



United States Department of Agriculture
Natural Resources Conservation Service

“Cropping System Specification Sheets”

October 2006

1. Introduction

1.1. Purpose

This document contains two types of Cropping System Specification (Spec) Sheets as well as instructions for completing them. The primary purpose of these Cropping System Spec Sheets is to provide a convenient method for documenting in detail planned crop rotations and tillage methods in NRCS Conservation Plans in Virginia. Including completed copies of these Spec Sheets in a Conservation Plan will satisfy the minimum requirements under “Plans & Specifications” for each of the following VA Conservation Practice Standards, revised in 2006:

- Conservation Crop Rotation (328);
- Residue & Tillage Management, No-Till/Strip Till/Direct Seed (329);
- Residue & Tillage Management, Mulch-Till (345).

1.2. Target Audience

The target audience for this document is NRCS and Soil & Water Conservation District (SWCD) Conservation Planners in Virginia. Completed Spec Sheets should be shared with farmer clients and included in Conservation Plans. These instructions should not be shared with farmer clients.

1.3. Recommended or Required?

Use of these Spec Sheets for documenting planned crop rotations and tillage methods in Virginia Conservation Plans is recommended, but not required. For more guidance on acceptable methods for documenting planned rotations and tillage in

accordance with VA Standards 328, 329, and 345, consult those Standards and the latest associated Tech Notes. Use of these Spec Sheets (or substitute documents containing similar information) may be required in special cases, such as when preparing applications for program incentive payments related to VA Standards 328 and 329.

1.4. New Toolkit Practice Narratives

Revised practice narratives for VA Standards 328, 329, and 345 were added to Toolkit planning software in October 2006. For each of these Standards, a new narrative coded “C1” is now available that refers the reader to “attached specification sheets” for details about planned crop rotations, tillage practices, and related management activities. These “C1” practice narratives should be selected when using these Spec Sheets in Conservation Plans.

Note that practice narratives for VA Standards 328, 329, and 345 in use prior to October 2006 have been retained unchanged in Toolkit. Planners may continue to use these narratives if they elect not to use these Spec Sheets (note: never use “archived” narratives when writing new Plans).

1.5. Obtain Latest Electronic Version

Over time, we expect to improve this document and the Spec Sheets it contains. To verify that you have the latest version, check the Virginia NRCS Field Office Technical Guide (FOTG) or the VA NRCS Cropland Agronomy website. A link to the VA Agronomy site can be found at: <http://www.va.nrcs.usda.gov/technical/>.

Planners are encouraged to obtain the latest modifiable electronic version of these Cropping

System Spec Sheets from the above sources. Planners can then customize the Spec Sheets to best meet the needs of a particular situation or client, as described below.

1.6. Modifications Encouraged

As a Conservation Planner, one of your most important goals is to convey sound land management recommendations to the farmer in a way that is both meaningful and easy to understand. The Spec Sheets contained in this document are intended first and foremost to help you achieve that goal. Keep this in mind when deciding when and how to use these Spec Sheets.

If the formatting of these Spec Sheets could be improved to better suit the needs of a particular client or situation, you are encouraged to use the electronic version as a starting point for creating customized documents.

Suggestions for improvements to these Spec Sheets are always welcome – contact the VA NRCS State Agronomist, State Resource Conservationist (SRC), or your Area Resource Conservationist.

1.7. Two Types of Spec Sheets

This document contains two types of Spec Sheets: a Cropping System Description and Evaluation (D&E) Sheet and a Cropping System Implementation Schedule. Blank copies of both Spec Sheets can be found at the end of this document.

Cropping System D&E Spec Sheet

The Cropping System Description & Evaluation (D&E) Spec Sheet is designed for describing and evaluating a planned cropping system. A cropping system consists of a single combination of management practices (cropping sequence, tillage methods, manure applications, etc.) applied to a single crop field or conservation management unit (CMU). A CMU is set of fields or land units whose soil type, slope, and other key characteristics are sufficiently similar so that the fields or land units can be aggregated for conservation planning purposes (National Planning Procedures Handbook, Amend. 4, March 2003; 600-A-11-3).

The D&E Spec Sheet is designed for recording details about planned management practices as well as key characteristics of the field or CMU to which those practices will be applied. The most important information to include in the D&E Spec Sheet is duration of planned crop rotation, planned cropping sequence, and planned tillage methods. Virginia Standards 328, 329, and 345 require that this information be specified in Conservation Plans.

The D&E Spec Sheet is also designed to serve as an evaluation tool – it provides a convenient way to (a) document the level of conservation performance that will be achieved when the cropping system is implemented and (b) evaluate that performance in relation to the criteria in VA Standards 328, 329, and 345.

