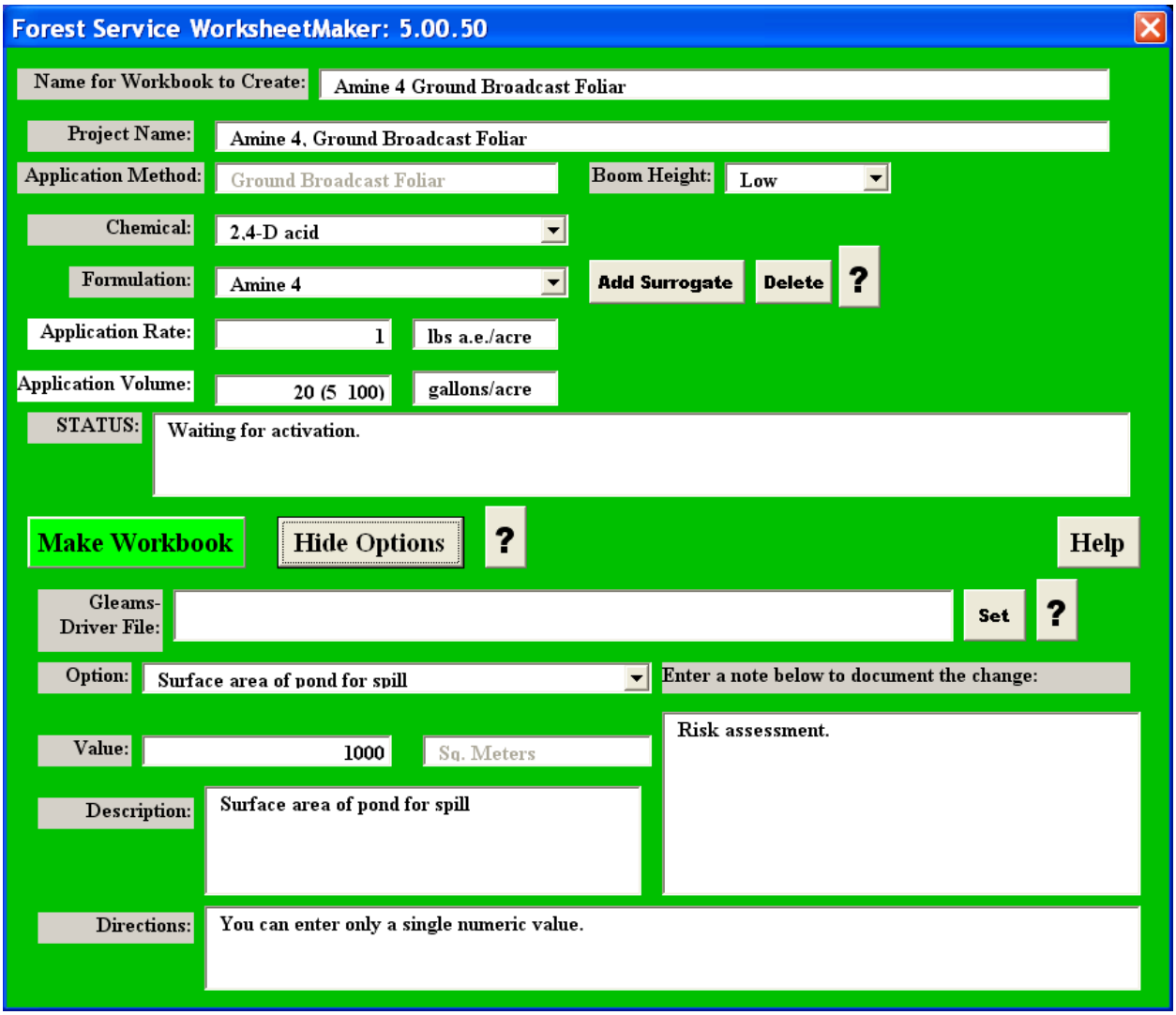


Figure 5: Expanded Application Window

The remaining area of the expanded Application Window contains a dropdown list box labeled Option as well as text boxes that are labeled Value, Description, and Directions. An additional text box to the right of the value and description controls is designated for user notes.

Use the dropdown list box to select that options that you want to review and may want to change. The specific items that will be available for your review will vary with the type of application. A full listing the currently supported options is given in Table 1.

Table 1: Summary of Options for the Application Window

Description	Units	Type
Dislodgeable residue, as a proportion of the application rate.	unitless	Range
Proportion of water basin that is treated.	unitless	Range

Table 1: Summary of Options for the Application Window

Description	Units	Type
Pond depth	meters	Number
Surface area of pond for spill	square meters	Number
Amount spilled into ponds	lbs	Range
Amount spilled into ponds	gal	Range
Stream flow rate for drift scenario	liters/day	Number
Stream length for drift scenario	feet	Number
Stream width for drift scenario	feet	Number
Duration for longer-term exposures	days	Number
Duration for swimming scenarios	minutes	Number
Toxic Equivalency Factor for formulation	unitless	Range
Residue rates for broadleaf/forage plants and small insects	ppm per lb/ac	Range
Residue rates for fruit	ppm per lb/ac	Range
Residue rates for short grass	ppm per lb/ac	Range
Residue rates for long grass	ppm per lb/ac	Range
Number of acres that the worker will treat per hour	acres/hr	Range
Amount of pesticide handled	lb/hour	Range
Worker Exposure Rate	mg/kg bw per lb	Range
Number of hours of worker exposure per day.	hrs/day	Range
Protection factor for workers based on PPE.	unitless	Range

As you change the item in the dropdown list, the default value or values that will be used by WorksheetMaker are displayed in the Value text box and the units for the value are displayed in a text box immediately to the right of the value. Note that you cannot edit the units. The value must be entered in the units specified by WorksheetMaker. The Description text box provides a fuller description of the item selected in the dropdown list. For some simple parameters, however, the description may be virtually identical to the text in the dropdown list. The Directions text box will indicate whether a single value or a range of values can be used. If a range is permitted, the range should be entered in the form of **`CC (LL – UU)`** – i.e., the central value followed by the lower and upper bounds in parentheses.

The larger box on the right hand side of the form will initially have the text **Risk Assessment**, meaning that the default value for WorksheetMaker is the value that was used in the Forest Service risk assessment or would be used in an update to the risk assessment. If you enter a new value, the box will change and the text, ***User Input***, will be placed in the box. If appropriate, you can enter a more meaningful explanatory note.

If you prefer, you can skip the Options feature in WorksheetMaker. All options that you can set within WorksheetMaker can also be set from Worksheet A01 in the workbook that WorksheetMaker will create. This is discussed more fully in Section 3.2. There are no substantial differences between using the Options feature in WorksheetMaker and directly modifying Worksheet A01 and you can use whichever approach seems most convenient for you.

3. USING THE WORKSHEETS

3.1. Mini-Documentation for Different Groups of Users

The worksheets are contained in a single file, an EXCEL workbook. The worksheets may be used by individuals reviewing or reading the risk assessments, individuals involved in the preparation of environmental documentation, or individuals modifying the worksheets for a different chemical. Each of these uses is discussed in the subsequent subsections.

As discussed in Section 2.3, the workbooks created by WorksheetMaker contain macros. If you open the workbook in EXCEL, you may receive a message asking if you want the macros to be enabled. If you are just going to look at the worksheets (and not modify anything) it does not matter if you allow the macros to be activated. If you plan on changing any values, the macros must be enabled or some of the automatic rounding and formatting features as well as the workbook utilities (Section 3.4) will not work.

If the worksheets do not appear to work at all, your security setting in EXCEL may be set to the highest level. In this case, you will not receive any notice concerning macros but the macros will be disabled and the features of the workbook discussed in this documentation will not work. Use the menu series Tools → Macros → Security to check your security setting in EXCEL.

3.1.1. Reviewers or Readers

Most individuals involved in reviewing or using the worksheets in combination with the full risk assessment will only need to look at Series E and Series G worksheets. These are the worksheets that summarize both the exposure assessments and risk characterizations. All of the worksheets which summarize exposures (e.g., Worksheets E01, E03 and G01) make reference to the more detailed calculation worksheets in which the exposure assessments are derived. These detailed calculation worksheets can be readily identified (see Section 3.2 for a discussion of the workbook structure). The calculation worksheets should be very easy to follow and all calculations should be totally transparent. Nonetheless, the rationale for the calculations is described in the risk assessments and documentation for the risk assessments (SERA 2007b) rather than in the worksheets. All risk summary worksheets (e.g., E02, E04, and G02) follow a consistent numeric formatting as summarized in the bottom section of Table 2 and detailed in Section 3.2.2.2.

Table 2: Color Scheme Used in WorksheetMaker

General Formatting in Calculation Worksheets	
Green shading	This is a default value or a user specified a value. You can change these values as you see fit but you should have a reason for doing so.
Yellow shading	This is a source for a link in other parts of the workbook. If you have good reason to change the value, you should note the change (with your reason) in the "Revisions" page.
Blue shading	This cell is linked to another cell in the workbook. **Do not change this value.** If you change any of these values, the workbook may not update correctly.
Blue shading blue border	This cell is linked to a Program parameter in Worksheet A01. **Do not change this value.** If you want the value to change, go to Worksheet A01 and change the value in that worksheet.
Red Shading	This is a Results cell. It is typically a named range and serves as a link to cells in the workbook. **Do not change this value.**
Purple Shading	Indicates (for information only) that the typical of order of Lower and Upper values is intentionally reversed. This is only used in the second (label) column.
Italics, no shading	The value in this cell is generated by a formula (the number that you see is the result of an equation). This cell is linked only to other cells in the worksheet. **Do not change this value.**
Bold font on gray background	These are simply labels or headings that are shaded to separate different parts of a worksheet

General Formatting in Calculation Worksheets	
HQ ≥ 2	For hazard quotient greater than 2, the number is in **bold font** with a red background and rounded to the nearest integer.
HQ > 1 but < 2	For hazard quotient greater than 1 but less than two, the number is in **bold font** with a white background and rounded to one significant place after the decimal.
HQ ≥ 0.1 but <1	For hazard quotient greater than 0.1 but less than one, the number is in regular font with a white background and rounded to one significant place after the decimal.
HQ < 0.1	For hazard quotient less than 0.1, the number is in regular font with a white background. The number is expressed in scientific notation and rounded to one significant place -- e.g., 2E-02 rather than 0.02.

3.1.2. Preparation of EA's or EIS's

The Forest Service worksheets were originally developed to support the development of Forest Service risk assessments. While WorksheetMaker workbooks are still used in the preparation of Forest Service risk assessments, WorksheetMaker 5 is designed for individuals in the Forest Service to use independent of the risk assessment documents in the preparation or EAs or EISs.

Simple modifications to the workbook created by WorksheetMaker 5 can be made in Worksheet A01, the worksheet that summarizes the basic the program or application parameters.

Worksheet A01 contains two sections, an upper section with basic program information and a lower section with program options. The upper section of Worksheet A01 is illustrated in Figure 6. **You can change any of the boxes shaded in green. This is a common formatting feature in WorksheetMaker 5** (Section 3.3.2). Thus, you can change the application rate and the application volumes.

