WIND EROSION EQUATION (WEQ)

Colorado Guidance Document

USE OF MICROSOFT® EXCEL SPREADSHEET MODEL

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§ 1.0- EXECUTIVE SUMMARY:

Until WEPS 1.0 is ready for implementation, NRCS will continue to use the Wind Erosion Equation (WEQ) critical period or management period procedures. States who wish to use a computerized version of the management period procedure hereby adopts the WEQ Excel spreadsheet model for use. The spreadsheet incorporates the WEQ modifications outlined in the National Agronomy Manual Circular No. 2 and significantly reduces the amount of input time required to calculate the management period procedure by hand.

This guidance document will give the basic instructions for using the Wind Erosion Equation (WEQ), management period procedure, programmed in Microsoft® Excel (EXCEL-WEQ). Whereas the Critical Period Method for estimating soil erosion for the entire year as a single calculation, the Management Period Method produces an erosion estimate for discrete periods during the year. Consequently, the Management Period Method accounts for changes in crop residue, soil surface conditions, and crop growth throughout the crop rotation. This computer version developed by Keep, Sporcic, and Nelson incorporates the procedures for making adjustments to the WEQ to account for the effects of irrigation and random roughness as published in the National Agronomy Manual and Agronomy Circular #2. The EXCEL-WEQ version Users will need, as a minimum, a 486 computer; Windows, 95, 98, NT or XP; MS Excel version 7.0 or more recent, and at least 64 meg of RAM.

A version of the model that has been modified for use in Colorado (**WEQvs8.05_CO_FieldVersion.xls**) is available from the CO eFOTG, Section I, Erosion Prediction folder.
http://efotg.nrcs.usda.gov/references/public/CO/WEQvs8.05_CO_FieldVersion.xls

The National version of the model (**WEQvs9.00.xls**) can be copied from the following web site:
http://www.nm.nrcs.usda.gov/technical/tech-notes/agro/ag55.xls

Additional Links

National Agronomy Manual: http://policy.nrcs.usda.gov/scripts/lpsiis.dll/M/M_190_NAM.pdf

National Guidance Document for WEQ EXCEL Spreadsheet Model:
http://www.nrcs.usda.gov/technical/ECS/agronomy/WEQGuidance.doc

Wind Parameters for WEQ (Prevailing Wind Direction, Preponderance and Erosive Wind Energy (EWE): http://www.weru.ksu.edu/nrcs/windparm.doc/windparm.pdf

Wind Parameters by Region and States in EXCEL Format; populated and maintained by Lorenz Sutherland, La Junta, CO: http://www.weru.ksu.edu/nrcs

"E" Tables for each combination of C & I factors: http://www.weru.ksu.edu/nrcs/etables/etable.pdf

Random Roughness Photos: http://www.nrcs.usda.gov/technical/ECS/agronomy/roughness.html.

Colorado C-Factor Map: http://efotg.nrcs.usda.gov/references/public/CO/CO_C_Factor_Map.pdf

§ 3.0- CURRENT VERSION:

The current version modified for use in Colorado: WEQvs8.05_CO_FieldVersion.xls

§ 4.0- SOFTWARE INSTALLATION:

See 1.0 above.

§ 5.0- PRINTING OUTPUT:

Printing of the output is accomplished from the EXCEL menu bar. The print areas of the output have been pre-selected for convenient printing.

§ 6.0- KNOWN ERRORS AND BUGS:

There is a circular reference bug in the sheet. As you enter data for the first time you will find an error caution coming up and telling you there is a circular formula error in the sheet. This error should not be considered as a fatal error. Just close the warning box when it pops up and continue to add the data needed for the run. The error warning will stop when the first harvest is entered.

Step-by-Step EXCEL-WEQ User's Guide

§ 7.0- GENERAL:

The WEQ management period method Excel spreadsheet can be used in states that use the management period method to estimate wind erosion. This computer version incorporates the procedures for making adjustments to the WEQ to account for the effects of irrigation and random roughness as published in the National Agronomy Manual and Agronomy Circular #2.

