

# PHASE 6 CONSERVATION TILLAGE EXPERT PANEL

APRIL 21, 2016

## IDENTITY AND EXPERTISE OF PANEL MEMBERS

Name	Affiliation	Role
Wade Thomason	Virginia Tech	Panel Chair
Sjoerd Duiker	Penn State University	Panel Member
Kevin Ganoe	Cornell University	Panel Member
Dale Gates	USDA-Natural Resources Conservation Service	Panel Member
Bill McCollum	DuPont Pioneer	Panel Member
Mark Reiter	Virginia Tech	Panel Member
Bill Keeling	Virginia Department of Environmental Quality	Watershed Technical Workgroup representative
Jeff Sweeney	CBPO	Modeling Team representative

*Technical support provided by Mark Dubin (University of Maryland), Lindsey Gordon (CRC Staffer), and Jennifer Ferrando (Tetra Tech).*

## PRACTICE NAME(S)

- Conventional High Till (HiTill)
- Low Residue Strip Till/No-Till
- Conservation Tillage (LoTill)
- High Residue Minimum Soil Disturbance Till (HRTill)

## DEFINITION OF THE PRACTICE

Conservation tillage involves the planting, growing and harvesting of crops with minimal disturbance to the soil surface through the use of minimum tillage, mulch tillage, ridge tillage, or no-till. The current version of the Chesapeake Bay Program (CBP) partnership's Watershed Model (Phase 5.3.2) includes three management levels for crop residue management. High till (0-29% crop residue) otherwise known as conventional tillage, and low till (30+% crop residue) known as conservation tillage, are both simulated as land uses and not as BMPs. A subset of the low till

acreage is eligible for the High Residue, Minimum Soil Disturbance Tillage (HRTill) Management BMP, which is defined as “a crop planting and residue management practice in which soil disturbance by plows and implements intended to invert residue is eliminated. Any disturbance must leave a minimum of 60% crop residue cover on the soil surface as measured after planting. This annual practice involves all crops in a multi-crop, multi-year rotation and the crop residue cover requirement (including living and dead material) is to be met immediately after planting of each crop.” The HRTill practice can be combined with other associated, applicable BMPs for additional reductions, including nutrient management and cover crops.

Tillage practices for the Phase 6 Model will include four practices, characterized primarily by residue cover and soil disturbance.

<b>Category</b>	<b>Residue cover and soil disturbance</b>	<b>Corollary Phase 5.3.2 practice</b>	<b>Other relevant standard</b>
1. Conventional/high till	< 15% cover OR 15 – 29% cover with full width tillage.	high till/conventional tillage	
2. Low residue, strip till/no-till	15 – 29% cover, strip till or no-till, and less than 40% soil disturbance	N/A - This is a new category for the conservation tillage practice.	NRCS Conservation Practice Standard Code 329
3. Conservation tillage	30 – 60% cover	conservation tillage	NRCS Conservation Practice Standard Code 345
4. High residue, minimum soil disturbance tillage	>60% cover, minimum disturbance	High residue, minimum soil disturbance tillage (HRTill)	

As charged by the Expert Panel Establishment Group, the Panel is considering development of a relationship matrix to associate practice categories with visual assessments of residue cover and residue levels predicted by USDA-NRCS index tools used to predict residue levels (e.g. RUSLE2 Soil Tillage Intensity Rating (STIR) and Soil Conditioning Index (SCI)) to allow cross-referencing among assessment methods.

## QUALIFYING PRACTICE CONDITIONS

Credit for a tillage practices requires achievement of both the residue and the soil disturbance portions of the definition. If development of a matrix relating conservation tillage categories to STIR and/or SCI values is feasible, the Panel will provide guidance in the BMP report regarding how those values may be used to evaluate practice qualification.

- The Panel is working with the Expert Panels for the cover crops and nutrient management BMPs to coordinate crediting for acres with cover crops that receive nutrients in the fall. If those acres are not eligible under one of the other BMPs, they may be eligible for crediting

under conservation tillage based on potential benefits for reduction of sediment and associated particulate phosphorus.