Program Data: Application rates, application volumns, and concentrations in field solutions

Parameter/Assumption	Code / Range	Equation/ Value	Units	Reference/ Equation
Application Rate	**ApRt**	**1**	lb/acre	***Program Input***
Application Volume	**ApVol**			
	Central	**20**	gal/acre	***Program Input***
	Upper	**100**		***Program Input***
	Lower	**5**		***Program Input***
Concentration in field solution (lb/gal)	$Conc_{ppg}$	*ApRt (lb/acre) / ApVol (gal/acre)*		***Note 1***
	Central	*0.05*	lb/gal	Eq
	Lower	*0.01*		Eq
	Upper	*0.2*		Eq
Conversion Factor for lbs/gal to mg/mL	**CnvF**	**119.8**	mg/mL/lb/gal	
Concentration in field solution (mg/mL)	**FldConc**	$Conc_{ppg}$ * *CnvF*		***Note 2***
	Central	**6.00E+00**	mg/mL	Eq
	Lower	**1.20E+00**		Eq
	Upper	**2.40E+01**		Eq
Number of significant figures used for ***FldConc***.	**NSig**	**2**		

Figure 6: Upper Section of Worksheet A01

For some types of applications, application volumes, the measure of projected liquid volume of field formulation to be applied per unit area, are not applicable. If application volumes are not relevant to the application method and formulation that was selected when the workbook was created, then application volumes will not appear in Worksheet A01. If application volumes are relevant, you will also be able to change the number of significant digits used to calculate the concentration in the field solution. The default value for rounding is 2 digits after the decimal. Other formatting features of this and other worksheets are discussed in Section 3.2.2.

The upper part of Worksheet A01 will have a different appearance and list different types of information for some types of applications and formulations. In all cases, you can change any of the inputs that are formatted with a green background. For bark applications, the Worksheet A01 worksheet is rather complex. This worksheet has detailed instructions for filling in the necessary information.

The lower part of Worksheet A01, illustrated in Figure 7, lists standard values or options that are used in one or more of the exposure scenarios covered by the workbook. These values

correspond to the Options section of the Application Window in WorksheetMaker as discussed in Section 2.5.5 and summarized in Table 1. If you feel that some of these values are not appropriate for your analysis, you can change any of the values formatted with a green background. As with the Options section of the Application Window, some values are entered as a single number and other values are entered as a central estimate with lower and upper bounds.

Standard Values/Options for Scenarios				
Surface area of pond for spill	**PondSA_M**	**1000**	Sq. Meters	Risk assessment.
Pond depth	**PondDepthM**	**1**	Meters	Risk assessment.
Stream flow rate for drift scenario	**StreamFlowLD**	**710000**	Liters/day	Risk assessment.
Stream length for drift scenario	**StreamLengthFt**	**1038**	Feet	Risk assessment.
Stream width for drift scenario	**StreamWidthFt**	**6**	Feet	Risk assessment.
Duration for longer-term exposures	**SubChDays**	**90**	Days	Risk assessment.
Duration for swimming scenarios	**SwimMin**	**60**	Minutes	Risk assessment.
Protection factor for workers based on PPE.	**WrkProtectFact**			
	Central	**0**		Risk assessment.
	Lower	**0**		
	Upper	**0**		
Toxic Equivalency Factor for formulation	**TEF**			
	Central	**1**		Risk assessment.
	Lower	**1**		
	Upper	**1**		
Amount spilled into ponds	**PondSpillVolGal**			
	Central	**100**	Gal	Risk assessment.
	Lower	**20**		
	Upper	**200**		

Figure 7: Lower Section of Worksheet A01

The number of items that are listed in the lower section of Worksheet A01 will depend on the application method and formulation that was selected when the worksheet was created by WorksheetMaker. Note that Figure 7 illustrates only some of the values used for a ground application of a liquid formulation.

While many of the options are reasonably self-explanatory, some such as worker protection factors and toxic equivalency factors are less so. In such cases, you should refer to the Forest Service risk assessment for the pesticide and/or the general methods document for preparing Forest Service risk assessments (e.g., SERA 2007b).

While Worksheet A01 contains many of the input factors that you may want to modify, many additional but more complex changes can be made to the workbooks that are produced by WorksheetMaker. These changes are discussed in Section 3.3 of this documentation. Before making any of the more complex changes, however, you should have a reasonable understanding the structure of the workbooks (Section 3.2).

3.1.3. Modifications for Different Chemicals

It is possible to use a workbook as a template and to modify the workbook for a new chemical. Experience has shown, however, that this approach is error prone and this use is not supported or recommended.

3.2. Workbook Structure

3.2.1. Organization

As summarized in Table 3, the worksheets are arranged in a manner similar to previous versions:

Table 3: Structure of Workbooks

Worksheet Series or Name	Content
Introductory Worksheets	Title Page
	General Notes
	Chemical Notes
	Revisions
	Contents
Sheet A01	Program Specific Values
Sheets A02 and A03	Standard Values
Series B	Chemical Specific Values
Series C	Worker exposures
Series D	General public exposures
Series E	HHRA Summary Tables
Series F	ERA Exposures
Series G	ERA Summary Tables
	References

In addition to several introductory worksheets, the workbook is organized into seven sets of worksheets designated as Series A to Series G. Each series worksheet is named with the series designation followed by a two digit number. For example, D02 is the second worksheet in Series D. The name of some worksheets is followed by a lower case letter. This general indicates that the worksheet is part of subgroup of similar worksheets. For example, Worksheet D03a is an exposure assessment for the consumption of contaminated fruit by a young woman and Worksheet D03b is an exposure assessment for the consumption of contaminated broadleaf vegetation by a young woman.

An effort is made to keep the naming of the various worksheets consistent with the names used in the Forest Service risk assessments. Nonetheless, the exposure scenarios used in Forest Service risk assessments change over time and these changes are incorporated into WorksheetMaker. Thus, minor discrepancies may be noted in the naming of worksheets between workbooks produced by the most recent release of WorksheetMaker (i.e., the version posted on the SERA or Forest Service web site) and workbooks that accompany and are cited in Forest Service risk assessments produced by earlier versions of WorksheetMaker. In most cases, these discrepancies will be relatively minor and should be easy to identify and resolve.

3.2.1.1. Introductory Worksheets

The introductory section of the workbook consists of five worksheets: **Title Page**, General **Notes**, **Chemical Notes**, **Revision Notes**, and **Contents**.

By default, the **Title Page** worksheet will indicate the chemical, the formulation, and the application method. If you elected to fill in the General Information section of the Application Window of WorksheetMaker (Section 2.5.1), the title page will contain the Project Name that you specified in WorksheetMaker. The title page will also include information on the version of WorksheetMaker that was used to generate the workbook as well as the date on which the workbook was created. If you are doing a formal analysis, you will probably want to modify the title page. The title page also contains a green shaded button labeled Utilities. The utilities are discussed further in Section 3.4 of this documentation.

The worksheet named **General Notes** contains information on who generated the worksheet and the specific support files that were used. This information is provided only for documentation and as potentially useful information in debugging. Most users will not be concerned with this information. The remainder of the General Notes worksheet provides an overview of the color codes used in the workbook (Section 3.2.2) as well as a brief explanatory note on using the workbook. Most users will have no reason to modify the General Notes worksheet.

The **Chemical Notes** worksheet will typically contain information on the Forest Service risk assessment that was used when data on the chemical was entered into the WorksheetMaker database. This information consists of a report number and the report date of the risk assessment.

> ***A text box is included in the Chemical Notes worksheet and this text box can and should be used to record any information about additional risk assessments or other sources of information that you used in modifying or otherwise documenting the information in the workbook.***
>
> ***Similarly, the Revisions worksheet is intended for your use in detailing and documenting any changes that you make to the workbook. In the preparation of Forest Service risk assessments, this page is used to describe any custom worksheets (Section 3.2.3.4) that are included in the Workbook.***

The **Contents** worksheet is basically a table of contents. The worksheet name is given in column A and the title of the worksheet is given in column B. If you double click on the worksheet name in Column A (the worksheet name) or Column B (the worksheet title), that worksheet will be activated.

3.2.1.2. Series A and Series B

Series A and Series B worksheets contain data that are used in subsequent worksheets. The number of worksheets and names of the worksheets in Series A and Series B are relatively standard.

There are generally three Series A worksheets:

- A01: Program Data
- A02: General reference values and exposure factors used in worksheets
- A03: Consumption values used in worksheets

As discussed in Section 3.1.2, Worksheet A01 contains most of the program-specific values and most of these values can be changed by the user. The remaining Series A worksheets contain standard values relating to people and wildlife species that are used in most Forest Service risk assessments.

Workbooks produced by WorksheetMaker contain up to six Series B worksheets with pesticide-specific information:

- B01: Chemical and Physical Properties
- B02: Toxicity values
- B03: Summary of chemical specific dermal absorption values
- B04: Estimates of Water Contamination Rates
- B05: Calculation of Zero-Order Dermal Permeability Rate
- B06: Calculation of First-Order Dermal Absorption Rate

Workbooks for some types of application methods – e.g., direct application to water – will contain separate B04 worksheets for expected peak/short-term concentrations in water (B04a) and expected longer-term concentrations in water (B04b).

Most workbooks made by WorksheetMaker will contain worksheets that estimate doses associated with dermal exposures. The values that are used in these exposure assessments are the dermal absorption rates that are summarized in Worksheet B03.

Worksheets B05 and B06 are atypical in that these two worksheets are calculation worksheets (Section 3.2.3.2) rather than data worksheets (Section 3.2.3.1). These two worksheets implement algorithms for estimating two types of dermal absorption rates (SERA 2007b, Section 3.1.3.2). In most Forest Service risk assessments, these algorithms are presented and compared to any available chemical-specific data on dermal absorption rates as well as other information that is relevant to assessing dermal absorption. Depending on the nature of the chemical-specific information, the dermal absorption rates calculated in Worksheets B05 and B06 may or may not be used quantitatively in exposure assessments. If the values in Worksheet B03 are different from those listed in Worksheets B05 and B06, the rationale for the difference will be presented in the Forest Service risk assessment for the pesticide covered by the workbook.

3.2.1.3. Series C and Series D

Series C and D worksheets consist of calculation worksheets (Section 3.2.3.2) that relate to human exposure scenarios. Series C worksheets pertain to workers and Series D worksheets pertain to members of the general public. The specific exposure scenarios used in WorksheetMaker are identical to those used in Forest Service risk assessments (SERA 2007b).

3.2.1.3. Series E

Series E worksheets are summary worksheets (Section 3.2.3.3) for the human health risk assessment. Typically, there are only four worksheets in this series:

- E01: Exposure Assessments for Workers
- E02: Risk Characterization for Workers
- E03: Exposure Assessments for Members of the General Public
- E04: Risk Characterization for Members of the General Public.

These worksheets follow the same general formatting used in all summary worksheets generated by WorksheetMaker (Section 3.2.2.2).

3.2.1.4. Series F

Series F worksheets detail exposure assessments for terrestrial animals including mammals, birds, and terrestrial invertebrates. As with Series C and D, Series F worksheets are calculation worksheets (Section 3.2.3.2). Also as with the Series C and D worksheet, the specific exposure scenarios used in WorksheetMaker are identical to those used in Forest Service risk assessments (SERA 2007b).

3.2.1.5. Series G

Series G worksheets provide summaries for the ecological risk assessment. Up to six Series G worksheets may be included in the workbooks generated by WorksheetMaker 5:

- G01: Exposure Assessments for Terrestrial Animals
- G02: Risk Characterization for Terrestrial Animals
- G03: Risk Characterization for Aquatic Species
- G04: Risk Characterization for Terrestrial Plants Associated with Runoff
- G05: Risk Characterization for Terrestrial Plants Associated with Drift
- G06: Risk Characterization for Terrestrial Plants Associated with Wind Erosion of Soil

Worksheets G01 and G02 are simple summary worksheets (Section 3.2.3.3) analogous to the Series E worksheets.

The remaining Series G worksheets are composite worksheets (Section 3.2.3.4). The distinction between summary worksheets and composite worksheets is important if you plan on adding additional worksheets or modifying any of the summary or composite worksheets. See Section 3.3 for details.

All workbooks made by WorksheetMaker will contain worksheets G01, G02, and G03. Worksheets G04, G05, and G06 will generally only be in workbooks for herbicides. In other words, if no toxicity values are available for terrestrial plants, as will be the case with most pesticides other than herbicides, then worksheets G04, G05, and G06 will be omitted from the workbooks generated by WorksheetMaker. As discussed further in Section 3.3.3.2, there are two types of G04 worksheets, depending on the type of modeling that was done in the risk assessment.

