



CONSERVATION ENHANCEMENT ACTIVITY

E345E

CONSERVATION STEWARDSHIP PROGRAM

Reduced tillage to reduce energy use

Conservation Practice 345: Residue and Tillage Management, Reduced Till

APPLICABLE LAND USE: Crop (Annual & Mixed)

RESOURCE CONCERN: Energy

ENHANCEMENT LIFE SPAN: 1 year

Enhancement Description:

Establish a reduced tillage system which reduces total energy consumption associated with field operations by at least 25% compared to conventional tillage systems (benchmark). Each crop in the crop rotation shall have a Soil Tillage Intensity Rating (STIR) of no greater than 80. The current NRCS wind and water erosion prediction technologies must be used to document STIR calculations and energy consumption.

Criteria:

- Uniformly distribute residues over the entire field. Removing residue from the row area prior to or as part of the planting operation is acceptable.
- Do not burn crop residues.
- The Soil Tillage Intensity Rating (STIR) value shall include all field operations that are performed during the crop interval between harvest of the previous cash crop and harvest or termination of the current cash crop (includes fallow periods). The crop STIR value rating shall be no greater than 80, and no primary inversion tillage implements (e.g. moldboard plow) shall be used.
- Reduce the total energy consumption associated with field operations by at least 25% compared to the benchmark condition. The current NRCS wind and water erosion

E345E - Reduced tillage to reduce energy use	July 2019	Page 1
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prediction technologies must be used for determining energy use to document energy use reductions.

CONSERVATION STEWARDSHIP PROGRAM





CONSERVATION STEWARDSHIP PROGRAM

Documentation and Implementation Requirements

Participant will:

- Prior to implementation, provide NRCS with the current (benchmark) and planned crop rotation and tillage operation(s) used for each crop.

Field	Acres	Current (Benchmark) Crops (in sequence)	Length of Crop Rotation (years)

Field	Crop	Current (Benchmark) Field Operation	Timing of Field Operation (month/year)

Field	Acres	Planned Crops (in sequence)	Length of Crop Rotation (years)

Field	Crop	Planned Field Operation	Timing of Field Operation (month/year)



CONSERVATION STEWARDSHIP PROGRAM

- During implementation, notify NRCS of any planned changes in crops, crop rotation, or field operations to verify the planned system meets the enhancement criteria.
- During implementation, no residue will be burned.
- During implementation, all residues will be uniformly distributed over the entire field. Removing residue from the row area prior to or as part of the planting operation is acceptable.
- During implementation, no primary inversion tillage implements (e.g. moldboard plow) will be used.
- During implementation, reduce the total energy consumption associated with field operations by at least 25% compared to the current benchmark tillage system.
- After implementation, if changes to the rotation were made, complete the tables above to document the applied Conservation Crop Rotation for the contract period and provide to NRCS.

NRCS will:

- As needed, provide technical assistance to meet the criteria of the enhancement.
- Prior to implementation, use information provided from the participant to calculate the Soil Tillage Intensity Rating values and energy consumption for both the current system and the planned system using the approved NRCS wind and water erosion prediction technologies. Verify the Soil Tillage Intensity Rating value is no greater than 80 for each crop in the planned rotation and total energy consumption is reduced by at least 25%.
Current STIR values = _____ and Energy Consumption = _____
Planned STIR values = _____ and Energy Consumption = _____
- During implementation, evaluate planned changes in crops, crop rotation, or field operations to verify the planned system meets the enhancement criteria.
- After implementation, if changes were made to the planned crops, crop rotation, or field operations, use information provided from the participant to calculate the Soil Tillage Intensity Rating values and total energy consumption to document that the applied rotation met the enhancement criteria.
Applied STIR values = _____ and Energy Consumption = _____

E345E - Reduced tillage to reduce energy use	July 2019	Page 4
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NRCS Documentation Review:

I have reviewed all required participant documentation and have determined the participant has implemented the enhancement and met all criteria and requirements.

