TECHNICAL NOTES

USDA-Natural Resources Conservation Service
Boise, Idaho

TN – Water Quality No.7 April 2011

Pesticide Environmental Risk Assessment Using WIN-PST Version 3.1 and Mitigating the Impacts of Pest Suppression

Introduction

The Natural Resources Conservation Service (NRCS) policy specifies that evaluation and interpretation of environmental risks associated with pest management and pesticide use are required for the pest management component of a conservation plan.

NRCS's Windows Pesticide Screening Tool, Version 3.1 (WIN-PST 3.1) is a "Tier 1" or basic level screening tool, based on the Soil/Pesticide Interaction Screening Procedure (SPISP2) developed by Goss and Wauchope (1990). It is designed to evaluate the potential for off-site movement of pesticides through leaching, dissolved in runoff, or attached to sediment in runoff. The SPSIP2 algorithm is based on model results using Groundwater Loading Effects of Agricultural Management Systems (GLEAMS, Leonard et al. 1987) with hypothetical soil and pesticide combinations under an extreme artificial rainfall regimen. Those soil and chemical properties with the greatest impact on transport (most sensitive parameters) were incorporated into SPISP2. Basic management techniques that can impact off-site movement and rainfall probabilities were also incorporated into the model. The soil and chemical properties and management/rainfall information used by SPISP2 and WIN-PST 3.1 are listed in Table 1.

WIN-PST 3.1 uses these soil and chemical properties to determine the capacity of a soil to retain a pesticide at the point of application, regardless of climate or management inputs. Then, pesticide toxicity (long-term only) is combined with the potential for exposure (off-site movement, with rainfall/management inputs) to determine the relative hazard rating (likelihood of exceeding the toxicity threshold when applied at typical rates). This is the soil/pesticide interaction report generated by WIN-PST 3.1. Those soil/pesticide combinations with a hazard rating of INTERMEDIATE **or greater** require planned mitigation in order to meet quality criteria.

The USDA-NRCS National Water and Climate Center developed and supports the WIN-PST 3.1 tool. This version provides an updated user interface and allows users to save soils, pesticides, or soil/pesticide scenarios that they typically utilize. Soils data are taken directly from the SSURGO Access files used by Toolkit and other Field Office applications. WIN-PST 3.1 reports can be saved as Acrobat "pdf" documents or can be saved to an Excel spreadsheet.

Installation of WIN-PST 3.1

WIN-PST 3.1 must be installed by an administrator on all platforms. Make sure that ***All Users*** is chosen during installation (the default is "All Users"). If ***Only Me*** is selected, only the administrator will be able to fully use the program. To download the program, click on the link http://www.wsi.nrcs.usda.gov/products/W2Q/pest/winpst.html and select WIN-PST 3.1.2 Software Download and Installation Instructions.

Collecting Input Data for Use in WIN-PST 3.1

A data collection worksheet (Attachment 1) is provided for the planner's use to collect pesticide use information from the producer. Use of the worksheet is not required, BUT the specific information requested IS REQUIRED to be recorded as part of the pest management plan and is needed to run the tool. Additionally, the planner will need to know the major soil(s) where the producer is applying pesticides and must indicate the target pest(s) for all pesticides or management techniques used.

Setting Up and Using Win-PST 3.1

A complete user guide for WIN-PST 3.1 is available at:
http://www.wsi.nrcs.usda.gov/products/W2Q/pest/docs/WIN-PST_3.1_User_Help.pdf

The User Guide should be downloaded and available on your computer for reference purposes.

A brief summary describing setup and use of the tool is provided below.

Location of the WIN-PST 3.1 Program

WIN-PST 3.1 is installed into **C:\Program Files\USDA\WIN-PST 3.1** on your computer. If you do not have a WIN-PST 3.1 icon on your desktop, then go to the START button at the bottom left of your screen (start menu). Select **All Programs.** Then select **Engineering Applications** and click on **Win-PST 3.1** to open the program.

Selection of Soils Database

The **Select Soils and Pesticides** screen will appear when you open WIN-PST 3.1. The default soils that will appear with first use are Massachusetts soils. Before you can use the program for Idaho, you will need to select the soils database(s) for your county. WIN-PST 3.1 uses the SSURGO-Access soils database file used in Toolkit.