Finally, the D&E Spec Sheet is also designed to serve as a convenient worksheet for Conservation Planners to use when planning crop rotations with farmers. Planners are encouraged to print blank copies of the D&E Spec Sheets for this purpose.

Cropping System Implementation Schedule

The Cropping System Implementation Schedule Spec Sheet provides a way to summarize on a single sheet of paper planned crop rotations, tillage methods, and associated implementation dates for multiple fields across multiple years.

Virginia Standards 328, 329, and 345 require that implementation dates for planned crop rotations and tillage activities be specified in Conservation Plans. The Implementation Schedule provides a convenient way to fulfill this requirement that is also easy for the farmer client to use and understand.

The best way to understand the potential value of the Implementation Schedule is to study an example of a completed Schedule, which is provided in Table 3 near the end of this document.

Conservation Planners are also encouraged to print blank copies of the Implementation Schedule to use as worksheets when planning crop rotations with farmers.

2. Instructions for Completing the D&E Spec Sheet

2.1. Lump or Split?

The Cropping System D&E Spec Sheet is designed for describing and evaluating a single cropping system. Therefore, multiple D&E Spec Sheets will be needed in a Conservation Plan that involves multiple cropping systems. For example, if three different crop rotations are planned for use on the farm, then at least three separate D&E Spec Sheets will be needed to fully describe and evaluate those three management systems.

The Cropping System D&E Spec Sheet is also designed for describing the characteristics of a single field or Conservation Management Unit (CMU). If two fields or CMUs under similar management differ significantly in slope or other important characteristics, then two D&E Spec Sheets will probably be needed to properly describe and evaluate the situation. This sort of “splitting” is necessary because significant differences in field characteristics may result in significant differences in predicted soil loss rates and other measures of conservation performance, which will in turn result in different outcomes for the two fields or CMUs in the evaluation section of the D&E Spec Sheet.

The Conservation Planner will need to determine on a case-by-case basis which combinations of management and field characteristics are similar enough to “lump” in a single D&E Spec Sheet and which should be “split” among multiple D&E Sheets.

Even when rotations and fields are uniform, at least two D&E Spec Sheets should typically be prepared during the Conservation Planning process: one D&E Sheet documenting the current or “before” cropping system and one D&E Sheet documenting the new or “after” management system that the grower will implement.

2.2. Do I Need to Run RUSLE2?

Output from RUSLE2 is always needed to complete the evaluation section of the Cropping System D&E Spec Sheet, but a “custom” RUSLE2 calculation may not be needed. If RUSLE2 has been used

previously to model a similar cropping system, then those results can be used to complete the D&E Spec Sheet. For example, NRCS Field Office personnel are encouraged to prepare “matrices” of RUSLE2 soil loss and SCI results for representative cropping systems in their local area. These RUSLE2 results may be used to complete D&E Spec Sheets.

In all cases, the Conservation Planner should describe the source of the RUSLE2 results that were used to complete a Cropping System D&E Spec Sheet. The evaluation section of the D&E Sheet includes a space for such a description. Attaching RUSLE2 printouts to completed D&E Spec Sheets is encouraged, but not required.

Planners have asked whether a RUSLE2 printout in Word format can be used as a substitute for the Cropping System D&E Spec Sheet in order to save time and avoid duplication. The answer is yes. However, no RUSLE2 printout template is currently available that automatically provides the same information and the same level of detail found in the current Spec Sheet. Our hope is to develop in the future a RUSLE2 printout template that can be more easily used as a substitute for the D&E Spec Sheet.

2.3. D&E Spec Sheet Section-By-Section Instructions

Section A: General Info

Identify the cropping system being described with a unique and concise name, number, or ID code. This will be helpful when referring to the cropping system in the Implementation Schedule or elsewhere in the Conservation Plan. Examples of possible cropping system names include:

- Before (cash grain, wheat CT), B slopes
- After (cash grain, wheat NT), B slopes

Next, indicate the client’s name, the Conservation Planner’s name & contact info, and the date when the D&E Spec Sheet was prepared.

Section B: Field/CMU Description

Identify the fields or CMUs covered by the D&E Spec Sheet. Include Tract and Field numbers, acreage, description of CMUs, etc. The Planner must decide the level of detail that is appropriate for each particular case.

Next, list RUSLE2 inputs that are representative of the field or CMU covered by the D&E Sheet. Include county (for climate), predominant soil type, and RUSLE slope in % and slope length in feet.