3.2.2. Workbook Formatting

The workbooks created by WorksheetMaker follow a consistent formatting convention as detailed in Table 2. The upper section of Table 2 summarizes the formatting conventions used in data and calculation worksheets and the bottom section of Table 2 summarizes the formatting conventions used in risk summary worksheets. The different types of worksheets are discussed further in Section 3.2.3.

3.2.2.1. Data and Calculation Worksheets

In data and calculation worksheets, most of the formatting is applied to numeric values which are typically in Column C of the worksheets. Most users will be concerned only with cells with a green background. These are cells that you may change as needed. Most of the green shaded cells are in Worksheet A01, as discussed in Section 3.1.2. The green shaded cells serve as link sources to one or more calculation worksheets – i.e., some cells in the calculation worksheets are linked to cells shaded in green. The default values for cells shaded in green are typically standard values or assumptions used in the corresponding Forest Service risk assessment. Nonetheless, it is anticipated that you may change these values based on the specific analysis that you are doing (Section 3.3).

Cells shaded in yellow also serve as link sources and the yellow shaded cells are also standard values typically used in most Forest Service risk assessments. The nature of these values, however, is such that it is not anticipated that you will have a need to change them. If you do decide to change these values, you should note the change and the rationale for the change in the Revisions worksheet (Section 3.2.1.1). Before making the change, you may want to use the *Trace Dependents* feature in EXCEL to ensure that the change you are making is appropriate in all of the cells that are linked to the value with the yellow background.

Cells that are shaded in blue are linked to some other cell in the workbook, either a cell with a green or yellow background. These cells should not be modified. If you do so, the workbook will not update properly.

Cells that are formatted in *italics* are simply intermediate results (i.e., EXCEL equation cells). The equation used to in the calculation will be given above the intermediate results cell in Arial bold italicized font – e.g., ***ApR × rr × Drift × PropR***. The abbreviations used in these equations are given in Column B of the calculation worksheet and the definition of each term is given in Column A of the worksheet. You should never change the cells formatted in italics unless you have found and are correcting an error in the worksheet. If this is the case, please report the error (Section 4).

Many values given in calculation worksheets specify a central estimate as well as lower and upper bounds. Typically, these values are given in consecutive rows in the order of central estimate, lower bound, and upper bound. In some instances, however, the upper bound is given in the row above the lower bound and all of these instances are formatted with purple background. This is illustrated in Figure 6 in which the order of the bounds for application volumes – i.e., upper and lower – are reversed and the labels for these values have a light purple background. The bounds are reversed because the upper bound of the application volume is used to calculate the lower bound of the concentration in the field solution and the lower bound of the application volume is used to calculate the upper bound of the concentration in the field solution. This type of ordering is also used for some other calculations and the purple background for the labels is used consistently in WorksheetMaker simply to indicate that the reversal is intentional.

3.2.2.2. Risk Characterization Worksheets

All summary worksheets that contain hazard quotients (e.g., standard worksheets E02, E04, G02) use a consistent formatting and this formatting is illustrated in bottom section of Table 2.

All hazard quotients less than 0.1 are given in scientific notation displayed to one significant place with a normal font – e.g., a hazard quotient of 0.0007243 is displayed as 7E-04.

HQ values between 0.1 and <1.0 are given in normal decimal notation displayed to one significant place – e.g., a hazard quotient of 0.2143 is displayed as 0.2. HQ values between 1.0 and <2.0 are given in bold font displayed to one significant place after the decimal – e.g., a hazard quotient of 1.5632 is displayed as **1.6**.

HQ's that are equal or greater than 2.0 are displayed to the nearest integer and are presented in bold font with a bright pink background – e.g., an HQ value of 9.425 is displayed as **9**.

If the workbook macros are enabled (Section 2.4.2), the adjustment of the way the hazard quotients are displayed is dynamic. If you change the application rate, the display of the hazard quotients will be adjusted to follow the above rules. Note that this feature involves only the display of the value and no actual rounding is done. Thus, if you want to view the hazard quotients in a different way, you may change the numeric format of the cell or copy the value in the cell and paste the value to another location.

3.2.3. Types of Worksheets

Workbooks created by WorksheetMaker contain four general types of worksheets: data worksheets (Series A and most Series B worksheets), calculation worksheets (Series C, D, and F), summary (Series E and G01 and G02), and composite worksheets (G03 through G06). In the preparation of Forest Service risk assessments, custom worksheets are sometimes added to workbooks created by WorksheetMaker. Except for custom worksheets, the various types of worksheets have similar general designs as detailed in the following subsections. All worksheets, regardless of their general classification, have the title of the worksheet in Cell A1.

3.2.3.1. Data Worksheets

All Series A and most Series B worksheets are classified as data worksheets. With the exceptions of Worksheets A01, B05, and B06 (Section 3.1.2), data worksheets contain only information rather than calculations.

Most of the data worksheets can be viewed a simple table of data. The second row of each data worksheet contains column labels that specify the type of information presented in the worksheet. The number of columns and the types of information contained in each column vary from worksheet to worksheet but will always include a column labeled Value as well as columns that designate the Unit in which the value must be expressed and a column designating a Reference for the information.

The specific listing of information starts on Row 3 of the worksheet. Each item in the Value column will have a yellow background, indicating that the item serves (or at least may serve) as a link source for other cells in the workbook (Section 3.2.2.1).

3.2.3.2. Calculation Worksheets

Calculation worksheets (Series C, D, and F) are used to estimate doses associated with a single exposure scenario. Thus, each exposure assessment considered in a Forest Service risk assessment has a corresponding calculation worksheet and the worksheet name used in workbooks created by WorksheetMaker will typically be identical to designation used in Forest Service risk assessments.

A typical calculation worksheet is illustrated in Table 4. The upper part of each calculation worksheet consists of the worksheet title (Cell A1) as well as a Short Title (Row 2), the Receptor (Row 3), the Duration (Row 4), and the Material consumed (Row 5) if the exposure scenario involves the consumption of food or water. The term *Receptor* is used generically to indicate the type of individual – e.g., adult male, young female, or child – or the type of organisms – e.g., large or small mammal or bird – to which the exposure assessment applies.

Table 4: Typical Calculation Worksheet

Consumption of Contaminated Fruit by a Adult Female, acute exposure after a single application

Short Title	Contaminated Fruit			FdPropBW_Ac
Receptor	Adult Female			
Duration	Acute			
Material consumed	Fruit			

Parameter/Assumption	Code / Range	Equation/ Value	Units	Reference/Designation
Application Rate (lbs/acre)	**ApRt**	**1**	lb/acre	Worksheet A01
Amount consumed per day per unit body weight	**Amnt**			
	Central	**0.00168**	kg food/kg BW per day	U.S. EPA/ORD 1996
	Lower	**0.00168**		U.S. EPA/ORD 1996
	Upper	**0.01244**		U.S. EPA/ORD 1996
Residue Rates	**rr**			
	Central	**7**	mg/kg food per lb/acre	Worksheet A01
	Lower	**7**		Worksheet A01
	Upper	**15**		Worksheet A01
Drift	**Drift**	1	proportion	*Scenario parameter*
Proportion remaining after washing	**PropR**	1	proportion	*Scenario parameter*
Concentration on vegetation	**Conc**	***ApR × rr × Drift × PropR***		
	Central	*7*	mg/kg food item	Eq
	Lower	*7*		Eq
	Upper	*15*		Eq
Toxic Equivalency Factor for formulation: (See risk assessment if this has a value other than 1.)	**TEF**			
	Central	**1**	Unitless	Worksheet A01
	Lower	**1**		Worksheet A01
	Upper	**1**		Worksheet A01
Dose	**Dose**	***Conc × Amnt***		
	Central	*0.01176*	mg/kg bw	Eq
	Lower	*0.01176*		Eq
	Upper	*0.1866*		Eq

Cell E2 of calculation worksheets contain the name of the worksheet template on which the worksheet is based. In Table 4, the template is designated as FdPropBW_Ac. Most users should not be concerned with the template name. The template name is included only as a tool in debugging.

The lower part of each calculation worksheet is organized in five columns: Parameter/Assumption, Code/Range, Equation/Value, Units, and Reference/Designation. The first column designates the input in concise but plain language. If you are familiar with the Forest Service risk assessment, the meaning of the inputs should be clear. If not, you may want to consult the risk assessment or the methods document (SERA 2007b). The second column (Code/Range) gives short codes for the input designated in the first column. These codes are

used in the third column to indicate the algorithm that is used in any cell that is marked as an equation. Equation cells are indicated in the fifth column (Reference/Designation) by the label Eq and the cells that actually contain the equations (column 3) are indicated by *italic font*. Other formatting features of calculation worksheets are described in Section 3.2.2.1.

Each calculation worksheet will include the application rate from Worksheet A01. In addition, each calculation worksheet is designed to be self-contained or at least reasonably so – i.e., all of the information needed to understand and document the exposure scenario is displayed in the calculation worksheet. Consequently, there is intentional redundancy among some of the worksheets but this redundancy allows you to completely document the exposure scenario in a single worksheet without having to switch to other worksheets for details.

The last item in each calculation worksheet is labeled Dose. For acute exposure scenarios, a one-day or single-event exposure is implicit and the units for the dose as in mg/kg body weight. For longer-term exposures, the units on dose are in mg/kg body weight/day. Doses are always expressed as the central value with a lower and upper bound.

3.2.3.3. Summary Worksheets

There are two types of summary worksheets: exposure and risk. As will all other worksheets, Cell A1 will contain the title of the worksheet. Exposure summary worksheets always have a corresponding risk summary worksheet, as described in Section 3.2.1.

The second row of a summary worksheet contains the application rate, formatted as a link to Worksheet A01. As with the calculation worksheets, the repetition of the application rate is provided only for clarity and documentation.

In Version 4 worksheets, you were able to copy a risk summary worksheet and then change the application rate. This procedure lead to errors in some types of workbooks that were difficult to detect and this procedure is not supported in Version 5. As with all cells formatted as a link (Section 3.2.2.1), you should not change the value of the application rate in any of the summary worksheets. Changing the application rate cell in a summary worksheet will have no effect on any of the calculations in the summary worksheet. Doing this, however, will mislead anyone using the workbook.

The organization of the summary worksheet is similar for both exposures and risks. One calculation worksheet is summarized in each row of the summary worksheet. The Short Title of the exposure scenario is given in the first column and the Receptor is given in the second column. The values – i.e., doses for exposure summaries and hazard quotient for risk summaries – are given in columns C through E: the central value (Column C), the lower bound (Column D) and the upper bound (Column E). In exposure summary worksheets, the last column contains a reference to the corresponding calculation worksheet. In risk summary worksheets, the sixth column contains the toxicity value that is used to calculate the hazard quotient. In some summary worksheets for the ecological risk assessment, a seventh column may be added that specifies the endpoint for the toxicity value – e.g., LC_{50} or NOAEC.

In both exposure and risk summary worksheets, the exposure scenarios are arranged in the following sequence: accidental exposures, non-accidental acute exposures, and chronic or longer/term exposures. The ordering of the scenario within each category is identical in the exposure summary and corresponding risk summary worksheet.

Exposure summary worksheets do not contain any special formatting. Note that no rounding is performed in the exposure summary worksheets. As noted in Section 3.1.2, the concentration in the field solution is the only value that is rounded in any workbook created by WorksheetMaker and you can adjust the level of rounding. The lack of rounding in the exposure worksheet does not imply that the exposure assessment is precise to the format of the numbers in the exposure worksheets. The numbers on the exposure worksheets are not rounded simply so that the numbers in the exposure worksheets will be identical to those in the corresponding calculation worksheets.

Risk summary worksheets are formatted as detailed in Section 3.2.2.2 and summarized in the bottom section of Table 2.