**CONSERVATION
STEWARDSHIP
PROGRAM**

Participant Name _____ Contract Number _____

Total Amount Applied _____ Fiscal Year Completed _____

NRCS Technical Adequacy Signature

Date



E345E - Reduced tillage to reduce energy use	July 2019	Page 5
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SOUTH DAKOTA (SD) SUPPLEMENT TO CONSERVATION ENHANCEMENT ACTIVITY

CONSERVATION STEWARDSHIP PROGRAM

E345E

Additional Criteria for SD:

In addition to the criteria specified in the national job sheet E345E, the following additional criteria apply in SD:

- Utilize the table below to estimate energy savings from the existing cropping system to the planned reduced-till system. Energy savings must be 25 percent (%) or greater. Utilize RUSLE2, IET or current erosion prediction technology if operations needed are not listed.

Operation Name	Diesel use per area
Aerial interseeding	.00000001
Bale straw or residue	0.38
Chisel plow, coulter, st. pts.	1.2
Chisel plow, coulter, st. pts., cover disks, rlng basket	1.8
Chisel, st. pt.	1
Chisel, sweep shovel	1.1
Chisel, sweep shovel 5 in. depth, coil tine har	1
Coulter caddy, dbl gang w/ fluted coulters - Great Plains Turbo-till	0.35
Coulter tiller and spike harrow	0.85
Coulter tiller, 10 degree angle, coiled tine harrow, rolling basket - Salford RTS	0.85
Cultivator, field 6-12 in sweeps	0.74
Disk, tandem heavy primary op.	0.75
Disk, tandem light finishing	0.4
Drill or air seeder single disk openers, + fert. opnrs 7-10 in spac.	0.48
Fert applic. side-dress, liquid	0.13
Fert applic. surface broadcast	0.16
Fert. applic. anhyd knife 30 in	0.8
Fert. applic. anhyd, liq, dry, minimal dist. precision placmnt, 30 in	0.8
Fert. applic., strip-till 30 in	0.9
Harvest, killing crop 50pct standing stubble	1.53
Harvest, silage	0.95
Harvest, stripper header	1.53
Manure injector, liquid low disturb.30 inch	1.56
Manure spreader, liquid	1.23
Planter, double disk opnr	0.44



CONSERVATION STEWARDSHIP PROGRAM

Planter, double disk opnr with starter fertilizer	0.65
Planter, strip till	0.62
Roller, smooth	0.25
Sprayer, post emergence and fert. tank mix	0.13
Sprayer, pre-emergence	0.13
Strip till bed conditioner	0.32

Example:

Benchmark Rotation	Diesel Use
Cultivator, field 6-12 in sweeps	.74
Planter, double disk opnr	.44
Sprayer, pre-emergence	.13
Fert application, surface broadcast	.16
Sprayer, post emergence	.13
<u>Harvest crop</u>	<u>1.53</u>
Chisel, sweep shovel	1.1
Cultivator, field 6-12 in sweeps	1.0
Roller, smooth	.25
Planter, double disk opnr	.44
Sprayer, pre-emergence	.13
Sprayer, post-emergence	.13
<u>Harvest crop</u>	<u>1.53</u>
Diesel use for entire rotation	<u>7.71</u>

Planned Rotation	Diesel Use
Planter, double disk opnr w/fert	.65
Sprayer, pre-emergence	.13
Sprayer, post-emergence	.13
<u>Harvest crop</u>	<u>1.53</u>
Disk, tandem light finishing (x2)	.40
Roller, smooth	.25
Planter, double disk opnr	.44
Sprayer, pre-emergence	.13
Sprayer, post-emergence	.13
<u>Harvest crop</u>	<u>1.53</u>
Diesel use entire rotation	<u>5.72</u>

To calculate energy savings, divide rotation diesel use by years in rotation to get average annual use.

Average Annual Use: $5.72/2 = 2.86$ (planned rotation) and $7.71/2 = 3.855$ (benchmark rotation)

Energy Savings: $1 - (2.86/3.855) * 100 = 25.8\%$ savings