To use the spreadsheet model, the user will need to have a good understanding of Part 502 of the National Agronomy Manual (NAM). Also, planners will need to have a basic understanding of the wind erosion equation (WEQ), understand irrigation (where the land is irrigated), and have basic EXCEL spreadsheet skills. The State Agronomist or Erosion Prediction Specialist will need to set up the wind climate data, crop data and operation (tillage) files. For many states, these have already been populated.

An important feature of the spreadsheet for ease of use is the different colored shaded areas. The light yellow shaded areas are the **only** "user" data required to run the program. The worksheet is "protected". This is not because the user is not trustworthy; it is because some of the data should only be changed state wide, and if a formula is lost it can be very difficult to replace.

The EXCEL-WEQ procedure differs from the specified procedure for circular fields like center pivots. In the case of estimating soil erosion from center pivots where the irrigated fields are planted in a circular pattern, two erosion estimates need to be made. To estimate wind erosion on fields planted and/or tilled in a circular pattern, make the first estimate after selecting a NS tillage direction and the second after selecting an EW tillage direction. The average of the two estimates is the correct soil loss value.

§ 8.0- USE OF CROP ROTATION TEMPLATES:

Crop rotation templates are available for use with the Colorado Field Version of the EXCEL-WEQ as separate workbooks. The templates are grouped by Crop Management Zone and represent common irrigated and non-irrigated crop rotations in Colorado. The crop rotation template workbooks are structured such that each worksheet within the workbook is dedicated to a specific crop rotation. The user may choose any of these templates and then modify to represent the tillage and management of the specific site condition. The user may also choose to develop a cropping system from scratch. These cropping systems developed with the model (WEQ Input Worksheet) can be saved to a file and used as templates for future planning.

Colorado Crop Management Zone Map (CMZ):
http://efotg.nrcs.usda.gov/references/public/CO/CO_CMZxPRECIP.doc

CMZ 05 Irr	http://efotg.nrcs.usda.gov/references/public/CO/CMZ-05_Irrigated_Templates.xls
CMZ 05 N-Irr	http://efotg.nrcs.usda.gov/references/public/CO/CMZ-05_Nonirrigated_Templates.xls
CMZ 12 Irr	http://efotg.nrcs.usda.gov/references/public/CO/CMZ-12_Irrigated_Templates.xls
CMZ 12 N-irr	http://efotg.nrcs.usda.gov/references/public/CO/CMZ-12_Irrigated_Templates.xls
CMZ 13 Irr	http://efotg.nrcs.usda.gov/references/public/CO/CMZ-13_Irrigated_Templates.xls
CMZ 13 N-Irr	http://efotg.nrcs.usda.gov/references/public/CO/CMZ-13_Nonirrigated_Templates.xls
CMZ 14 Irr	http://efotg.nrcs.usda.gov/references/public/CO/CMZ-14_Irrigated_Templates.xls
CMZ 15.1 Irr	http://efotg.nrcs.usda.gov/references/public/CO/CMZ-15.1_Irrigated_Templates.xls
CMZ 15.1 N-Irr	http://efotg.nrcs.usda.gov/references/public/CO/CMZ-15.1_Nonirrigated_Templates.xls
CMZ 28 Irr	http://efotg.nrcs.usda.gov/references/public/CO/CMZ-28_Irrigated_Templates.xls
CMZ 28 N-Irr	http://efotg.nrcs.usda.gov/references/public/CO/CMZ-28_Nonirrigated_Templates.xls

§ 9.0- SAVING TEMPLATES:

Cropping systems that are newly developed on the EXCEL-WEQ **Res Wks** can be saved as **templates.** To do so, the first six columns of data are saved to an empty worksheet of either an empty (new) or existing workbook. This is accomplished by highlighting and **COPYING** all the cropping system in the light yellow shaded area, beginning with the second row under the Crop and Management Records part of the WEQ Input Worksheet. Open a new workbook and paste this system on a blank sheet. Name this new template workbook, as well as the tab, and now the workbook can also be used to file additional cropping system templates under other tabs. Templates can then be copied from the template workbook sheet and be pasted back into the WEQ Input Worksheet.