- SSURGO-Access soils database files need to be located on your c:\ drive for use by WIN-PST 3.1. Copy the files from your f:\ drive to any location on your c:\ drive. Soils database files should be located in either the GEODATA/SOILS folder or in the FOTG/SECTION II/SOILS folder on your f:\ drive.

- Click on the **Open New** tab at the top left of the screen. Then select **Data Management**. This opens the Data Management screen where you will select the appropriate soils database.
- Use the browse button on the top right to locate the SSURGO-Access database for your county. If you see a temporary error message, IGNORE IT. Find your SURRGO database and double-click on it.
- The **Soil Survey Area** section should show your survey area (highlighted in blue). Check the box to the left of the survey name to select that survey.
- Close the data management window by clicking the **Save** button at the bottom right.

Selecting Soils in WIN-PST 3.1

Make sure you are on the Soils page (click on the **Soils** tab at the top if needed).

- Use the **Locate Records Where** search function to quickly find soils, either by **Comp_Name** or **MUSYM**. The grid will move to the first record that begins with or contains the letter(s) typed in.
- Select a soil (entire row will be highlighted) and click the **ADD** button to place it in the soil "queue" at the bottom. You can edit certain soil properties (such as slope, OM, depth, etc.) if desired.
- If you want to delete a selected soil, select that soil from the list in the queue. Then click on the **DEL** button at the left.
- Once you have added the soils of interest, then you can select the pesticides used.

Selecting Pesticides in WIN-PST 3.1

You can select pesticides using active ingredient (**AI** page) or product name (**Products** page) by selecting the desired tab at the top.

- Use the **Locate Records Where** search function to quickly find pesticides, either by **Name** or **EPA Reg No**. The grid will move to the first record that begins with or contains the letter(s) typed in. It is recommended to use the CONTAINS function since many pesticides are listed by company name first (e.g., "Dupont Ally Extra Herbicide").
- Select a pesticide (entire row will be highlighted) and click the **ADD** button to place it in the pesticide "queue" at the bottom. You can change the default management associated with the pesticide applications by clicking on **App_Area**, **App_Method** and/or **App_Rate** for the selected pesticide. You can evaluate the same pesticide with different management simply by adding each choice individually to the pesticide queue.
- If you want to delete a selected pesticide, select that pesticide from the list in the queue. Then click on the **DEL** button at the left.
- Formulations may contain more than one active ingredient. If you select only one of the pesticides in the formulation, all others will be automatically selected and added to the queue. You will rate the entire product by the most hazardous active ingredient.

Selecting Rainfall Probability in WIN-PST 3.1

- Click on the **Interactions** tab at the top of the screen.
- Select the appropriate rainfall probability.

- The default setting is High, signifying a high probability that significant rainfall OR irrigation will occur soon (typically within a few days) after pesticide application.

Creating Scenarios in WIN-PST 3.1

You can save soils and/or pesticides in the current queue to use at a later date or to create typical scenarios for your area. It is not necessary to save scenarios to create a WIN-PST 3.1 report.

- To save the scenario you have created, click on the **Save** button on the right bottom. A **Scenario** pop-up screen appears.
- Enter a name on the **Jobname** line on the pop-up screen.
- You do not need to fill in **Categories 1-3**, but you can use these categories to provide information to help you identify specific groupings.
- Select **OK** to save the scenario under the given name. You can pull up or select saved scenarios from the Scenario page for future reports.
- If you select a saved scenario and click on **ADD**, it will add all the saved soils and/or pesticides to the current queue of soils and pesticides (provided you have already selected some).
- Any soil or pesticide can be removed from the queue by selecting it (highlight) and clicking the **DEL** button.

Creating Reports in WIN-PST 3.1

To create reports, click on the **Reports** button at the bottom right of the screen. The **Reports** pop-up screen appears.