3.2.3.4. Composite Worksheets

As discussed in Section 3.2.1.5, worksheets G03 (aquatic species), G04 (terrestrial plants, runoff), G05 (terrestrial plants, drift), and G06 (terrestrial plants, wind erosion of soil) are classified as composite worksheets. Composite worksheets are self-contained in that exposures estimates, toxicity values, and resulting hazard quotients are summarized in a single worksheet.

This general approach to composite worksheets is intended to make it easy for you to modify the composite worksheets to better reflect site-specific or program specific factors in the analysis that you are doing. The modification of composite worksheets in workbooks created by WorksheetMaker is discussed further in Section 3.3.3.

3.2.3.5. Custom Worksheets

Custom worksheets may be added to the workbooks produced by WorksheetMaker. Custom worksheets, by definition, are simply worksheets that are designed for a specific purpose not encompassed by any of the standard worksheets that are produced by WorksheetMaker. WorksheetMaker does not produce or otherwise handle custom worksheets.

Workbooks released with Forest Service risk assessments sometimes contain custom worksheets. By convention, custom worksheets are named differently from standard worksheets. Rather than using alphanumeric names, custom worksheets in workbooks that are released with Forest Service risk assessments will have names that are based on abbreviations of the topic in the custom worksheet.

For example, the Forest Service risk assessment on rotenone (SERA 2008) contains the following custom worksheets:

- Naph Calculations of potency weighted doses for naphthalene in different formulations
- MPR Calculations of potency weighted doses for methyl pyrrolidone in different formulations
- TBM Calculations of potency weighted doses for trimethylbenzene in different formulations
- TCE Calculations of potency weighted doses for trichloroethylene in different formulations
- TEF Calculations of toxic equivalency factors for different formulations

In the workbook for rotenone, these custom worksheets follow standard Worksheet A01. The worksheets themselves are not extensively documented but each worksheet refers to a specific section in the Forest Service risk assessment where the purpose of each worksheet and the algorithms used in each worksheet are detailed.

Depending on the analysis that you are doing, you should feel free to add custom worksheets as you see fit. In order to clearly distinguish custom worksheets from standard worksheets – i.e., those generate by WorksheetMaker – you may want to consider using the type of naming convention discussed above. You can determine the amount of documentation that should be added to any custom worksheet. In the interest of transparency and clarity, documentation should be provided either in the worksheet or in the analysis that you are doing. If you take the latter approach which is used in Forest Service risk assessments, you should consider specifying the section in your analysis where the algorithms are detailed and documented.

3.3. Modifying Workbooks

You can and often should modify workbooks produced by WorksheetMaker in a manner that will make the results more directly relevant to the analysis that you are doing.

It is beyond the scope of this documentation to discuss all modifications that you might want to make and the reasons that these modifications would be justified and desirable. Nonetheless, you should be aware that Forest Service risk assessments adopt an Extreme Value approach (SERA 2007b, Section 1.2.2.2) in which exposures and risks are expressed as central estimates with lower and upper bounds. The risk estimates derived in Forest Service risk assessments are generally based on conservative assumptions and may not reflect the type of application or application conditions that are applicable to your analysis. If this is the case with your analysis, you should consider modifying the workbook generated by WorksheetMaker.

3.3.1. Minor Modifications

As discussed in previous sections of this documentation, some very important modifications – e.g., the application rate and application volume(s) – are very simple to make.

As another example of a relatively simple modification, consider that all worker exposure assessments are based on the amount of a chemical that is handled per day as well as general estimates of the absorbed dose rate. The amount of a chemical that is handled is typically calculated as the number of acres that a worker will treat per hour multiplied by the number of hours per day that the worker will be involved in the application. The specific values used in Forest Service risk assessments have been based on general estimates from the Forest Service and many of these estimates have rather wide ranges. In your particular analysis, however, you may able to justify different values that could alter the estimates of risk (either upward or downward) or at least narrow the range of estimated doses.

As discussed in Section 3.1.2, many of the basic input values that you might want to change are contained in Worksheet A01. Before using a WorksheetMaker workbook in your analysis, you should review all of the inputs in Worksheet A01 (Section 3.1.2). There is nothing wrong with changing any of these input values so long as the changes are based on objective and documented considerations. Again, the Chemical Notes and Revisions worksheets are designated as areas in the workbook where you can document any changes that you make. More detailed documentation for any changes that you make can also be incorporated directly into your analysis.

Other types of changes that you can and perhaps should make to workbooks generated by WorksheetMaker are more complex and require independent analyses. These are considered further in the following subsections.

3.3.2. Incorporating Results from Gleams-Driver

USDA Forest Service has developed ***Gleams-Driver***, a user-friendly Windows program that serves as a pre-processor and post-processor for GLEAMS. GLEAMS is a root zone model developed by USDA/ARS that can be used to examine the fate of chemicals in various types of soils under different meteorological and hydrogeological conditions (Knisel and Davis 2000). GLEAMS is a DOS program written in FORTRAN. While it can and has been used by some USDA personnel to perform exposure assessments in support of USDA program activities, it is not widely used by Forest Service personnel because of the difficulties in both running the model and manipulating the output. *Gleams-Driver* prepares input files for GLEAMS, runs the GLEAMS program, and then reads and processes the output from GLEAMS to make estimates of concentrations of pesticides in soil (target and nontarget fields) as well as surface water (streams and ponds). Detailed documentation for using Gleams-Driver is available (SERA 2007c). The current documentation for WorksheetMaker considers only how this information can be incorporated into a workbook generated by WorksheetMaker.

Gleams-Driver will estimate both concentrations of the pesticide in surface water as well as effective offsite application rates associated with runoff to a nontarget field. If you input drift into the Gleams-Driver run, then the outputs from Gleams-Driver will consider both drift and

other transport properties (i.e., runoff, sediment loss, and percolation) in the estimates of the pesticide concentrations in surface water and effective offsite application rates.

As indicated in Section 2.5.5, WorksheetMaker allows you to specify a Gleams-Driver output file prior to the creation of the workbook. The workbooks created by WorksheetMaker also allow you to incorporate this information after the workbook has been created.

3.3.2.1. Manual Modification

To incorporate the results from a Gleams-Driver run, you must select (activate) Worksheet B04. As discussed in Section 3.2.1.2, Worksheet B04 is a standard worksheet in most workbooks created by WorksheetMaker and this worksheet contains the peak and longer-term concentrations in surface water. A snapshot of Worksheet B04 is given in Figure 8.

Estimates of Water Contamination Rates -- i.e., the concentration in ambient water per pound applied per acre

Parameter/Assumption	Code / Range	Equation/ Value	Units	WaterSum
Short-term peak concentrations	**Peak**			
	Central	**0.02**	mg/L	***Section 3.2.3.4.***
	Lower	**0.002**		***Section 3.2.3.4.***
	Upper	**0.44**		***Section 3.2.3.4.***
Longer-term average concentrations	**Average**			
	Central	**0.0004**	mg/L	***Section 3.2.3.4.***
	Lower	**0.00002**		***Section 3.2.3.4.***
	Upper	**0.0033**		***Section 3.2.3.4.***
User Specified Gleams-Driver File:	**None**			

Link to Gleams-Driver

If you want to replace the general water concentrations used in the risk assessment (which were originally inserted above by the WorksheetMaker program), simply enter the new values above. These will be used in all calculations in this worksheet. You should, of course, document your changes with the text box below. Note that you must enter **Water Contamination Rates, concentrations in ambient water in units of mg/L per lb/acre applied.**

If you are using concentrations modeled from ***Gleams-Driver,*** take the concentrations from Gleams-Driver and divide by the application rate that was used when Gleams-Driver was run. This will yeild the WCR. This process can be automated by pressing the **green button** to the left.

Documentation for Changes to Water Contamination Rates:
In the initial release of this workbook, the water contamination rates listed above are from WorksheetMaker and are the concentrations documented in the risk assessment (as specified in the General Notes worksheet). **If these values are changed by the user, the user should delete the text in this box and provide documentation/justification for the changes.**

Figure 8: Gleams-Driver Import Utility in Worksheet B04

The upper text box on Worksheet B04 (Figure 8) contains help information that describes what you can do to this worksheet. These directions describe how to manually modify the values for peak concentrations in water (cells C4:C6) as well as the longer-term concentrations in water (cells C8:C10). These yellow shade cells are used as link sources in other parts of the workbook that require information on the concentration of the pesticide in water. Thus, changing the values for the concentrations in water here will change the values for the concentrations in water in all other parts of the workbook. As a result, other cells that use this information – e.g., calculations of doses or hazard quotients – will also change automatically.

Note that you do not need to use information from Gleams-Driver. You can manually enter peak and longer-term concentrations based on the results of other models, monitoring data, or any other information. It is essential, however, that the concentrations be entered for a normalized application rate of 1 lb a.e./acre for weak acids or 1 lb a.i./acre for other pesticides. This is referred to as a Water Contamination Rate (WCR). As detailed in the methodology for doing Forest Service risk assessments (SERA 2007b), the water contamination rate are calculated as:

WCR = Concentration in Water / Application Rate.

This conversion is important because all of the values in Worksheet B06 are multiplied by the application rate specified in Worksheet A01.

The lower text box is labeled: Documentation for Changes to Water Contamination Rate. As a default, the WorksheetMaker program uses the peak and longer-term water concentrations derived in the corresponding Forest Service risk assessment. Thus, when the risk assessment workbook is created by the WorksheetMaker program, the lower text box will appear as in Figure 1. If you change the values of the peak and/or longer-term concentrations, you should enter some explanatory text into the lower text box. This could describe how the new values were obtained and refer the reader to some more detailed description (e.g., an EIS or EA).

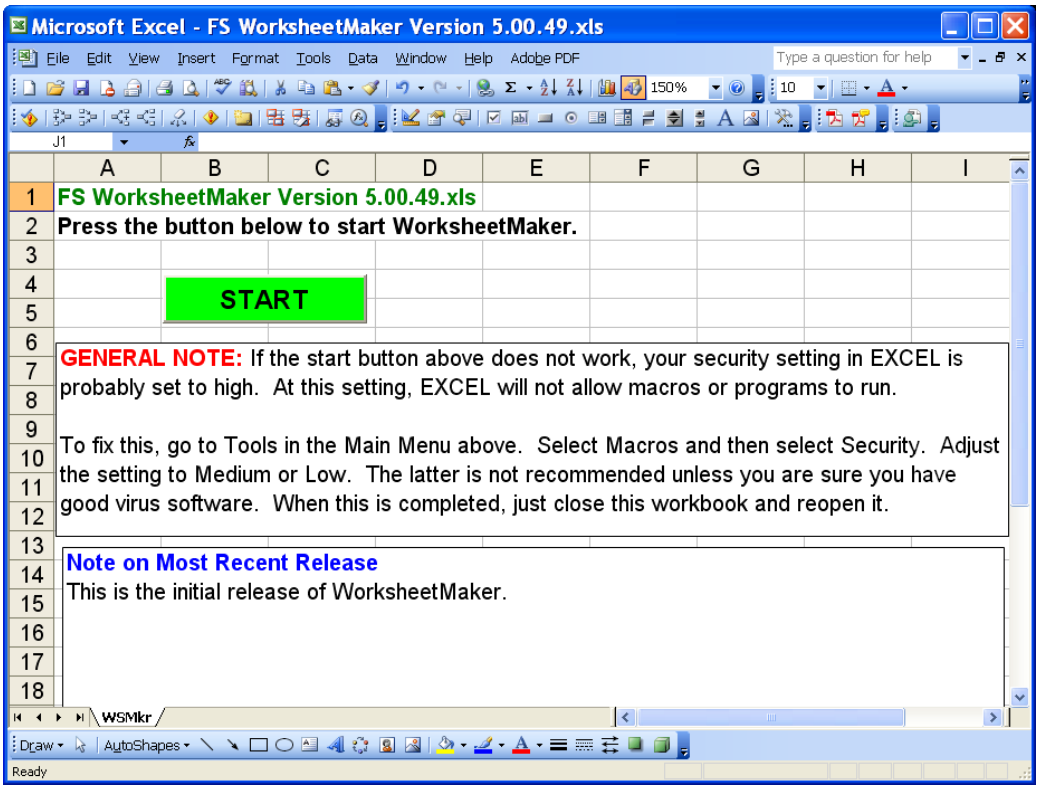


Figure 9: WorksheetMaker open in EXCEL

If you want to incorporate the results of a Gleams-Driver run into the worksheet, this can be done manually using the procedures described above. Every Gleams-Driver run creates an output Access database, the name of which is specified by the user. This output database is placed in the \Access Files subdirectory in the directory selected by the user for the Gleams-Driver run.