§ 10.0- DEFINITIONS:

The first sheet in the spreadsheet (**Instr**) has most of the column headings defined and an explanation of the information required for the spreadsheet to run. Please print a blank worksheet (**Res Wks** tab at the bottom) and the calculation sheet (**Calc**) before reading and following the **Instr** sheet. **Remember only the shaded cells need data input by the user.** Please read the **Instr** sheet before starting.

§ 11.0- DATABASES:

Climate database.
The WEQ EXCEL Spreadsheet Model requires monthly values of three wind related climate parameters for a given location. These parameter values, found in the “Climate” spreadsheet (tab) of the WEQv8.01 Excel workbook, are (1) prevailing wind erosion direction, (2) preponderance, and (3) wind energy. The wind energy is expressed as the annual cumulative amount on a monthly basis. There are **two options** for loading the appropriate wind parameters into the WEQ EXCEL Spreadsheet Model. Also there is a limit to the number of climate stations that can be included. Therefore, it is suggested that only data needed in the state where the sheet is used and the adjacent states are added to the State climate database.

Option #1.
In addition to the WEQvs8.01 Excel workbook, there are four other Excel workbook files that contain the climate parameters for each of the participating regions. These files, which will be provided before and during the training, contain the required wind parameters to run the WEQ EXCEL Spreadsheet Model. The files can be accessed and downloaded from the national WEQ web site. The wind parameter data is aggregated by region. For example, the file named *EXCEL-WEQ Climate DB_West.xls* contains the wind parameter data for each state in the West USDA-NRCS Region.

Persons authorized to load, change or add to the Climate database will open the WEQvs8.01 Excel workbook, click on the Climate tab and unprotect the worksheet. If there are existing data not needed by your state, then highlight only the data not needed, including the location names; right click the mouse and select 'clear contents'. Open the region *.xls file and click on the tab for your state (i.e. Nevada). Select (highlight) the location names and data, then copy and paste to the Climate tab of the WEQvs8.01 Excel workbook. When the task is complete, the sheet must be protected and the workbook saved.

Option #2.
The wind parameter data can also be manually loaded by entering the data from Exhibit 502-7a in the National Agronomy Manual. The table is located at the following web location:
http://www.weru.ksu.edu/nrcs/windparm.doc/windparm.pdf

To copy the needed data from the above file, open the WEQ master file (WEQvs8.01.xls) and the windparm.pdf file mentioned above. Locate the windparm data for your state and manually copy this data to the bottom of the climate sheet in the WEQ model. Be sure to get all the data columns. Next locate and highlight all other state's data that you do not need, and hit the delete key. Once the needed climate locations have been added, and the unwanted states have been removed, sort the entire table on the first column (B). This will take out all the blank rows and size it down to read the needed locations. When the task is complete, the sheet must be protected and the workbook saved.

Crops Database.
The default crops database consists of a comprehensive list of crops. It is anticipated that database additions will need to be made on an infrequent basis. When adding a new crop to the Crops database, two types of data are needed, Residue data and Green Growth data. Residue data is entered on one line, and green growth data is entered by 15-day growth intervals. The first growth period must be adjusted for emergence. If it takes 10 days to emerge then there will be only 5 days of growth the first period. The growth periods express an average dry matter (lbs/ac) accumulation for the period. The growth periods can be extended as long as additional dry matter is added to the crop. Residue is expressed as dry matter (lbs/ac) left above ground after the harvest operation.