Exporting reports to Excel (**Mandatory**):

- The Pest Management component of a conservation plan MUST include the Idaho Pest Management Worksheet. In order to use this Excel spreadsheet, be sure to put a check in the **Export** box next to **Interactions Path\File Name**. It must be located at the following path:

  C:\ \WIN-PST 3.1\Exports\Interactiondata.xls.

- This path is the default path – **DO NOT CHANGE IT**. Select either the **Excel Only** or the **Both** radio button at the bottom.
- Click on the **Export** button. Select **OK** when the message asks to overwrite the existing file for the Excel file and the text file.
- **The Idaho Pest Management Excel spreadsheet will harvest the information from the interactions report and assist in developing the pest management component of your conservation plan.**

Printing/Saving text reports (optional):

- You can enter producer information to be written to the printable report by placing a check in the **User Data** box. Then type in the producer name, tract, and field numbers.
- If you want to print out a report, then put a check in the **Interactions.rpt** under the **Select Reports** window. You may also select the pesticides and/or soils reports, if you are interested in more specific information. If you click on the plus (**+)** sign next to any of the report check boxes, then you can select the specific information you want the report to include.

- You can preview the reports and then print them out. Either select a destination printer or select **Adobe pdf** to save the report to your computer.

Procedure for Risk Analysis and Interpretation of Results

A resource inventory for any plan must include all pesticides used, target pest(s), application method, and timing of use. Attachment 1 provides a data collection form you can use to provide this information. With this information, an environmental risk analysis can be conducted using WIN-PST 3.1 that is specific to site conditions. This information is then used to determine if mitigation is required (below). For more general planning purposes or to evaluate quality criteria during the resource inventory phase, WIN-PST checklists developed for Idaho can be used to evaluate potential risk.

Utilizing WIN-PST 3.1 and the Idaho Pest Management Worksheet for Planning

Acquiring Interaction Data and Making Interpretations

Once you have run WIN-PST 3.1 and exported the interactions report to the Excel file, then open the Idaho Pest Management Worksheet (Excel spreadsheet).

- Upon opening the spreadsheet in Excel 2007, ENABLE the MACROS but DO NOT enable the LINKS. A text box will appear with basic information and reminders. Click the **x** to close the text box.
- Select **Update from WinPst** button on top right of the worksheet (you must be on **WinPST Run** tab) to harvest the information from the interaction report. The program is looking for a specific filename in a specific location (c:\WIN-PST 3.1\Exports\ Interactiondata.xls).
- If you have altered the file name and path from the default file name and path, the spreadsheet WILL NOT WORK.

The pesticides and soils from the interaction report, with the interaction ratings, will automatically populate the spreadsheet.

- **IMMEDIATELY rename the spreadsheet and save to your computer.**
- When the data have been imported into the spreadsheet, click on the **Show Pesticides of Concern** button at the upper left of the Worksheet page.
- The hazard rating results are color-coded for easy visualization of hazardous chemicals (red for Extreme, orange for High, yellow for Intermediate hazard).
- This worksheet is a summary report of the WIN-PST 3.1 interaction report and can be printed out, if desired, and placed in the planning folder.

To evaluate the hazards and determine appropriate mitigations needed (if any), click on the **Jobsheet** tab. The amount of mitigation required will be based on the hazard ratings. Refer to ***National Agronomy Technical Note 5 – Pest Management in the Conservation Planning Process*** for complete information about mitigation practices and techniques and associated point values.

- You must check at least one of the boxes indicating the purpose of the pest management practice. You may check more than one box. **Required points will be based on the purpose of the practice.**
- In the **List of Existing/Current Practices and Techniques** section, select all practices and techniques that the client is currently using in their pest management activities. Points for existing practices and techniques will automatically be calculated.
- Click on the **Show Hazard Ratings** button in the **Mitigation Needs** section to determine if ADDITONAL mitigating practices are needed to address loss or hazard issues. The transport mode(s) associated with loss/hazard will also be identified.
- If additional mitigation is required, **YES** will appear in the appropriate transport mode category at the bottom of the section (***Additional Mitigation Required?***), and the remaining mitigation points required will be listed in the line below (***Points Still Needed***).
- This provides an interpretation of the results and clearly indicates whether additional mitigation is r***equired as part of the pest man***agement practice.
- **Proceed to "Determining Management and Mitigation Requirements" *(next section).***