## PRACTICE MODEL SIMULATION DESCRIPTION

The Phase 6.0 tillage practices are simulated as BMPs with associated nutrient and sediment reduction efficiencies. Tillage practices are an annual practice.

## LAND USES TO WHICH THE PRACTICE IS APPLIED

Tillage practices apply to the following Phase 6.0 Agricultural Land Uses:

Land Use	Description
Full Season Soybeans	Soybeans ineligible for double cropping
Grain with Manure	Corn or sorghum for grain eligible for manure application and ineligible for double cropping
Grain without Manure	Corn or sorghum for grain ineligible for manure application and ineligible for double cropping
Silage with Manure	Corn or sorghum for silage eligible for manure application and ineligible for double cropping
Silage without Manure	Corn or sorghum for silage ineligible for manure application and ineligible for double cropping
Small Grains and Grains	Small grains and grains other than corn or sorghum eligible for manure and ineligible for double cropping
Small Grains and Soybeans	Soybeans double cropped with small grains and ineligible for manure
Specialty Crop High	Specialty crops with relatively high nutrient inputs with some crops eligible for manure
Specialty Crop Low	Specialty crops with relatively low nutrient inputs with some crops eligible for manure
Other Agronomic Crops	Other high commodity row crops such as tobacco, cotton, etc., with some crops eligible for manure

## UNIT OF MEASURE

Tillage practices can be reported in either acres or percentage of acres implementing the practice.

## LOCATIONS WITHIN THE CHESAPEAKE BAY WATERSHED WHERE THIS PRACTICE IS APPLICABLE

Tillage practices can be applied to specified land uses everywhere within the Chesapeake Bay watershed. The practices may have localized limitations on applicability, including steep slopes, stony soils, and wet conditions.

## POTENTIAL METHODS TO ESTIMATE HISTORIC IMPLEMENTATION UNITS

The Phase 5.3.2 Conservation Tillage Expert Panel (EP) recognized the potential for including additional management levels for crop residue management in the Phase 6 modeling tools, which have been documented by USDA-NRCS and [implementation data](#) captured by the Conservation Technology Information Center (CTIC). Crop residue implementation data is represented in the CTIC database for the following categories:

- |                        |                  |
|------------------------|------------------|
| ◦ Conventional Tillage | 0 - 15% Residue  |
| ◦ Reduced Tillage      | 15 - 30% Residue |
| ◦ Mulch Tillage        | >30 % Residue    |
| ◦ Ridge Tillage        | >30 % Residue    |

The Phase 6.0 modeling tools will replace the existing Phase 5.3.2 agricultural land uses with new crop-focused land uses. As part of this transition, the former Hi-Till and Lo-Till land uses will be replaced by the new tillage BMPs applied to the new crop-focused land uses. The CTIC data can provide an important historical implementation record for supplementing past jurisdictional BMP reporting, as well as support model calibration starting in 1989 as the initial year for the national dataset. The CTIC data exists for all counties up to 2005 when the nationally funded program was ended, and is available post 2005 for those counties and states which continued to collect data. In Phase 6, states are responsible for reporting county acres or percentages for conservation tillage practices to NEIEN for all years. If a state does not have information beyond the latest CTIC values for a county, they should continue to report the latest CTIC values to NEIEN in future years. However, the full implementation of CBP BMP verification requirements in 2018 will necessitate the tracking and reporting of practice implementation data for future reduction credits.

## POTENTIAL FOR PANEL ADJUSTMENTS IN FINAL REPORT

The Panel is fairly confident in the definition of the four tillage practices, but practice efficiencies and potential supplemental elements (e.g., relationship matrix to NRCS tools) are still under development. Efficiencies for nitrogen, phosphorus, and sediment, and supplemental elements for the practice definition will be decided upon for the final report.