Persons authorized to change or add to the Crops database will click on the Crop tab and unprotect the sheet, enter data as instructed below, sort the data table, and protect the sheet again so that data will not be accidentally lost. Passwording the sheet is required. Data entered in this table must be similar to surrounding states.

Residue data needed includes (1) an estimated yield, (2) the unit wt. per acre, (3) the residue in lbs/ac at harvest, and (4) the residue/unit wt. (lbs/ac divided by the unit wt). In addition the cover residue table (Corn, S Grain, or Cotton), and the flat small grain equivalent chart to be used (See Exhibit 502-10 pg. 502-61 of the NAM) is required.

The primary green growth data needed is the dry matter (lbs/ac) accumulation on 15-day intervals and the flat small grain equivalent chart to be used (See Exhibit 502-10 pg. 502-61 of the NAM). Also the green growth equation for the selected chart representing rows "perpendicular" to the prevailing wind and the green grow equation for the selected chart for represented rows "parallel" to the prevailing wind are required. Much of the green growth data and residue data have been developed by individual States. Green growth table names are tied to regressed curve equations and can be copied to new cells (crops) as needed.

The crop name, without a number following the name, is used to call in residue values. The crop name, with numbers after the name, is used to call in green growth values. Example: a line with the name Corn, grain is a line of residue values, a line with the name Corn 15 indicates this is the first 15 day green growth period for corn.

Operations Database.
Similarly, the EXCEL-WEQ operations consist of a comprehensive list of tillage operations and crop phenology and harvest actions. Residue reducing tillage operations vary by speed, soil type, depth, spacing, amount of residue present, type of residue (fragile or non-fragile), and soil moisture. It is not assumed that the listed operations will reflect all the situations where this model will be used. There are four parameters needed for each operation, % residue remaining (mass), random roughness (RR) created by the operation, ridge height created (inches), and ridge spacing (inches). The N and F listed in the name indicate Non-fragile or Fragile residue. In the old NAM, 2nd edition, Amendment 5, 1993, Part 503 subpart E pages 503-13 and 503-14, tables 1 and 2 list the N and F crops.

If it is necessary to add or change the operations table, authorized persons may change or add to the Operations in the database. The new operations data will be added to the bottom of the worksheet. Do not change the names of the brown colored operations. They are used in formulas and if changed, the sheet to give incorrect answers. Start the by clicking on the "Oper" tab at the bottom of the workbook. Click tools, and unprotect to unlock the sheet to add or change the data. Enter or change the data as needed and protect and password as instructed above.

§ 12.0- MAKING EXCEL-WEQ WORK:

This is a step by step process to show how to use the program. From the WEQ Desktop, open the ***WEQvs8.05_CO_FieldVersion.xls*** workbook. Start the step by step process after reading the **Instr** worksheet (the tab at the bottom of the WEQ Excel spreadsheet).

Step 1
Select the **Res Wks** worksheet. Fill in the (a) Producer, (b) Planner, (c) Crop Rotation, (d) Location (Farm number or Sec., Town, Range), (e) Tract, and (f) Field boxes.

Step 2
Use the drop down list and select the (g) Climate Data Station. When the climate data station is selected, the model automatically pulls the data from the **Climate** sheet (see the tab at the bottom of the worksheet).

Step 3
Enter the (h) Field Width in feet (short side of field), (i) Tillage Direction (EW or NS, drop down list)**,** (j) Length/Width Ratio (drop down list), and (k) Field Direction (EW or NS, drop down list).

Step 4
Select the (l) Soil Erodibility "I" Factor from the drop down list, which is the assigned I value for the soil texture plus the adjustment for knolls, if applicable, and the (m) Climate "C" Factor Value (in whole numbers. Divide the isobar interval only once from the C factor map. Select "yes" or "no" (Y/N) for Irrigation. When Irrigation is checked "yes," the "I" factor is automatically adjusted.

It is very important to note that when you have an "I" value based on sieving and want to take credit for irrigation induced non-erodible wet days, you need to change your "adjusted sieved I" by one higher wind erodibility group before checking "yes" in the irrigation block.