Each output Access database contains an Access Table that is named **`Statistics`**. A sample Statistics table is given in Table 5. This table contains six columns, referred to as fields, as illustrated in Table 5. The first column is the Receptor field. This field will give the names of the different sites and water bodies that were modeled. Gleams-Driver can be run in two modes: a user-friendly Quick Run mode or a more powerful but more complex Full Run mode. The names of the Receptors are specified by the user in a Full Run or assigned by the Gleams-Driver program in a Quick Run.

Table 5: Sample Statistics Table from Gleams-Driver

Receptor	Parameter	Median	EmpLower	EmpUpper	p-Value
Site01	SOIL12	0.2226	0.2225	0.2228	0.2
Site01	SOIL60	0.0445	0.0445	0.0445	0.2
Site01	SoilMax	60	48	60	0.2
WatBd01	Conc001	0.0106	0.0103	0.0106	0.2
WatBd01	Conc365	5.6E-04	5.6E-04	6.2 E-04	0.2
OffSite01	EffApRate	0.1	0.1	0.1	0.2

Table 5 illustrates the results from a Quick Run. In a Quick Run there is always only one body of water and this body of water is named **WatBod01** in the **Receptor** field. In a Full Run, there may be more than one body of water. The second column in the Statistics table is named **Parameter** and the entries in this column specify the type of information on the **Receptor**. For bodies of water, the relevant **Parameter** entry will always start with **Conc**, indicating that the information is the maximum time-weighted average (TWA) concentration in water. **Conc** will be followed by a three digit number that specifies the duration in days over which the maximum average concentration is calculated. Thus, **Conc001** indicates a maximum 1-day TWA. Since the minimum time interval modeled in GLEAMS and Gleams-Driver is one day, **Conc001** is equivalent to the peak concentration that is modeled. **Conc365** is a 365-day (about 1 year) maximum average concentration. Since many users will be modeling applications that are conducted yearly (the default in a Quick Run), **Conc365** is the best measure of the longer-term (chronic) average concentration. **Conc001** and **Conc365** are both default parameters that are always included in a Quick Run. Users doing a Full Run can have an arbitrary sequence of applications over any period of time. Nonetheless, **Conc001** will always be the value to select for acute exposures and **Conc365** will typically be the best value to select for longer-term (chronic) exposures.

The concentrations themselves are in the columns (fields) named **Median**, **EmpLower**, and **EmpUpper**. These fields represent the median (i.e., the midpoint), the empirical lower limit, and the empirical upper limit for the corresponding concentrations based on the number of simulations that were conducted by the user. The number of simulations is set by the user in both a Quick Run and a Full Run in Gleams-Driver. Note that the lower and upper bounds are empirical rather than statistical. The two-tailed *p*-value for the empirical limits is given in the last column of the Statistics table. See Section 8.2 in the user-guide for Gleams-Driver (SERA 2007c) for a more detailed discussion of the empirical limits.

3.3.2.2. Modification Utility

As an alternative to manually entering the results from a Gleams-Driver run into Worksheet B04, you can activate the Link to Gleams-Driver button on Worksheet B04. This button is activated by placing the mouse cursor over the Link to Gleams-Driver button and pressing the left button on the mouse. This will open the initial view of the **Link to Gleams-Driver form** as illustrated in Figure 10.

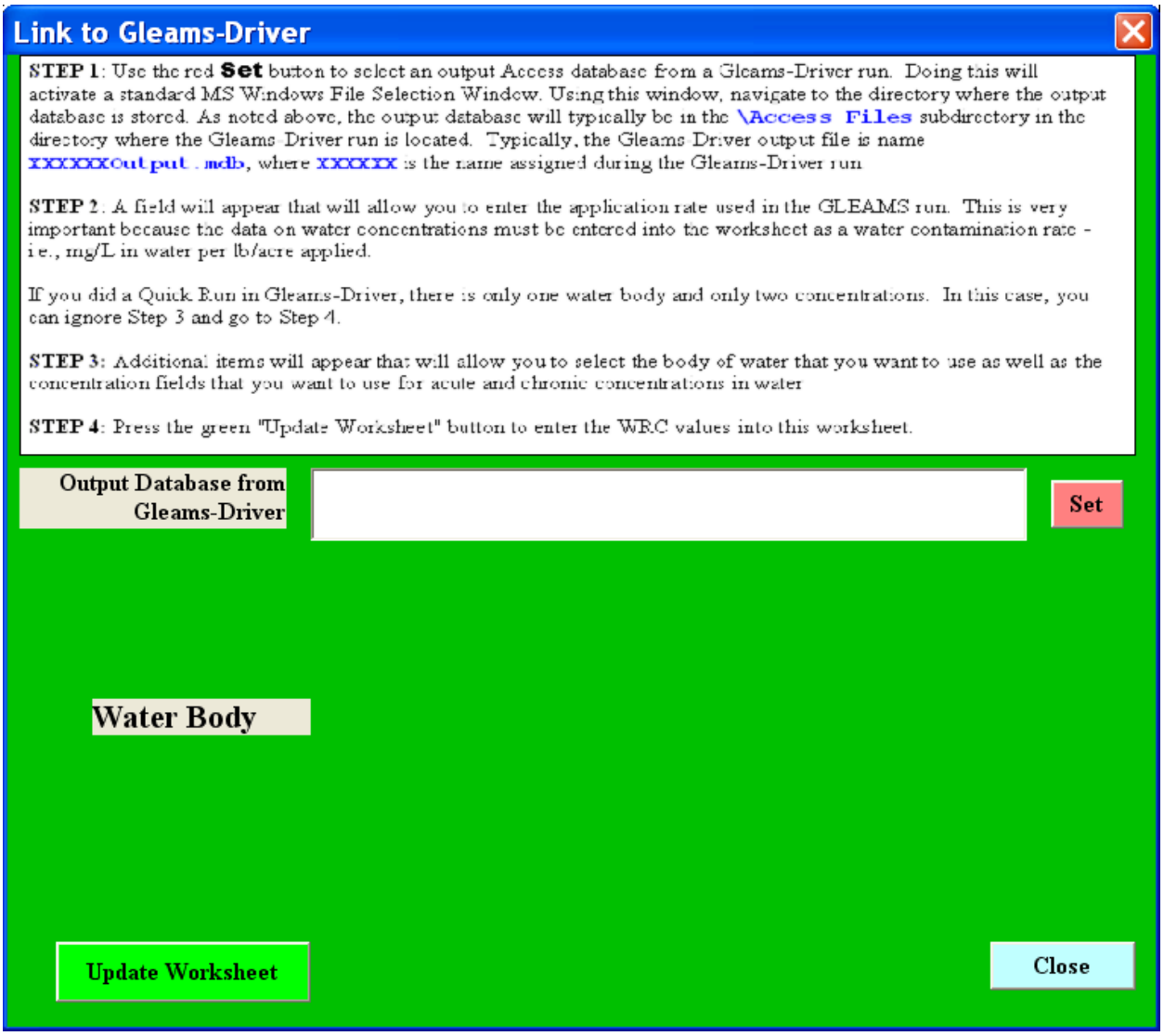


Figure 10: Initial View of Link to Gleams-Driver Form in Worksheet B04

The upper part of the Link to Gleams-Driver form contains a brief set of directions for using the form. As indicated in these directions, the first step involves setting the name and location of the Gleams-Driver output database. To do this, activate the red **Set** button that is to the right of the text area with the label, Output Database from Gleams-Driver. Doing this will activate a standard MS Windows File Selection Window. Using this window, navigate to the directory where the output database is stored. As noted above, the output database will typically be in the **\Access Files** subdirectory in the directory selected by the user for the Gleams-Driver run. Once you are in the correct location, select the output database so the name appears in the text box that is labeled Open. Then, activate the Open button on the File Selection Window. This will close the File Selection Window and the Link to Gleams-Driver form will be reactivated.

Once the Link to Gleams-Driver form is reactivated, the form will check to ensure that the selected Access database is a legitimate output database from Gleams-Driver. If this check fails – i.e., the file you selected is not an output database from Gleams-Driver – you will be given an error message. You should then reselect a legitimate output database from Gleams-Driver.

Once you have selected an output database from Gleams-Driver, additional fields will appear on the Link to Gleams-Driver form as illustrated in Figure 11. If the output database from Gleams-Driver is based on a Quick Run and if the default application rate of 1 lb/acre in the Quick Run, the only thing that has to be done is to activate the Update Worksheet button. This will transfer the values for **Conc001** to the Peak Concentrations in the Worksheet and the values for **Conc365** to the longer-term average concentrations in the worksheet. As noted above, this will automatically update all water concentrations and derived values (e.g., doses and hazard quotients) in the workbook. The Link to Gleams-Driver form can then be closed using the Close button or the X on the upper right hand corner of the Link to Gleams-Driver form.

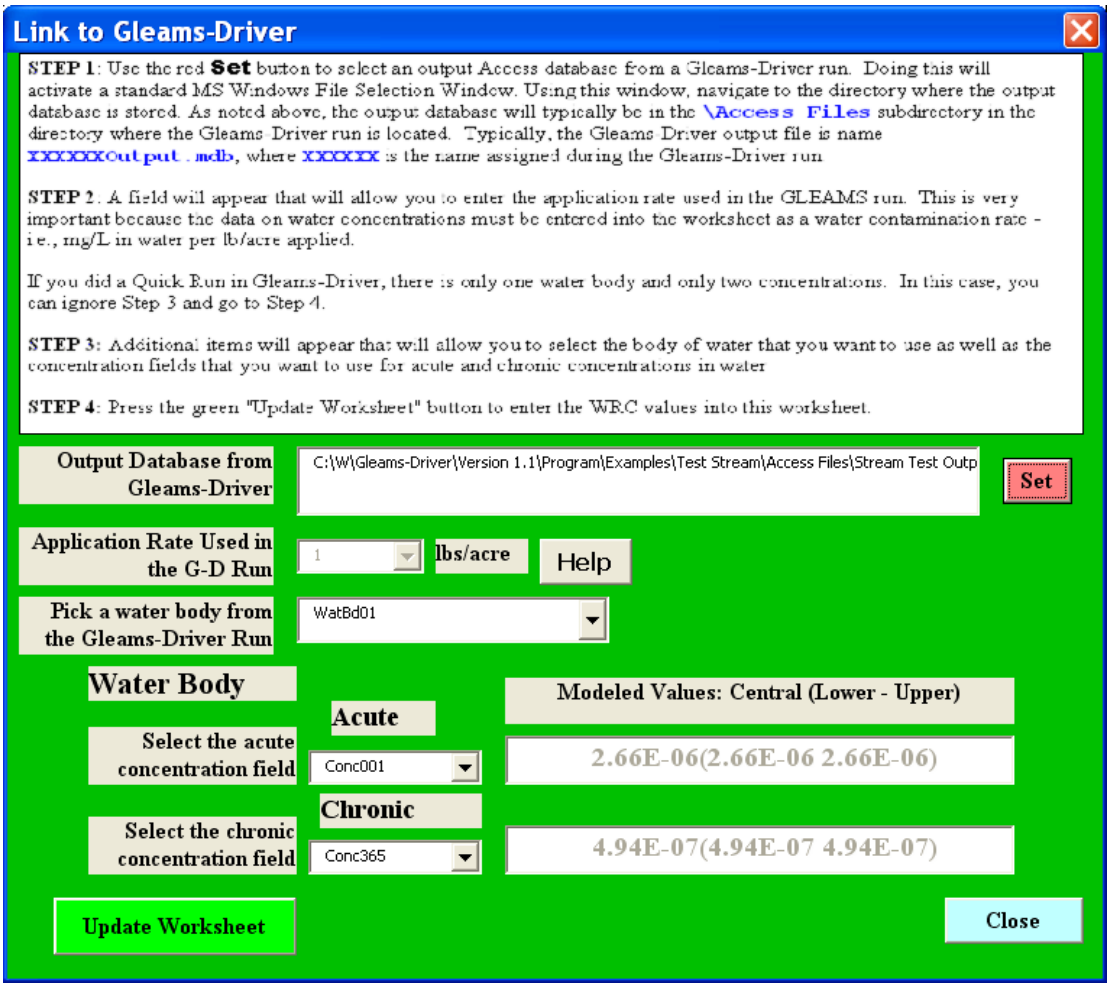


Figure 11: Full View of Link to Gleams-Driver Form in Worksheet B04

If the Gleams-Driver simulation was based on a Full Run, the number of water bodies as well as the number of chemicals that were modeled will be determined by the user who generated the Full Run inputs (SERA 2007c). In this case, you will need to select the appropriate application rate as well as the appropriate name of the water body and fields for the acute and longer-term concentrations using the dropdown lists on the Link to Gleams-Driver form.