***D*etermining Management and Mitigation Requirements**

WIN-PST 3.1 soil/pesticide interaction ratings with LOW or VERY LOW generally meet RMS criteria and don't require mitigation. Pesticides with interaction ratings of INTERMEDIATE or greater require mitigation. Higher hazard pesticides require more extensive mitigation, depending on the transport mode and conditions. For example, hazard ratings of HIGH or EXTREME for leaching are difficult to mitigate without the use of a less hazardous pesticide. Each resource concern/transport pathway with INTERMEDIATE hazard ratings requires a minimum mitigation score of 20, those with HIGH require 40, and those with EXTRA HIGH require a minimum mitigation score of 60.

WIN-PST 3.1 ratings are estimated at the edge of the field or bottom of the rooting zone so impacts to surface or ground water are not measured directly. Significant attenuation of chemical contaminants may occur prior to reaching surface or ground water. Many mitigation strategies attempt to maximize this attenuation to reduce impacts to water quality. Regardless of the hazard ratings obtained, ALL pest management plans should incorporate IPM principles of pest management.

- Proceed to the **Integrated Pest Management Plan** section on the **Jobsheet.** Basic scouting and pest inventory are an important component of the pest management plan. Basic information on scouting is available on the Idaho NRCS intranet at:

  ftp://ftp-fc.sc.egov.usda.gov/ID/technical/pdffiles/ipm_checklistguidance1_1105.pdf

- If additional techniques are desired (such as cultural practices or advising caution for high hazard pesticides), then select these choices from the "**IPM Approaches to Reduce Reliance on Pesticides**" section.
- Are leaching or runoff/erosion risks indicated? If so, choose appropriate practices in the "**Practices to Reduce Transport Risk**" section.

- Mitigation points are automatically calculated at the bottom of this section. In order to meet mitigation requirements, the row entitled "**Mitigation Points Required**>>>" should indicate a "0" for each transport mode. If not, select additional practices or techniques.
- If there are specific recommendations or sensitive areas, indicate these in the "**Additional Comments**" section. You can adjust row size as needed to accommodate all written text.

Once completed, the resulting Pest Management Plan provides the basic interpretation of risk and the recommended mitigation to achieve water and air quality criteria for pest suppression activities. The Idaho Pest Management Worksheet is REQUIRED where Conservation Practice 595 applies. Required additional mitigating practices and techniques are PART OF the 595 practice.

Environmental analysis of recommended pesticides is done within the framework of an Integrated Pest Management (IPM) program. Use IPM guidance by crop when available or general IPM principles when crop-specific guidance is not available. IPM is an important component of pest management and can reduce the reliance on pesticides of all hazard levels. IPM includes:

- Scouting and pest inventory
- Use of established economic thresholds before control measures are utilized
- Non-chemical methods of prevention, avoidance, and control
- Substitution of high-hazard chemicals (NRCS does NOT make pesticide recommendations; producers need to consult crop advisors or Extension personnel)

Further guidance on IPM strategies is available at:

http://www.uidaho.edu/wq/wqpubs/cis938.html

References

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Leonard, RA., WG Knisel, and DA Still.1987. GLEAMS: Groundwater Loading Effects of Agricultural Management Systems. Trans., Amer. Soc. of Agric. Engrs. 30:1403-1418.

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USDA-NRCS-New Mexico. 2005. Pest Management Job Sheet.

USDA-NRCS-National Pest Management spreadsheet (2011).

USDA-NRCS. 2005. WIN-PST Version 3.1, “Getting Started Guide”. Climate and Water Center.

Table 1. Soil and chemical properties, and management techniques, used in the WIN-PST screening tool to evaluate the potential for off-site movement of pesticides.