Step 5
Determine the Wind Erodibility Group (WEG) from the FOTG soil survey, and (n) select the WEG (1-7 or 4L) from the drop down list.

Step 6
If you are building a crop rotation from scratch, go to **Step #13**; otherwise go to **Step #7**.

Step 7
From the WEQ Desktop, open the Irrigated (IR) or Non-Irrigated (NI) Template workbook for the Crop Management Zone (CMZ) you are working in.

Step 8
From the open Template workbook pick the crop rotation worksheet (tab); then highlight all of the crop and management system record in the light yellow shaded area, beginning with the second row.

Step 9
Copy and **Paste Special (value)** the highlighted crop and management system record into the **Res Wks** worksheet starting in the first column of line 13.

Step 10
Enter **1/1/xxxx** on the first line of worksheet (same line as "Start Rotation") where the year "xxxx" is the same year shown in the first column of line 13.

Step 11
Make sure crop and management system record ends with a **12/31/xxxx date,** last harvested **crop name** and the **End Rotation** operation. The EXCEL-WEQ will now automatically calculate an erosion estimate for this cropping system.

Step 12
Make any modifications to the crop and management system record by changing dates, crops, tillage operations, yield levels, number of irrigations, and proportion of standing to flat residue for each management period.

Step 13
Enter **1/1/xxxx** on the first line of worksheet (same line as "Start Rotation"). In the first column of line 13, put in the date **1/2/xxxx**. Next place the cursor in the **Crop** column next to the date, left click in the box to activate the pull down and select the previous crop harvested (select from the list). Move to the **Operation** column. Start the first management period with an **Over winter loss** operation. In cell C13, click the pull-down and select the **Over winter loss, fragile (F) or non-fragile (N) operation.** (see NAM, Second Ed., Amend 5, Part 503 Subpart E, table 1 & 2 or the Colorado eFOTG, Section I, Erosion Prediction for definition) Repeat these steps with correct dates until all tillage operations, planting operations, and harvests are completed. As you select the planting operation, change the crop to the new crop being planted.

Step 14
The next date after planting will be the end of the first 15-day growth period. The date can be entered as a formula. In the blank date column A, type **=**, then point and click on the cell just above and type **+15**, then hit the return key. This will enter a formula that tells the computer, to type the date above and add 15 days. All growth periods are 15 days except winter wheat or other winter crops, which have a 60-day growth period over winter (see the **Crop** table for details). The 15-day date formula can be copied down for the number of growth periods for the crop planted. Next, in the **Crop** column, click and select the growing crop name with a number **(15 to 75 days after planting)** next to it. Continue to select down the column a series of growth periods.

Example of a 2nd way to enter crop during growth: **Bean 15**, **Bean 30**, **Bean 45**, **Bean 60**, and **Bean 75** can be copied and moved at the same time to the **Crop Name** column of the **Res Wks**. This must be done using the **paste special** function. Select the Crop Tab and find the correct series of grow names, highlight them and copy them. Change back to the **Res Wks** sheet, place the cursor in the first cell under **Crop** (column B) where crop growth begins, right click and click on **paste special**, then select the radio button for **values** under the paste section, and click OK. In the **Operation** column enter (click and select) **"Grow"** for all the growth periods. **"Grow"** can be pasted in the first cell for "Grow" and then copied down the sheet (**Res Wks**) as needed**.** All growth series of data can be copied from the tables, in groups by using the **paste special** feature to paste only the **values** to the **Res Wks**. If you copy and paste normal you will lose the formatting in the cells.

Step 15
Enter the **Harvest date**, the harvested **crop name** (without a number extension), and the word "**Harvest**" for above ground crops or "**Harvest, root crop**" for root crops, in the **operation column**.