Section C: Management Description

Erosion Control Support Practices

Indicate erosion control support practices planned for the cropping system. Such practices can influence soil loss rates and SCI scores and should therefore be considered when evaluating overall cropping system performance. Only include support practices when they are likely to have a meaningful influence on calculated soil loss rate and/or SCI score. The most important of these are:

- Contouring
- Strip/buffer systems (rotational strip cropping, contour buffer strips, etc.)
- Terraces & diversions

Duration of Planned Rotation:

Indicate the duration of the planned crop rotation in years.

Year / Season / Planting Date:

Complete these columns as needed to define timing of the planned cropping sequence. The correct approach to take can range from very general (“Year 1, Winter”) to very specific (“10/15/07”). The Conservation Planner must determine the level of detail needed. If implementation dates are specified elsewhere in the Plan, there is no need to be very specific. Delete columns or leave blanks as needed.

Crop

Indicate the name of each crop to be grown in the rotation. Be as specific as necessary to ensure that planned conservation goals will be achieved. Refer to the latest Tech Note for VA Standard 328 for guidance on use of generic vs. species-specific terms. Examples of terminology that may be used to indicate a planned corn crop include “row crop,” “corn,” or “corn for grain.”

A period of 60 days or more during which no crop will be grown should be described as “fallow.”

Tillage

Indicate the tillage method planned for the establishment of each crop. The three recommended choices are listed below:

- No-till/Strip-till (NT/ST)
- Mulch-till (MT)
- Clean-till (CT)

For definitions of these tillage methods, consult VA Standards 329 and 345 and the latest associated guidance documents.

Additional information may be included in this column such as the type of tillage tool or planting device to be used or the predicted Soil Tillage Intensity Rating (STIR) associated with each crop.

Minimum % Cover After Planting

Indicate the minimum percentage of the ground that should be covered with residue immediately after planting. Refer to the latest Tech Notes for VA Standards 329 and 345 for complete guidance on determining minimum cover percentages. The following is a summary of the recommendations in those Tech Notes:

- Conservation Planners should use the cover values below as starting points, then adjust those values up or down as needed. Adjustments should be made by a qualified Conservation Planner after consideration of the cropping system and RUSLE2 results.
- It is recommended, but not required, that Conservation Planners limit their choices of cover percentages used in Cropping System D&E Spec Sheets to multiples of 15% (i.e., 0%, 15%, 30%, 45%, 60% 75%, 90%).
- For crops established using no-till (NT) or strip-till (ST), the suggested starting point for minimum cover after planting is 60%. This cover value may then be adjusted up or down depending on the amount of residue expected from the previous crop. The VA 329 Standard revised in 2006 defines NT/ST simply as establishing crops without full-width tillage; there is no specific minimum cover percentage specified in the Standard.
- For crops established using mulch-till (MT), the appropriate starting point for minimum cover after planting is 30%. This cover value may only be adjusted upwards. The VA 345 Standard defines MT as establishing crops with full-width tillage where a

minimum of 30% ground cover remains after planting. If less than 30% cover is expected after full-width tillage, the tillage system should be listed as clean-till (see below).

- For crops established using clean-till (CT), the suggested starting point for minimum cover after planting is 0%. The only upwards adjustment recommended is to 15%.
- Your goal is to specify minimum residue levels needed at key points in the rotation to achieve the overall level of conservation performance (soil loss rate, SCI Score, etc.) predicted in the D&E Sheet. Your goal is not to specify optimum residue levels.
- A key reason for including minimum residue percentages in a Plan is to provide the farmer with a practical indicator that he can use to gauge whether what he is doing in the field is reasonably close to what is expected of him in the Plan. If you are going to specify minimum cover requirements in Spec Sheets, make sure your client understands what the numbers mean!

External Residue Additions

Indicate planned manure, biosolids, compost, mulch, or other external residue additions. Such additions can influence soil loss rates and SCI scores and should therefore be considered when evaluating overall cropping system performance.

Notes

This column is for additional notes or clarifications.

Number of Fallow Periods

This column is included primarily to help Conservation Planners assess compliance with the criteria for Continuous No-Fallow Crop Rotations defined in the latest VA 328 Standard. Use this column to help count the total number of fallow periods longer than 60 days in the planned crop rotation. For more guidance on determining fallow periods and assessing crop continuity, consult the VA 328 Standard and associated Tech Note.

New Species Count

These columns are included primarily to help Conservation Planners assess compliance with the

criteria for High Diversity Crop Rotations defined in the latest VA 328 Standard. Use these columns to help count the total number of crop species and the total number of legume species in the planned rotation. For more guidance on counting species and making diversity determinations, consult the VA 328 Standard and associated Tech Note.