SOIL PROPERTIES	CHEMICAL PROPERTIES	MANAGEMENT/RAINFALL
Surface horizon thickness	Solubility	Extent of application to field (i.e., broadcast vs. banding/spot treatment)
Organic matter content at surface	Soil half-life	Rate of application
Subsurface texture	Organic carbon partitioning coefficient (Koc)	Method of application (foliar, surface, incorporated)
Hydrologic soil group		Likelihood of rainfall/irrigation following application
Slope		
Preferential flow potential		
High water table		

Table 2. Parameters Contained in the Soils Database

Parameter Code	Definition
MUSYM	Map unit symbol
PCT_COMP	Component percent of map unit
COMP_NAME	Component name
TEXTURE	Textural class
HYDRO	Hydrologic soil group
USER_OM	Percent organic matter in first horizon, user can adjust
USER_DEPTH	Depth of the first horizon, user can adjust
KFACT	Soil erodibility factor
SLOPEGR15	Indicates slope is greater than 15%
CRACKSGR24	Indicates that macropores connected to the surface or preferential flow exists within the top 2 feet
HWT_LT_24	Indicates that a high water table exists within the top 2 feet
SLP	Rating factor – soil leaching potential
SSRP	Rating factor – soil solution runoff potential
SAPR	Rating factor – soil adsorbed runoff potential
HI_DEPTH	Default depth of first horizon
OM_H	The high range of organic matter for the soil, default value
OM_L	The low range of organic matter for the soil, default value
PHH	The highest pH for the soil
PHL	The lowest pH for the soil
ROCKDEPTHH	High range of depth to rock, default value
ROCKDEPTHL	Low range of depth to rock, default value
SEQNUM	Sequence number
SHRINKSW	Shrink-swell properties
SLOPE_H	High range of slope for the soil, default value
SLOPE_L	Low range of slope for the soil, default value
SSANAME	State soil survey name
WTBEG	The beginning date for the presence of a high water table
WTDEPH	High range of depth to water table, default value
WTDEPL	Low range of depth to water table, default value
WTEND	Then ending date for presence of a high water table
WTTKIND	Type of high water table (e.g., apparent, seasonal)

Table 3. Parameters in Pesticide Database (Active Ingredient Selection and Products Selection).

Parameter Code	Definition
Active Ingredient:	
NAME	Name of the active ingredient, common chemical name
PCCODE	PC code associated with the active ingredient
PH	pH at which the active ingredient property is valid
HL	Field half-life of the active ingredient
KOC	Soil sorption coefficient
SOL	Water solubility
APP_AREA	Management factor – application area (broadcast or banded or applied to less than 50% of the field)
APP_METHOD	Management factor – application method (surface, soil incorporated, or foliar)
APP_RATE	Management factor – application rate (standard is > 0.25 lb ai/ac, ultra low is < 0.1 lb ai/ac, otherwise low)
PLP	Rating factor – pesticide leaching potential
PSRP	Rating factor – pesticide solution runoff potential
PARP	Rating factor – pesticide adsorbed runoff potential
HUMANTOX	Long-term human toxicity
HUMANTOXT	Long-term human threshold in ppb
MATC	Maximum acceptable toxicant concentration, long-term threshold for fish in ppb
STV	Sediment toxicity value, long-term threshold for fish (KOC x MATC)
EATHUMAN	Exposure adjusted toxicity class, based on long-term human toxicity thresholds
EATMATC	Exposure adjusted toxicity class, based on long-term fish toxicity threshold
EATSTV	Exposure adjusted toxicity class, based on long-term sediment toxicity threshold
CAS_NO	Chemical abstract service registration number
Product:	
NAME	Product name as sold
EPAREGNO	EPA pesticide registration number
PC_NAME	Produce name
PC_CODE	PC code associated with the active ingredient
PC_PCT	Percent active ingredient in the product
APP_AREA	Management factor – application area (broadcast or banded or applied to less than 50% of the field)
APP_METHOD	Management factor – application method (surface, soil incorporated, or foliar)
APP_RATE	Management factor – application rate (standard is > 0.25 lb ai/ac, ultra low is < 0.1 lb ai/ac, otherwise low)

Attachment 1

PESTICIDE DATA COLLECTION SHEET

Crop	Target Pest	Product Name or Active Ingredient (AI)	% AI	Broadcast or Banded	Application: Surface, Foliar, or Soil Incorporated	Rate: Standard, Low, or Ultra Low