Once the selections on the Link to Gleams-Driver form are made, press the **Update Worksheet** button. The utility will then enter the water contamination rates into the appropriate cells in Worksheet B03.

3.3.3. Modifying Composite Worksheets

As discussed in Section 3.2.3.4, composite worksheets are self-contained. The exposure assessment, toxicity values, and resulting hazard quotients are summarized in a single worksheet. This makes the worksheets relatively simple to modify to meet the specific needs of your analysis.

In making these modifications, you should be relatively familiar with the use of basic editing procedures in EXCEL, particularly the options in Edit → Paste Special as well as procedures for adding or deleting rows and entering simple equations. You should also understand the difference between *relative cell references* and *absolute cell references*.

If you are not familiar with relative and absolute cell references, search the following phrase in the EXCEL Help System: *About cell and range references*. This will bring up an EXCEL Help Window with several topics. In EXCEL 2003, you will be concerned only with the first two topics:

- The A1 Reference Style
- The difference between relative and absolute references

All cell references in WorksheetMaker use the A1 reference style. You need not be concerned with the R1C1 reference style. If you are using EXCEL 2002, the help topics may have slightly different headings.

You may want review EXCEL formatting options but these are simply cosmetic features that will not impact the results of your analysis.

3.3.3.1. Worksheets for Aquatic Species (G03)

Worksheets for aquatic species are typically designated as Worksheet G03 in the workbooks produced by WorksheetMaker. As illustrated in Table 6, different concentrations of the pesticide in water are summarized in upper part of the worksheet. You will seldom have any reason to change these numbers. Changes to the water concentrations would be made in either Worksheet B04 (Section 3.3.2) or in Worksheet A01 (i.e., parameters relating to the accidental spill scenario) as discussed in Section 3.1.2.

Table 6: Sample G03 Worksheet (Aquatic Species)

Worksheet G03: Summary of Hazard Quotients for Aquatic Species

Application Rate:	**1**	**lb a.e./acre**	AqToxSumV5

Exposures	**Concentrations** (mg/L)			
Scenario	**Central**	**Lower**	**Upper**	**Worksheet**
Accidental Spill	2.271	0.09084	18.168	D05
Peak EEC	0.02	0.002	0.44	D06
Chronic	0.0004	0.00002	0.0033	D07

Receptor	**Type**	**Hazard Quotients**			**Toxicity Value**	**Toxicity Endpoint**
		Central	**Lower**	**Upper**		
Accidental Acute Exposures						
Fish	Sensitive	2E-02	1E-03	0.2	**95.6**	LC50
	Tolerant	3E-03	1E-04	2E-02	**830**	LC50
Amphibian	Sensitive	0.3	1E-02	**2**	**8.05**	LC50
	Tolerant	6E-03	3E-04	5E-02	**359**	LC50
Invertebrate	Sensitive	9E-02	4E-03	0.7	**25**	EC50
	Tolerant	2E-03	7E-05	1E-02	**1389**	EC50
Macrophyte	Sensitive	**454**	**18**	**3,634**	**0.005**	NOAEC
	Tolerant	**1.1**	5E-02	**9**	**2**	NOAEC
Algae	Sensitive	**1.6**	6E-02	**13**	**1.41**	NOAEC
	Tolerant	4E-02	2E-03	0.3	**56.32**	NOAEC

The lower sections of Worksheet G03 contain summaries of the scenarios for sensitive and tolerant species (fish, amphibians, invertebrates, macrophytes, and algae) for accidental acute exposures (i.e., the spill), non-accidental or expected acute exposures, and chronic or longer-term exposures. For simplicity, Table 6 illustrates only the section on accidental acute exposures. The procedures discussed below can be used in any of the other sections.

The major reason for modifying this worksheet would be if you have additional data that you want to add on individual species that are relevant to your analysis. To do this, simply insert a row in the appropriate place. You should enter the name of the new species in Column B. You then need to type in a toxicity value and endpoint in Columns F and G, respectively. Lastly, you need to enter the equations for the hazard quotients in Columns C, D, and E. These are simply the toxicity value divided by the appropriate exposure value from the top part of the worksheet. The easiest was to do this is to use an absolute column reference for the toxicity value.

For example, if you were entering a new species in a new Row 16, this would be related to an accidental acute exposure – i.e., a spill. The new toxicity value would be in Cell **F16**. The central estimate of the concentration would be in Cell **C5**. Thus, the equation that you enter into Cell **C16** for the hazard quotient would be: **=C5/$F16**. Because you used the absolute column reference, **$F16**, you could simply block-copy Cell **C5** to Cells **D5:E5** and the resulting

calculations would be correct. It is easy to make a mistake in these types of modifications and checking the results independently is recommended.

As with any similar modification, you should document the change in the **`Revisions`** worksheet and you might want to include a note somewhere in Worksheet G03 as well.

3.3.3.2. Worksheets for Terrestrial Plants, Runoff (G04)

As noted in Section 3.2.1.5, Worksheet G04 summarizes risks to plants associated with runoff of the pesticide from a treated site to an offsite field. Two types of G04 worksheets may be found in workbooks generated by WorksheetMaker.

Prior to the development of Gleams-Driver, offsite runoff was assessed at generic sites with annual rainfall rates ranging from 5 inches to 250 inches (SERA 2004). Worksheets based on this type of modeling are illustrated in Table 7. As discussed in the documentation for Gleams-Driver (SERA 2007c, Section 4.5), these generic exposure assessments assumed that the nontarget field was essentially identical to the treated field. The cumulative proportion of runoff and sediment were used to calculate a functional offsite application rate assuming no degradation. Thus, as illustrated in Table 7, the functional offsite application rate was calculated simply as the proportion lost multiplied by the application rate used in the workbook.

Table 7: Sample of Older G04 Worksheet (Runoff)

Summary of Exposure Assessment and Risk Characterization for Terrestrial Plants from Runoff.

Short Title	Runoff to terrestrial plants	PlntRuno2	Link to Gleams-Driver
Receptor	Terrestrial vegetation		
Duration	Acute		

Parameter/Assumption	Code / Range	Value	Units	Reference/Designation
Application Rate	ApRt	**1**	lb/acre	If you have done a custom (site-specific) ***Gleams-Driver*** run and you want to replace this worksheet (which was originally inserted by the WorksheetMaker program) with the output from your ***Gleams-Driver*** run, click on the Gleams-Driver button above. This will open a window and you will be able to select the ***Gleams-Driver*** output file. Note that the current worksheet will be replaced with a new G04 worksheet that is designed for calculating HQ values based on *Gleams-Driver* runs. The current worksheet will be renamed as G04Obsolete. You should probably delete this worksheet manually.
Toxicity Values (seedling emergence)	**ToxVal**			
Sensitive species	NOAEC	**0.0093**	lb/acre	
Tolerant species	NOAEC	**4.2**	lb/acre	
Proportion Lost	**Prop**			
Annual Rainfall	Clay	Loam	Sand	
5	0.00E+00	0.00E+00	0.00E+00	
10	0.00E+00	0.00E+00	0.00E+00	
15	1.47E-02	0.00E+00	0.00E+00	
20	3.20E-02	0.00E+00	0.00E+00	
25	5.11E-02	0.00E+00	0.00E+00	
50	1.47E-01	1.15E-04	0.00E+00	
100	3.12E-01	4.44E-03	0.00E+00	
150	4.07E-01	4.75E-03	0.00E+00	
200	4.57E-01	4.08E-03	0.00E+00	
250	4.92E-01	3.42E-03	0.00E+00	
Functional Off-site Application Rate				
Annual Rainfall				
5	*0*	*0*	*0*	
10	*0*	*0*	*0*	
15	*0.0147*	*0*	*0*	
20	*0.032*	*0*	*0*	
25	*0.0511*	*0*	*0*	
50	*0.147*	*0.000115*	*0*	
100	*0.312*	*0.00444*	*0*	
150	*0.407*	*0.00475*	*0*	
200	*0.457*	*0.00408*	*0*	
250	*0.492*	*0.00342*	*0*	
Hazard Quotients	**Sensitive Species**			
Annual Rainfall	Clay	Loam	Sand	
5	0	0	0	
10	0	0	0	
15	1.6	0	0	
20	3.4	0	0	
25	5.5	0	0	
50	15.8	1.24E-02	0	
100	**33.5**	4.77E-01	0	
150	**43.8**	5.11E-01	0	
200	**49.1**	4.39E-01	0	
250	**52.9**	3.68E-01	0	

Gleams-Driver provides much more reasonable estimates of offsite transport of the pesticide in runoff as well as degradation/dissipation of the pesticide in the nontarget field (SERA 2007c, Section 4.5). While the assumption of no degradation or dissipation is still supported, more recent Forest Service risk assessments will not use this assumption. Instead, the assumption is made that degradation and dissipation from the nontarget field occurs at the same rates as in the

target field – i.e., the field where the pesticide was applied. A third option in Gleams-Driver is to input a composite degradation/dissipation rate for the nontarget field and this option may be employed in some Gleams-Driver runs.

Workbooks generated by WorksheetMaker for more recent risk assessments will use estimates of functional offsite application rates from Gleams-Driver. An example of the G04 worksheet for these newer risk assessments is given in Table 8. Consistent with other composite worksheet, the new G04 worksheets will provide central, lower bound, and upper bound estimates of the functional offsite application rate. Hazard quotients will be based on these estimates as well as the toxicity values for sensitive and tolerant species from seedling emergence assays (SERA 2007b, Section 4.1.2.4).