Key

If abbreviations or acronyms are used in the preceding table, Planners should define them in the “Key” following the table. Definitions for NT/ST, MT, and CT are already included in the Key for the Planner’s convenience.

Section D: Cropping System Evaluation

The Cropping System Evaluation section of the D&E Spec Sheet provides a framework for evaluating the level of conservation performance that can be expected when the planned cropping system is implemented. This section is divided into two parts. Part 1 is for evaluating the cropping system based on the detailed soil erosion and soil quality criteria established in the latest VA Conservation Crop Rotation (328), No-till (329), and Mulch-till (345) Standards. Part 2 provides a blank space for Planners to add their own evaluation of the cropping system for other conservation purposes (pest management, wildlife habitat, etc).

Part 1: Evaluation Based on Soil Erosion and Soil Quality Factors

Soil Erosion (Sheet & Rill)

Enter predicted soil loss rates (from RUSLE2) and the soil loss tolerance or “T” value for the predominant soil type in the field or CMU. Next, interpret the results, emphasizing that a soil loss rate above T is not considered sustainable. The following two interpretation choices are suggested:

- Soil loss to T: Sustainable
- Soil loss above T: Not sustainable

Soil Organic Matter (SOM) Trend

Enter RUSLE2 results needed for predicting soil organic matter (SOM) trend according to the criteria in VA Standards 328, 329, and 345. Required information:

1. Whether or not predicted soil loss is at T (indicate “Yes” or “No”);
2. Soil Conditioning Index (SCI) Score.

Next, using the data entered, look up and enter the appropriate interpretation from Table 1, below:

Table 1. SOM Trend Evaluation

Soil loss at or below T?		SCI Score	Interpretation
Yes	and	+0.75 or more	SOM Building – Optimum
Yes		+0.74 to +0.50	SOM Building – Intermediate
Yes		+0.49 to +0.25	SOM Building – Minimum
Yes		+0.24 to 0.00	SOM Maintenance
No	and/or	-0.01 to -0.25	SOM Depleting – Moderate
No	and	-0.26 to -0.50	SOM Depleting – Severe
No		-0.51 to -0.75	SOM Depleting – Very Severe
No		-0.76 or less	SOM Depleting – Extreme

The criteria and interpretations related to SOM Building and Maintenance situations in Table 1 above are drawn directly from the latest VA Standards 328, 329, and 345. The criteria and interpretations related to SOM Depleting situations are not found in these Standards, but are explained more fully in the Tech Notes associated with VA Standards 328, 329, and 345.

Crop Continuity

Enter the total duration of the planned rotation in years and the total number of planned fallow periods greater than 60 days. These values can be helpful in gauging the general level of crop continuity in the rotation. Next, indicate in the Interpretation column whether or not the planned cropping sequence meets the criteria for a Continuous No-Fallow Crop Rotation (i.e., number of planned fallow periods = 0). Indicate that continuous no-fallow represents an optimal level of crop continuity. See the VA 328 Standard and associated Tech Note for guidance.

Crop Diversity

Enter the total number of different species and total number of different legume species in the planned crop rotation. Next, using the data entered, look up and enter the appropriate interpretation from Table 2, below:

Table 2. Crop Diversity Evaluation

Total Species in Rotation		Legume Species in Rotation	Interpretation
7 or more	and	3 or more	High Diversity – Optimum
5 or more		2 or more	High Diversity – Intermediate
3 or more		1 or more	High Diversity – Minimum
less than 3	or	0	Not High Diversity

The criteria and interpretations in Table 2 are drawn directly from the latest VA 328 Standard. Note that “total species” includes all legume and non-legume species in the rotation. For example, a rotation of corn, wheat, and soybeans should be rated as having three total species and one legume species. See the VA 328 Standard and associated Tech Note for more guidance.

Tillage System

Classify the overall tillage system based on the definitions established in VA Standards 329 and 345. There are seven basic choices:

1. Continuous NT/ST
2. Continuous MT
3. Continuous CT
4. Rotational Tillage (NT & MT)
5. Rotational Tillage (NT & CT)
6. Rotational Tillage (NT & MT & CT)
7. Rotational Tillage System (MT & CT)

Also enter the average annual Soil Tillage Intensity Rating or STIR value for the cropping system.

Next, interpret the data. The latest VA Standards 328, 329, and 345 define the optimal tillage system for the purpose of soil quality improvement as continuous NT/ST. These Standards also define the optimal STIR value for soil quality improvement as an average annual STIR value of 10 or less for the overall crop rotation. Indicate in the Interpretation column whether or not these targets for optimum soil disturbance are being achieved.

