NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

RESIDUE MANAGEMENT, NO TILL/STRIP TILL

(Acre)

CODE 329A

DEFINITION

Managing the amount, orientation, and distribution of crop and other plant residues on the soil surface year-round, while growing crops in narrow slots, or tilled or residue free strips in soil previously untilled by full-width inversion implements.

PURPOSES

This practice may be applied as part of a conservation management system to support one or more of the following:

- Reduce sheet and rill erosion.
- Reduce wind erosion.
- Maintain or improve soil organic matter content.
- Conserve soil moisture.
- Manage snow to increase plant available moisture or reduce plant damage from freezing or desiccation.
- Provide food and escape cover for wildlife.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all cropland.

This standard includes tillage and planting methods commonly referred to as no till, zero till, slot plant, row till, zone till, strip till, or direct seeding.

CRITERIA

General Criteria Applicable to All Purposes Named Above

Loose residues to be retained on the field shall be uniformly distributed on the soil surface. Where combines or similar machines are used for harvesting, they shall be equipped with spreaders capable of distributing residue over at least 80 percent of the working width of the header.

Planters or drills shall be equipped to plant directly through untilled residue or in a tilled seedbed prepared in a narrow strip along each row by planter attachments such as rotary tillers, sweeps, multiple counters, or row cleaning devices.

Crop residues shall not be burned or disturbed by full-width tillage operations.

Seedbed preparation, planting, and fertilizer placement shall disturb no more than one-third of the row width. The row area formed by the planting operation shall be level with or slightly above the adjacent row middles unless the rows are planted on the contour.

If row cultivation or spot treatment for weed escapes, leveling ruts, or similar operations become necessary, tillage shall be limited to undercutting operations which minimize burial of surface residue.

Additional Criteria to Reduce Sheet and Rill Erosion

The amount of randomly distributed, flat residue needed to reduce erosion within the soil loss tolerance (T) or any other planned soil loss objective, shall be determined using current approved erosion prediction technology. Partial removal of residue by means such as baling or grazing shall be limited to retain the amount needed. Calculations shall account for the effects of other practices in the conservation management system.

Seedbed preparation, planting, and fertilizer placement shall disturb no more than one-fourth of the row width. The row area formed

by the planting operation shall be level with or slightly above the adjacent row middle unless the rows are planted on the contour.

Additional Criteria to Reduce Wind Erosion

The amount and orientation of residue needed to reduce erosion within the soil loss tolerance (T) or other planned soil loss objective shall be determined using current approved wind erosion prediction technology. Partial removal of residue by means such as baling or grazing shall be limited to retain the amount needed.

Calculations shall account for the effects of other practices in the conservation management system.

Additional Criteria to Maintain or Improve Soil Organic Matter Content

Partial removal of crop residues by haying and grazing shall be limited to those crops designated as non-fragile residue, as listed in the Kansas Field Office Technical Guide, Section I – General Resources References, Part 1 – Water Erosion, Table C-5, Residue Types (page 12). No more than 50 percent of total residue remaining after harvest of the crop will be removed unless the residues have been interseeded with a cover crop. Organic matter content or trends will be determined using current approved technology.

Additional Criteria to Conserve Soil Moisture

Crop stubble will not be disturbed and harvest residue shall be evenly distributed and maintained on the soil surface during the growing or fallow period to retain soil moisture for crop use by enhancing infiltration and reducing evaporation.

Additional Criteria to Manage Snow to Increase Plant Available Moisture or Reduce Plant Damage from Freezing or Desiccation

Stubble shall be left standing as high as possible by the harvesting operation, but not less than 6 inches in any case. Stubble shall remain standing over winter to trap and retain snow. Loose residue may be removed providing that the remaining residue is left standing.

When crops are planted in the fall, the width of the tilled strip or slot shall be no more than one-third of the row width, in order to reduce the disturbance of standing stubble.

Additional Criteria to Provide Food and Escape Cover for Wildlife

The amount of residue height of stubble and length of the management period will be determined to meet the habitat requirements for the targeted species or wildlife population.

Where migratory waterfowl are the species of concern, residue shall be present during both the spring and fall migration.

Residue will not be removed unless it is determined by an on-site assessment that such removal will not adversely affect habitat values.

CONSIDERATIONS

Removal of plant residue by baling or grazing often produces negative impacts on soil condition unless residues are interseeded with a cover crop.

No till or strip till may be practiced continuously throughout the crop sequence, or may be managed as part of a system which includes other tillage and planting methods such as mulch till.

Production of adequate amounts of crop residues necessary for the proper functioning of this practice can be enhanced by selection of high residue producing crops and crop varieties in the rotation, use of cover crops, and adjustment of plant populations and row spacing.

Maintaining a continuous no till system will maximize the improvement of soil organic matter content. Also, when no till is practiced continuously, soil aggregation provides additional resistance to sheet and rill erosion.

Minimizing tillage reduces the rate of decomposition of new crop residue and residual soil organic matter content. Increased soil organic matter leads to improved soil structure, reduced crusting, increased infiltration and water holding capacity, and reduced nutrient leaching potential. The improved environment for soil biological

activity may result in more efficient nutrient cycling and lower pesticide loss potential.

Soil test levels of relatively immobile nutrients like phosphorus shall be adjusted to optimum levels prior to initiation of a no till or strip till system.

Initial application of the no till and strip till systems may result in N immobilization and temporary N deficiency as microorganisms decompose crop residues on and near the soil surface. Additional N fertilizer above the minimum crop requirements may be necessary until the C:N ratio stabilizes and an equilibrium is established in the crop rotation.

The effectiveness of stubble to trap snows or reduce plant damage from freezing or desiccation increases with stubble height. Variable height stubble patterns may be created to further increase snow storage.

Residue provides food and cover for some resident and migratory wildlife species. High residue levels will provide the greatest habitat benefit. Leaving rows of unharvested crop standing at intervals across the field can enhance the value of residues for wildlife habitat.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field or treatment unit according to the Criteria, Considerations, and Operation and Maintenance described in this standard. Specifications shall be recorded using approved specification, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

If row cultivation or tillage for weed escapes, leveling ruts, or similar operations become necessary, tillage shall be limited to shallow or deep non-inversion tillage tools that minimize burial of surface residue as a site-specific operation only.

Pesticides used in performing no till and strip till systems shall be registered and applied in accordance with the authorized uses, directions on the label, and other federal, state, and local regulations.

Establishment of controlled traffic patterns in a no till or strip till system can help prevent recurrence of soil compaction in crop rows. Manage harvesting and planting operations to reduce in-field equipment operation to a minimum to avoid compaction areas in the field.