Step 16
Enter the **date** of any post harvest tillage**, crop name**, of the crop just harvested, and the name of the **operation.** Repeat step 5, 6, 7, and 8 for any additional crops in the rotation. 100 management periods can be used in each calculation. If more are needed try removing lines where there is no erosion. An example would be to reduce the number of operations of **"Grow"** to just what is needed to take erosion to zero for the rest of crop growth period.

Step 17
End the run with a **12/31/xxxx date,** last harvested **crop name** and the **End Rotation** operation.

Step 18
Enter the number of **irrigations** for the periods listed. (This is **NOT** the cumulative number of irrigations or "Irrigation Days").

Step 19
In the **Flat Res.** column on each line of the run, enter **0** when residue is 100% standing (no flat residue) and 100 when all the residue is flat (as in heavy inversion tillage). For example, if 60% of the residue is standing after tillage, then enter 40 or 0.4 and press the return key. The number will be in percent.

Step 20
Finally, adjust any **yield values** that are different than the default yields in column G-H. You can change the yield by 50% up or down by using the drop down in the **Yield Adjustment** column (F).

§ 13.0- EXAMPLE:

Iam Windy farms, tract 123 on an irrigated circle (field 1) of continuous grain corn, where the soil has an I of 56. The circle field has a diameter of 2640 ft, and is near Clovis, NM. The C is 100. The grower tills and/or plants approximately perpendicular to the damaging winds from the west during the spring critical period. The field is farmed north and south. Iam plants corn on 4/15 and harvests 10/15. The stalks are disked with an offset disk and packer on 11/1. In the spring the field is disked and packed again on 3/15. On 4/1 the circle is moldboard plowed, conventionally, and packed. Then, on 4/10 a seedbed maker is used to set up the field for the corn planter. The corn is cultivated on 5/15. His average yield has been 200 bushels/acre.

Step 1
Fill in **Iam Windy**, **MAS**, **Corn, grain, Sec 10 T80 R45**, tract **123** and field **1** on the WEQ Input Worksheet.

Step 2
Select the climate data station of **Clovis, NM** from the pull down list.

Step 3
Enter **2640** feet in the **field width** box; **NS** for **tillage direction**, **length width ratio** is **1.0**, **field direction** is **EW,** and the **Soil I** factor is **56** (keep in mind that the selection of yes in the irrigation box automatically adjusts the I factor value by one favorable group). Then enter**100** in the **Site "C" Value** box, and **Irrigation** is **Y** (yes).

Step 4
WEG is **5**.

Step 5
Enter **1/1/2000** in the first line (cell A12) of the table. Enter 1/2/2000 in the second line (cell A 13) and select (cell B13), enter **Corn, grain, high yield** from the **Crop** table drop-down list and select **Over winter loss N** for the **operation.** Enter the first tillage on **3/15/2000**, copy **Corn, grain, high yield** from the cell above, select **Disk, offset, heavy N** from the **Oper** drop down list. Do the same for the **Packer, roller** on the same date**.** Enter **4/1/2000** and put in the **Plow, moldboard, conventional** and **Packer, roller.** Enter **4/10/2000** and copy **Corn, grain, high yield**. There is no seedbed maker operation, but a **Chisel-disk-harrow-packer (comb) N** is close, so use it. Enter **4/15/2000**, **Corn, grain, high yield** and **Planter, DD opener, 30 in sp N**.

Step 6
Copy the 4/15 date and add 15 days to the formula. Copy or select **Corn, grain 15** through **Corn, grain 75** from the **Crop** table and "paste special" in the crop column. Type or select **Grow** in the **Operation** column and copy down to match the **Crop** column. Copy down the **Operation Date** column to match the growth cells. Note that there is cultivation on the second growth date. Copy the six columns and four rows of data from 5/15 down one line to add the cultivation. On the second 5/15 date, which is the second **Corn, grain 30** line, copy and paste the **Cultivator, rowcrop, 3 in ridge** operation in the **Operation** column.