Source of RUSLE2 Data

Use this space to describe the source of the RUSLE2 data used for evaluating the cropping system. Attach RUSLE2 printouts or other supporting documentation as needed.

Part 2: Evaluation Based on Other Factors

This space is for Conservation Planners to evaluate the cropping system based on factors other than soil erosion and soil quality. For example, if a particular crop rotation is expected to significantly reduce the need for nitrogen fertilizer purchases and insecticide applications, these positive conservation benefits could be summarized here.

Section E: Additional Comments & Recommendations

Use this last section of the D&E Spec Sheet to provide additional notes, comments, clarifications, or recommendations about the cropping system for the client or for the file.

3. Instructions for Completing the Implementation Schedule

3.1. See Example

The best way to understand the potential value of the Cropping System Implementation Schedule Spec Sheet is to study an example of a completed Schedule, which is found in Table 3 on the next page. In this example, the Implementation Schedule is used to specify planned cropping sequences, tillage methods, and implementation dates for 12 fields on three tracts over a six-year period. In this example, two different rotations involving annual crops are being implemented simultaneously on different fields, plus some fields are in permanent grass.

3.2. Make it Useful

Your primary reason for using the Implementation Schedule is to convey meaningful information to the farmer in a way that is easy to understand. Use of the Implementation Schedule is optional. Planners are always encouraged to customize the format of the Schedule to best fit the situation and the client. Planners may need to remove or add columns to the chart to best match the number of years into the future that crop rotations are planned.

3.3. Define Terms and Include Recommendations

When abbreviations are used in the Implementation Schedule, remember to use them consistently and to define them in the “Key” following the chart. Definitions for NT/ST, MT, and CT are already included in the Key for the Planner’s convenience.

Use the last section of the Implementation Schedule Spec Sheet to provide additional notes, comments, clarifications, or recommendations as needed for your client or for the file.

(Continued on next page)

Table 3. Example of Completed Cropping System Implementation Schedule

Client: Farmer

Conservation Planner & contact info: District Conservationist

Date: 10/27/06

Tract(s)	Field(s) & acres	Cropping System / Rotation ID (see D&E Spec Sheets)	2007	2007	2008	2008	2009	2009	2010	2010	2011	2011	2012	2012
			Summer	Winter										
ABCD	1, 2, 3 (45 ac)	NT corn/ CT rye silage	NT Corn	CT Rye										
EFGH	1, 2, 3 (24 ac)	2&2 rotation, all NT	NT Corn	NT Hay	Hay	Hay	Hay	Hay	NT Corn	NT Rye	NT Corn	NT Hay	Hay	Hay
EFGH	4, 5, 6 (18 ac)	2&2 rotation, all NT	Hay	Hay	NT Corn	NT Rye	NT Corn	NT Hay	Hay	Hay	Hay	Hay	NT Corn	CT Rye
MNOP	1, 2, 3 (27 ac)	Permanent grass	Grass	Grass	Grass	Grass	Grass	Grass	Grass	Grass	Grass	Grass	Grass	Grass

Key: NT = No-till; CT = Clean-till; Corn = corn for silage; Rye = rye for silage or cover crop; Hay = orchardgrass/clover; Grass = fescue sod

Comments & Recommendations

The above chart shows planned crops and tillage for the period 2007 through 2012.

Kill rye for cover whenever forage is not needed.

Table is color-coded: white background for annual crops, gray background for perennial hay crops.

Cropping System Description & Evaluation (D&E) Spec Sheet

A. General Info

Cropping system / rotation name or ID: _____
 C
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 n
 t
 : _____ Conservation Planner & contact info: _____ Date: _____

B. Field / CMU Description

Tract(s) / field(s) / acres: _____
 R
 U
 S
 L
 E
 2

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 t
 s
 : County: _____ Soil type: _____ Slope %: _____ Slope length (ft): _____

C. Management Description

Erosion control support practices (contouring, etc.): _____
 Duration of planned rotation(years): _____

Year	Season	Planting date	Crop	Tillage	Minimum % cover after planting	Manure or applied residue	Notes	# of fallow periods >60 days	new species count	
									all	leg

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Cropping System Implementation Schedule Spec Sheet

Client: _____ Conservation Planner & contact info: _____ Date: _____

Tract(s)	Field(s) & acres	Cropping System / Rotation ID (see D&E Spec Sheet)	Year:										
			Season:										

Key: NT = No-till; ST = Strip-till; MT = Mulch-till; CT = Clean-till

Comments & Recommendations:

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