Table 8: Sample of Newer G04 Worksheet (Runoff)

Summary of Exposure Assessment and Risk Characterization for Terrestrial Plants from Runoff				Link to Gleams-Driver
Short Title	Runoff to terrestrial plants			
Receptor	Terrestrial vegetation			
Duration	Acute			
User-Specified Gleams-Driver File	C:\W\FS2006\Task 12 - Update of Worksheet Maker\STEPS\Version 5.00.48 - Offsite Field Part I\Gleams-Driver Test Files\Aminop FL-Key			
Parameter/Assumption	**Code / Range**	**Value**	**Units**	**Reference**
Worksheet Application Rate	$ApRt_{WB}$	0.078	lb/acre	
Offsite Application Rates Inputs				
Run ID:		User Specified G-D Run		
Application Rate Used in Run:	$ApRt_{Run}$	1	lb/acre	
Off-site Functional Application Rate from Run	$ApRt_{Offsite}$			
	Central	0.00115382	lb/acre	
	Lower	0.00039777		
	Upper	0.00248572		
Calculated Values				
Normalized Off-site Functional Application Rate	$NormApRt_{Offsite}$	$ApRt_{Offsite}$ / $ApRt_{Run}$		
	Central	0.00115382	lb/acre	Eq
	Lower	0.00039777		Eq
	Upper	0.00248572		Eq
Off-site Application Rate at Workbook Application Rate	$ApRt_{WB}$	$ApRt_{WB}$ x $NormApRt_{Offsite}$		
	Central	8.9998E-05	lb/acre	Eq
	Lower	3.1026E-05		Eq
	Upper	0.00019389		Eq
Toxicity Values (seedling emergence) in units of lbs/acre				
		Sensitive	Tolerant	
	Endpoint	NOEC	NOEC	
		0.00048	0.11	
Hazard Quotients				
	Central	0.18749613	0.000818165	
	Lower	0.06463692	0.000282052	
	Upper	0.40393019	0.001762604	

As illustrated in Table 7 and Table 8, both the older style G04 worksheets as well as the newer style G04 worksheets contain a utility button to link the results of a Gleams-Driver run to the G04 worksheet. Activating this button will open a form, illustrated in Figure 12, which will allow you to incorporate the results of a Gleams-Driver run into the G04 worksheet.

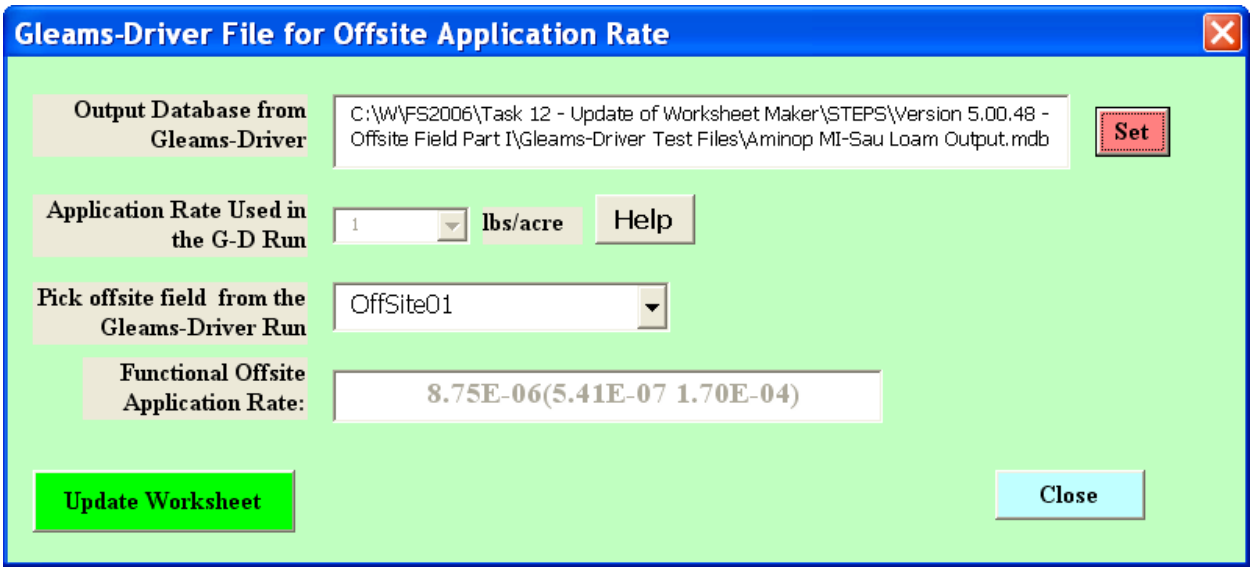


Figure 12: Gleams-Driver Import Facility for Worksheet G04

This form is conceptually similar to but somewhat less complex than the corresponding form for incorporating a Gleams-Driver run into the B04 worksheet (Figure 8), as discussed in Section 3.3.2. You must use the **Set** button to identify an output file from Gleams-Driver. If the output file is from a Quick Run, this is all that you need to do and all that you can do. If the output file is from a Full Run of Gleams-Driver, you may need to specify the name of the offsite field as well as the application rate. Pressing the **Update Workbook** button will then make the appropriate changes to the G04 form.

If the G04 form that you are modifying consists of the older style form (Table 7), the worksheet will be replaced with a newer style G04 worksheet (Table 8). The older worksheet is not deleted by the utility but is renamed. You will probably want to delete the older style worksheet manually.

If the WorksheetMaker workbook that you are using contains the older style G04 form and if the hazard quotients for nontarget plant are a concern, it is highly recommended that you do a custom Gleams-Driver run and then update Worksheet G04. As noted above and discussed further in SERA (2007b, Section 4.5), the older estimates based on the assumption of zero degradation are likely to be grossly conservative. A relatively simple Quick Run using Gleams-Driver is likely to result in exposure estimates that are much more plausible (and probably much lower) than those based on pre-Gleams-Driver exposure assessments.

3.3.3.3. Worksheets for Terrestrial Plants, Drift (G05)

Composite Worksheet G05 provides risk quotients for nontarget terrestrial plants based on estimates of drift. A sample G05 worksheet is illustrated in Table 9. The upper section of the G05 worksheet contains standard entries for the worksheet title (Cell A01), the short title (Row 2), the receptor (Row 3), and the duration (Row 4). The lower section of the worksheets gives the toxicity values for sensitive and tolerant species, the estimates of drift as a fraction of the application rate, the estimated functional offsite application rate (i.e., proportion of drift x application rate), and the resulting hazard quotients. Table 9 illustrates only the hazard quotients for sensitive species in order to keep the table on a single page.

Table 9: Sample G05 Worksheet (Drift to Terrestrial Plants)

Summary of Exposure Assessment and Risk Characterization for Sensitive and Tolerant Terrestrial Plants from Drift After Backpack Directed Foliar Application.

Short Title	Drift to terrestrial plants			PlntDrift2
Receptor	Terrestrial vegetation			
Duration	Acute			
Parameter/ Assumption	**Code / Range**	**Equation/ Value**	**Units**	**Reference/ Designation**
Application Rate	ApRt	**1**	lb/acre	Worksheet A01
Toxicity Values(Post-emergence)				
Sensitive species	**NOAEC**	**0.0075**	lb/acre	Table 4-14
Tolerant species	**NOAEC**	**2.1**	lb/acre	Table 4-14
Proportion of Drift at distances downwind in feet [0 feet = direct spray]	**Prop**			
0		1	unitless	
25		0.0187		
50		0.0101		
100		0.0058		
300		0.0024		
500		0.0015		
900		0.0008		
Estimates of functional offsite application rate	**OfApRt**	***=ApRt x Prop***		
0		*1*		Eq
25		*0.0187*		Eq
50		*0.0101*		Eq
100		*0.0058*		Eq
300		*0.0024*		Eq
500		*0.0015*		Eq
900		*0.0008*		Eq
Hazard Quotients (Sensitive Species)	**HI_{Sens}**	***= OfApRt / $ToxVal_{Sens}$***		
0		**133**		
25		**2**		
50		**1.3**		
100		0.8		
300		0.3		
500		0.2		
900		0.1		

In the G05 worksheets generated by WorksheetMaker, the proportion of offsite drift as well as the corresponding application rates and hazard quotients are given at varying distances from the target field or application site. The first entry, 0 feet, corresponds to a direct spray. Other entries range from 25 feet to 900 feet. As discussed further below, the drift estimates used by WorksheetMaker are taken from AgDRIFT. AgDRIFT is a model developed as a joint effort by the EPA Office of Research and Development and the Spray Drift Task Force, a coalition of pesticide registrants. AgDRIFT is based on the algorithms in FSCBG (Teske and Curbishley, 1990), a drift model previously used by USDA. AGDISP, a drift model developed for the Forest Service (Teske and Curbishley 2003), is also available. The most recent version of AGDISP is Version 8.15.

As discussed in SERA (2007b, Section 4.2.3.2), AgDRIFT permits very detailed modeling of drift based on the chemical and physical properties of the applied product, the configuration of the aircraft, wind speed, and temperature for aerial applications. For ground applications, AgDRIFT provides estimates of drift based solely on distance downwind as well as the types of ground application: low boom spray, high boom spray, and orchard airblast. AgDRIFT gives a detailed evaluation of a very large number of field studies and is likely to provide more reliable estimates of drift. For ground broadcast applications, applications will typically involve low boom or high boom ground spray and these estimates from AgDRIFT are used in WorksheetMaker.

The AgDRIFT estimates used in WorksheetMaker Version 5 are based on the most recent release – i.e., AgDRIFT Version 2.0.05 (Teske et al. 2002). The drift estimates used in Version 4 were based on AgDRIFT Version 1.16 (Teske et al. 2001), the most recent version of AgDRIFT that was available at the time that Version 4 was initially released.

The drift estimates used by default in WorksheetMaker Version 5 are based on Tier 1 analyses for aerial and ground broadcast applications. The term *Tier 1* is used to designate relatively generic and simple assessments that may be viewed as plausible upper limits of drift. Aerial drift estimates are based on Tier 1 using ASAE Fine to Medium drop size distributions. This is the default approach used in AgDRIFT Version 2.0.05. Tier 1 values used in WorksheetMaker 5 for ground applications are modeled using both low boom and high boom options in AgDRIFT. For both types of applications, the values used by WorksheetMaker 5 are based on Very Fine to Fine drop size distributions and the 90^{th} percentile values from AgDrift.

Drift associated with backpack applications (directed foliar applications) are likely to be much less than drift from ground broadcast applications. Few studies, however, are available for quantitatively assessing drift after backpack applications. Unlike Version 4 worksheets, WorksheetMaker Version 5 currently uses estimates of drift from an AgDRIFT Tier 1 run of a low boom ground application using Fine to Medium/Coarse drop size distributions (rather than very fine to fine) as well as 50^{th} percentile estimates of drift (rather than the 90^{th} percentile used for ground broadcast applications). More appropriate estimates of drift associated with backpack applications are being sought and, if appropriate data are found, these data will be incorporated into future releases of WorksheetMaker.

If you have or can obtain copies of either AgDRIFT or AGDISP, the use of these models to replace the general estimates provided by WorksheetMaker is encouraged. While older DOS-based drift models such as FSCBG are somewhat difficult to operate, both AgDRIFT and AGDISP are relatively easy to use and both have standard help systems. As with the standard Gleams-Driver runs used in Forest Service risk assessments, the drift estimates used by WorksheetMaker are generic and may not well-reflect drift that is likely to occur in any specific application.

Modifying Worksheet G05 should be relatively simple. If you use seven rows for distance – i.e., the default number used by WorksheetMaker – and you do not need to change or add toxicity values for other species, you can just change the distances and proportions of drift. Note that the distances downwind in the area of the worksheet that specifies the proportion of drift (Column A) serve as links for the other areas of the worksheet. Thus, if you change the first set of distances – i.e., those in the proportion area – all other distances will update correctly. Similarly, values for the proportion of drift (Column C) are linked to the lower sections relating to offsite application rate and HQ values. Thus, if you change the proportions of drift to reflect your project-specific or site-specific drift modeling, all of the other values will update correctly.

If you want to add or reduce the number of designations for distance and/or toxicity values, more extensive editing of the worksheet will be necessary but the basic format of the worksheet produced by WorksheetMaker provides a reasonably simple template and the worksheet modifications should not be difficult.

If you do conduct project-specific or site-specific drift modeling for Worksheet G05, you should consider incorporating this information into the Calculation Worksheets that estimate the offsite consumption of contaminated vegetation. In workbooks generated by WorksheetMaker, these worksheets are F04b, F11b, and F13b.

3.4. Utilities

The Title Page of all workbooks created by WorksheetMaker – i.e., the first worksheet in the workbook – will have a button labeled **Utilities** in the upper right-hand corner of the worksheet. Activating this button with the mouse pointer will open a utilities window as illustrated in Figure 13. These utilities allow you to:

- Create a Summary Workbook
- Move all Summary Worksheets to the front of the workbook
- Set the Zoom for all worksheets to 100%
- Increase the Zoom
- Decrease the Zoom
- Set Cell A01 as the active cell in all worksheets

The utilities are all relatively simple and self-explanatory with the exception of the utility for creating the summary workbook.