Step 7
Enter the harvest date **10/15/2000**, copy down the crop **Corn, grain, high yield** and type or select the word **Harvest**.

Step 8
Add the post harvest tillage on 11/1/2000, which is a Disk, offset, heavy N and then a Packer, roller. Copy both tillage operations from the cells above.

Step 9
End the rotation year by entering **12/31/2000**, copy **Corn, grain, high yield** and copy or select the **End Rotation** operation.

Step 10
Estimate the number of irrigations needed for each growth period or use Iam's records for each period. The number of Irrigations is determined by the number of times that irrigation water will wet the soil surface in a given management period. The attached example may have too many irrigations in some management periods.

Step 11
Go down the **Flat Res** column and estimate the **percent flat residue**. Start with the Harvest Operation. Estimate about 50% of the residue is flat after harvest and 100% is flat after the fall tillage. Enter **50** in the flat Res column after harvest and **100** in the management period for fall packing. Note only the first period after harvest has standing residue.

Step 12
Select 0.5 on the drop down in column F, Yield Adjustment. This increases the 135 bu/ac to 200 bu/ac.

See the following example: (Res Wks sheet and Calc sheet).

NRCS - WEQ INPUT WORKSHEET, Version 8.01

Producer:	Iam Windy Farms	**Climate Data Station:**	NM, CLOVIS			**Tract:**	123	**Field:**	1
Planner:	Cropland Student	**Field Width** (Ft.):	2640	**Tillage Direct** (NS/EW):	NS	**Irrigated?** (y or n):	Y		
Crop Rot:	Corn, grain	**Field Direction** (NS/EW):	EW	**Length/Width Ratio:**	1.0	**Wind Erodibility Group:**	5	(1-7)	
Location:	Covis, NM	**Adjusted Soil "I":**	56	**Site "C" Value:**	100				

Average Annual Wind Erosion (t/ac):	6.9	**Yrs in Rotation:**	1.0	**Sum Period Erosion:**	6.9 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/99	-	**Start Rotation**		100%	-	- -	0	0	0.90	3184	66	1564	0	0	0.30
1/2/99	Corn, grain, high yield	Over winter loss N		100%			0	0	0.80	2547	58	1236	0	0	0.30
3/15/99	Corn, grain, high yield	Disk, offset, heavy N		100%			1	11	0.30	764	24	346	0	0	0.50
3/15/99	Corn, grain, high yield	Packer, roller		100%			0	0	0.95	726	23	328	0	0	0.30
4/1/99	Corn, grain, high yield	Plow, moldboard, conventional		100%			1	18	0.02	15	1	5	0	0	1.00
4/1/99	Corn, grain, high yield	Packer, roller		100%			0	0	0.95	14	1	5	0	0	0.30
4/10/99	Corn, grain, high yield	Chisel-disk-harrow-packer (comb) N	2	100%			1	30	0.45	6	1	2	0	0	0.50
4/15/99	Corn, grain, high yield	Planter, DD opener, 30 in sp N	3	100%			1	30	0.85	5	1	2	0	0	0.40
4/30/99	Corn, grain 15	Grow	5	100%			1	30	1.00	5	1	2	1	7	0.40
5/15/99	Corn, grain 30	Grow	0	100%			1	30	1.00	5	1	2	150	569	0.40
5/15/99	Corn, grain 30	Cultivator, rowcrop, 3 in ridge	6	100%			3	30	0.70	4	1	2	150	571	0.60
5/30/99	Corn, grain 45	Grow	11	100%			3	30	1.00	4	1	2	500	1482	0.60
6/14/99	Corn, grain 60	Grow	11	100%			3	30	1.00	4	1	2	2500	5286	0.60
6/29/99	Corn, grain 75	Grow	28	100%			3	30	1.00	4	1	2	4000	7662	0.60
10/15/99	Corn, grain, high yield	Harvest		0%	50%	200 bu/ac	3	30	1.00	11172	100	8475	0	0	0.60
11/1/99	Corn, grain, high yield	Disk, offset, heavy N		50%			1	11	0.30	3352	68	2094	0	0	0.50
11/1/99	Corn, grain, high yield	Packer, roller		100%			0	0	0.95	3184	66	1564	0	0	0.30
12/31/99	Corn, grain, high yield	End Rotation		100%			0	0	1.00	3184	66	1564	0	0	0.30

NRCS - WEQ CALCULATIONS, Version 8.01

Producer:	Iam Windy Farms	**Planner:**	Cropland Student	**Location:**	Covis, NM	**Tract:**	123	**Field:**	1
Crop Rotation:	Corn, grain	**Climate Data Station:**	NM, CLOVIS					**Site "C" Value:**	100
Tillage Direction (NS/EW):	NS	**Length/width ratio:**	1	**Field Direction (NS/EW):**	EW			**Field Width (Ft.):**	2640
Irrigation (Y or N):	Y	**Soil "I":**	56	**Wind Erodibility Group:**	5	(1-7)	**TWF:**	2	(see instr.)
Sum Period Erosion (t/ac):	6.9	**No. Yrs in Rotation:**	1.0	**Av. Annual Wind Erosion:**				6.9	(t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/99	0	38	0.0	0	0	1.00	0.86	90.0	2.1	1.020	2693	1564	0.8	0.3	1.00	0.00
1/2	03/15/99	0	38	0.0	0	0	1.00	0.99	90.0	2.1	1.020	2693	1236	3.6	27.7	1.00	1.01
3/15	03/15/99	0	38	22.5	1	11	0.93	0.58	67.5	1.8	1.030	2719	346	11.7	0.0	1.00	0.00
3/15	04/01/99	0	38	22.5	0	0	1.00	0.99	67.5	1.8	1.030	2719	328	25.9	10.8	1.00	2.80
4/1	04/01/99	0	38	22.5	1	18	0.86	0.33	67.5	1.8	1.030	2719	5	7.6	0.0	1.00	0.00
4/1	04/10/99	0	38	22.5	0	0	1.00	0.86	67.5	1.8	1.030	2719	5	28.4	5.0	1.00	1.42
4/10	04/15/99	2	38	22.5	1	30	0.90	0.58	67.5	1.8	1.030	2719	2	15.5	2.8	0.20	0.09
4/15	04/30/99	3	38	22.5	1	30	0.90	0.69	67.5	1.8	1.030	2719	2	19.2	8.3	0.60	0.96
4/30	05/15/99	5	38	22.5	1	30	0.90	0.69	67.5	1.8	1.030	2719	9	19.1	5.9	0.33	0.38
5/15	05/15/99	0	38	45.0	1	30	0.91	0.69	45.0	1.8	1.030	2719	572	10.3	0.0	1.00	0.00
5/15	05/30/99	6	38	45.0	3	30	0.63	0.50	45.0	1.8	1.030	2719	572	4.0	5.7	0.20	0.05
5/30	06/14/99	11	38	45.0	3	30	0.63	0.50	45.0	1.8	1.030	2719	1483	0.0	3.6	0.00	0.00
6/14	06/29/99	11	38	67.5	3	30	0.68	0.50	22.5	1.8	1.030	2719	5288	0.0	3.3	0.00	0.00
6/29	10/15/99	28	38	67.5	3	30	0.68	0.86	22.5	1.8	1.030	2719	6999	0.0	7.4	0.48	0.00
10/15	11/01/99	0	38	67.5	3	30	0.66	0.86	22.5	2.5	1.060	2798	6999	0.0	2.9	1.00	0.00
11/1	11/01/99	0	38	45.0	1	11	0.93	0.58	45.0	1.5	1.030	2719	2094	0.0	0.0	1.00	0.00
11/1	12/31/99	0	38	45.0	0	0	1.00	0.99	45.0	1.5	1.030	2719	1564	1.1	16.1	1.00	0.18