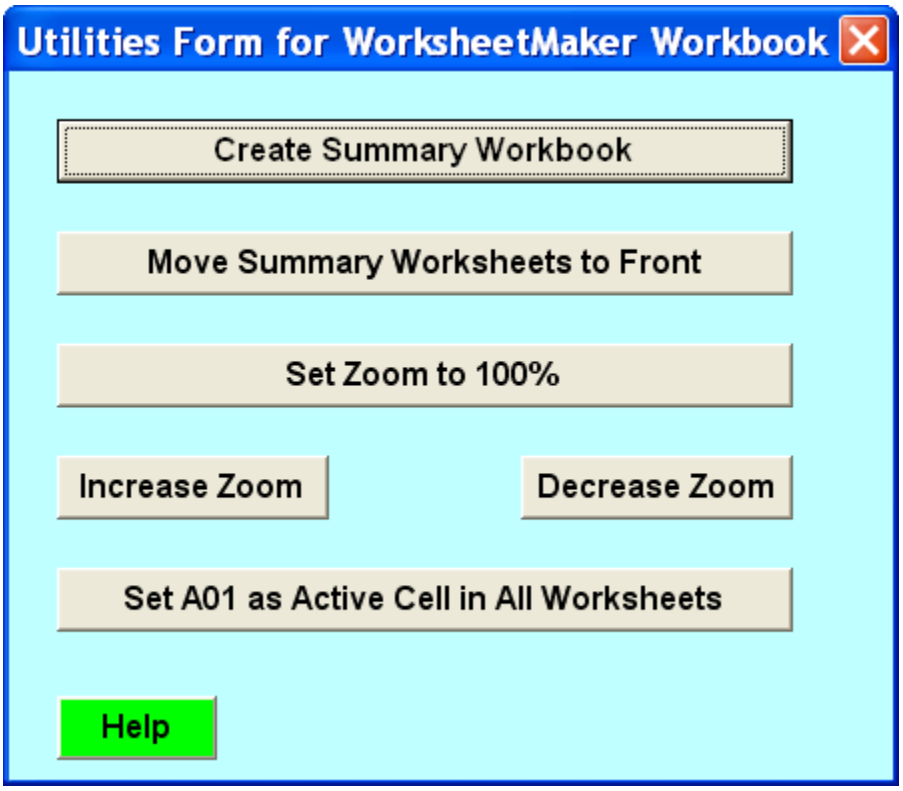


Figure 13: Utilities Window in Workbooks from WorksheetMaker

If you activate the Create a Summary Workbook button on the utilities form, a new workbook will be created that contains a slightly modified title page, the revisions page, as well as all risk summary worksheets and composite worksheets. Because some of these worksheets contain program code, the summary workbook must be based on the EXCEL workbook, **`FS WSMkr Blank V05-01a.xls`**, one of the support files that is contained in the zip file with the WorksheetMaker EXCEL file. Thus, the best time to make a Summary Workbook is immediately after you create the full workbook, which will be in the same directory as WorksheetMaker. Otherwise, you will have to either copy **`FS WSMkr Blank V05-01a.xls`** to the directory that contains the full workbook or move the full workbook to a directory containing all of the WorksheetMaker files.

This is an annoying limitation but simple workarounds require the use of coding methods that would cause the WorksheetMaker file to be incorrectly identified by most virus protection programs as a file that contains a virus.

4. ERROR REPORTING AND FURTHER DEVELOPMENT

While care has gone into the preparation of WorksheetMaker, experience has demonstrated amply that some errors (or at least some sources of confusion) may exist in either the WorksheetMaker program or the workbooks that are produced by WorksheetMaker. If you find errors or confusing results, please report these issues by email to either:

pmistretta@fs.fed.us
or
sera_inc@msn.com

If WorksheetMaker detects an error, details of the error will be logged to a file named, **`Status File for FSWorksheetMaker 5.txt`**. If you encounter an error, you may want to review the contents of this file. In some cases, the information in this file might allow you to resolve the error. If you are reporting an error, please include a copy of this file.

No formal plans have been made for the further development of WorksheetMaker 5. Nonetheless, based on experience with previous versions of WorksheetMaker, it is likely that modifications and enhancements to WorksheetMaker 5 will be made over time as suggestions or error reports are received. For example, WorksheetMaker 4.00 was released in May, 2005. The last version of WorksheetMaker 4 – i.e., Version 4.10 – was released in July, 2008.

Currently, WorksheetMaker 5 is available at www.sera-inc.com and WorksheetMaker 5 may also be posted on a Forest Service web site at some point in the future. As noted in Section 2.1, you may want to check the SERA web site or a Forest Service web site periodically to ensure that you have the most recent release of WorksheetMaker.

5. REFERENCES

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Teske ME; Bird SL; Esterly DM; Ray SL; Perry SG. 2002. A User's Guide for AgDRIFT 2.0.05: A Tiered Approach for the Assessment of Spray Drift. Continuum Dynamics, Inc. Public Use Version. C.D.I. Report No. 01-02. Report dated January 2002. Available, with executable model at: http://www.agdrift.com.

APPENDIX – NOTES ON PREVIOUS RELEASES

`Version 5.00.50`, September 29, 2008

This was the initial *review release* of WorksheetMaker Version 5.00. This release was accompanied by documentation in SERA TR-052-12-01a. The What's New release note is given below:

> This documentation accompanies the initial release of WorksheetMaker Version 5. In this respect, everything is new.
>
> Based on experience with WorksheetMaker Version 4, enhancements, corrections, and other modifications to WorksheetMaker 5 will be made. In subsequent releases, this section of the documentation will contain a brief summary of the changes and will refer you to specific subsections in this documentation where the changes are described in additional detail.

`Version 5.00.54`, October 31, 2008

This documentation accompanies the initial post-review release of WorksheetMaker Version 5 – i.e., WorksheetMaker 5.00. This documentation is a minor modification to SERA TR-052-12-01a, dated September 29, 2008. Most changes involve only editorial corrections and minor changes to the program code. The only technical change involves the use of Tier 1 drift estimates using the most recent version of AgDRIFT (Version 2.0.05). These changes are discussed in Section 3.3.3.3.

Version 5.00.57, January 24, 2009

Release Notes

Correcting 2,4-D esters

The database entries for 2,4-D esters was incomplete in Version 4 of WorksheetMaker and this carried over to previous releases of Version 5. This has been corrected. Note that the chronic EECs for 2,4-D esters are identical to 2,4-D acid. As discussed in the risk assessment for 2,4-D (available at http://www.fs.fed.us/foresthealth/pesticide/risk.shtml), 2,4-D esters will rapidly hydrolyze to 2,4-D acid. Thus, longer term exposures to 2,4-D esters will not occur. For this reason, all longer-term toxicity values for 2,4-D esters are identical to those of 2,4-D acid.

Running within a Zip file

Some users have attempted to run WorksheetMaker from within a zip file. This cannot be done. The program has been modified to give the user a warning message. The Quick Start memo has also been revised to reflect the need to unzip the WorksheetMaker distribution file prior to running the program.

Risks to Bees

A new worksheet for elaborating risk to bees from direct spray and drift has been added. This is only used if the upper bound of the HQ for bees after direct spray in Worksheet G02 exceeds one. If this is the case, G02 is renamed G02a and the special worksheets for bees are added as G02b.

Worksheet Template **ProgBark**.

A required named range (**Concppg** for cell **C6**) had been omitted from the template. This caused the **Press to Set** button to generate a runtime error. This has been corrected.

Formatting

Minor bug in formatting fixed to allow for non-numeric values in hazard identification cells in summary worksheets.

This documentation

Various minor editorial errors have been corrected

Version 5.00.58

This documentation accompanies the March 1, 2009 release of WorksheetMaker Version 5.00.58. The following bug fixes and modifications have been made in this release.

Bug Fixes

In previous versions of WorksheetMaker, attempting to do more than a single run from the formulation screen could lead to circular references. This has been corrected.

An error in the Program Worksheet for ULV applications – i.e., a broken link for named ranges associated with the concentration in field solutions – has been corrected. Typically, all three values for the named ranges for the field concentration should be identical and equal to the bulk density of the formulation in units of mg/mL. These values are all set to the bulk density by WorksheetMaker. In most cases, these values should not be changed by the user.

Other Changes

For the scenarios involving contact with contaminated vegetation (Worksheet Template **DrmVegC**, typically Worksheet **D02**) now can use a range of values for the dislodgeable foliar residue.

To accommodate the risk assessment on dinotefuran, soil injection has been added as an application method.

The honeybee has been removed from Worksheets G01 and G02 and Worksheet F02b (Direct Spray of Honeybee) is not longer used. For liquid broadcast applications, the G02 worksheet is renamed to G02a and a worksheet named G02b is added with more detailed HQ values for the honeybee based on direct spray and drift.

The body surface area of a honeybee is no longer calculated from the allometric relationship given by Boxenbaum and D'Souza (1990). The method from Humphrey and Dykes (2008) is now used.

> Humphrey JAC; Dykes ES. 2008. Thermal energy conduction in a honey bee comb due to cell-heating bees. J Theoretical Biology. 250 (1): 194-208.

New templates, **BeeSprayHQs** and **NectConsump**, have been added to accommodate an elaboration of exposures and risks to honey bees. Mathematica QA files have been implemented and are available on request.

Residue rates on vegetation in previous releases of WorksheetMaker included only central and upper bounds following the original approach of Hoerger and Kenaga (1972) and the update by Fletcher et al. (1994). In the most the current release, lower bound estimates are given under the assumption that the ratio of the central estimate to the upper bound estimate will be identical to the ratio of the lower bound to the central estimate (i.e., the variability will be log-symmetrical). This change will be reflected in the next version of the methodology document for Forest Service risk assessments.

Version 5.00.60

This documentation accompanies the June 12, 2009 release of WorksheetMaker Version 5.00.60. The following bug fixes and modifications have been made in this release.

Minor Bug Fix

In Worksheet G02b, the risk values for bees based on the **BeeSprayHQs** template, first column of HQ values did not update correctly. This was due to a mis-definition of a named range and this has been corrected.

Other Changes

Fluroxypyr has been added to the data base with the release of the final risk assessment (SERA TR-052-13-03a).

Version 5.00.61

This documentation accompanies the August 3, 2009 release of WorksheetMaker Version 5.00.61. The following bug fixes and modifications have been made in this release.

Database Maintenance

During the summer of 2009, SERA conducted an audit of the toxicity database for WorksheetMaker to ensure that the toxicity values properly reflect the most recent Forest Service risk assessments. No changes were made to the WorksheetMaker code.

Version 5.00.62

This documentation accompanies the September 11, 2009 release of WorksheetMaker Version 5.00.62. The following bug fixes and modifications have been made in this release.

EXCEL Version 12

WorksheetMaker has been modified to run on EXCEL Version 12. This is the version of EXCEL that is included in MS Office 2007. The Forest Service is in the process of migrating to MS Office Version 2007. To accommodate the period during which older version of MS Office may still be used in the Forest Service, the modifications to WorksheetMaker have been made so that the program will run under EXCEL Version 8 through Version 12.

There are new security procedures in EXCEL 2007. Security in EXCEL 2007 is greatly enhanced and may seem complicated. The steps that you will need to take are discussed in some detail in Attachment I. All users who are new to EXCEL 2007 and/or EXCEL security settings should read this attachment.

Non-Contiguous Applications

Some non-contiguous application methods – i.e., hack-and-squirt and soil spot applications – have been added to the dropdown list of application methods in the main WorksheetMaker window. This is discussed further in Section 2.4.1, *Special Note on Non-Contiguous Applications*.