Tennessee Nitrogen Leaching Index

The potential for nitrate nitrogen to leach through an agricultural soil depends on several factors, including soil properties that affect rate of water movement through the soil and rate of surface runoff, rainfall, and the amount and type of nitrogen fertilizer being applied to the field. Soil infiltration rate, the ease with which water moves into and through the soil, is by far the best indicator of leaching potential. This permeability is determined by factors such as soil texture, soil structure, bulk density and depth to restrictive layers such as bedrock and fragipans (hard pans). Different soil map unit components have been categorized into different soil hydrologic groups, where soils with different runoff and infiltration potential are grouped into one of the following four groups:

- **Group A**. Well drained soils with a high infiltration rate and thus a high potential for leaching nitrate.
- **Group B**. Moderately well-drained soils with a moderate infiltration rate and thus a moderate potential for leaching nitrate.
- **Group C**. Somewhat poorly drained soils with a slow infiltration rate and thus a low potential for leaching nitrate.
- **Group D**. Poorly drained soils with a very slow infiltration rate and thus a very low potential for leaching nitrate.

Another important aspect to know is whether the field is in an area that has karst topography. Karst topography is formed in limestone, gypsum or other soluble rocks by dissolution. It is characterized by closed depressions, sinkholes, caves or underground drainage. Tennessee is well known for its areas of karst topography such as the Central Basin, the Highland Rim and the Cumberland Plateau. If the field is in an area that potentially has karst topography, then the potential risk of nitrate leaching maybe higher.

Assessing Leaching Potential and Leaching Index Rating

In order to assess the potential for nitrate nitrogen to leach from a field, follow the four-step process outlined below:

Step 1: Identify the dominant soil map unit in the field.

In 2014, the information provided by Web Soil Survey will include the Nitrogen Leaching Index rating for the selected field (steps 2, 3 and 4 below).

Step 2: Determine the soil leaching potential from the soil hydrologic group.

Step 3: Find the Leaching Index Rating for the soil hydrologic group in your county.

The leaching index rating will depend on the rainfall in the representative county. Look up the county and soil hydrologic group in Table 1 to assess the rating.

Step 4: Interpreting your Nitrate Leaching Index Rating.

The leaching index rating score (Table 1) will determine whether the field has a high, medium or low risk of nitrate leaching. Use the table below to determine if the field is at a low, medium or high risk of nitrate leaching.

Index Rating	Risk of Leaching
< 10	Low
≥10 to 16	Medium
> 16	High

If the risk score is greater than 16 or the field has karst topography, the field has a **high** risk of leaching nitrate. It is required to implement the best management practices that are appropriate for the specific field operations to minimize soil nitrate leaching losses.

Best Management Practices to Reduce Nitrate Leaching

For fields with a **medium** risk of nitrate leaching (risk score ≥ 10 to 16), it is required to implement practices that will reduce the amount of nitrogen that could be leached as nitrate. At a minimum, implement practices 1 to 3 (see below).

For fields with a **high** risk of nitrate leaching (risk score >16), in addition to implementing practices 1 to 3, it is required to implement one or more of practices 4 to 8 (see below).

1. Follow a Nutrient Management (590) budget based on the realistic yield goals. The realistic yield goals are to be established on historical yield data (minimum of 5 years).
2. Do not apply nitrogen fertilizer until ready to plant, ideally within a few days of planting, or if possible, after germination and crop emergence.
3. Manure and litter applications should be based on a Nutrient Management (Conservation Practice Standard 590) budget.
4. When applying urea or urea ammonium nitrate (UAN), consider using a fertilizer stabilizer that will reduce nitrogen losses for a few weeks after the fertilizer has been applied. Choose a fertilizer stabilizer that blocks the enzyme urease (which converts urea into the ammonium and nitrate forms that plants use). Delaying the conversion of urea means there will be more nitrogen available to the plant when it needs it and less will be lost.
5. If growing corn, split the nitrogen applications. Apply no more than 50 pounds of nitrogen per acre at planting and side-dress the remainder of the recommended fertilizer. Side-dress application should be made once the corn has emerged and has at least four leaves.

6. If applying manures, use the pre-side-dress nitrate test (PSNT) to determine side-dress nitrogen application rates[1].

7. Implement the Cover Crop (Conservation Practice Standard 340) practice on the field. Cover crops will not only reduce soil erosion over the winter but will also scavenge residual nitrogen.

8. Implement one or more NRCS conservation practice standards (CPS) that will minimize nitrate losses. These practices include (but are not limited to) the following:

   - Conservation Cover (CPS 327)
   - Conservation Crop Rotation (CPS 328)
   - Forage and Biomass Planting (CPS 512)
   - Irrigation Water Management (CPS 449)
   - Karst Sinkhole Treatment (CPS 527)

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1 http://soilplantandpest.utk.edu/pdffiles/PSNTCinfosheet105.pdf

Table 1: Tennessee Nitrogen Leaching Index Rating

County	Nitrogen Leaching Index by Hydrologic Group			
	A	B	C	D
Anderson		21	15	12
Bedford		18	13	10
Benton	27	19	14	11
Bledsoe		22	16	13
Blount	26	19	13	10
Bradley	28	20	15	12
Campbell		19	13	10
Cannon	29	21	15	12
Carroll		19	13	10
Carter	22	15	10	7.8
Cheatham		17	12	9.2
Chester		16	11	8.9
Clairborne	24	17	12	9
Clay	26	18	13	10
Cocke	19	13	8.5	6.2
Coffee	29	21	16	12
Crockett		18	13	9.9
Cumberland		22	17	13
Davidson		16	11	8.4
Decatur	27	20	14	11
DeKalb	28	20	15	11
Dickson		18	13	10
Dyer	24	17	12	9.1
Fayette	22	16	11	8.6
Fentress	27	19	14	11
Franklin	30	22	16	13
Gibson		19	13	10
Giles		17	12	9.7
Grainger		15	11	7.9
Greene	17	11	7.4	5.2
Grundy		25	19	15
Hamblin		12	8.2	5.9
Hamilton		21	15	12
Hancock		15	10	7.6
Hawkins		12	8.2	5.9
Hardeman	22	16	12	9
Hardin	24	17	13	10
Haywood		15	11	8.3
Henderson		17	12	9.1

County	Nitrogen Leaching Index by Hydrologic Group			
	A	B	C	D
Henry	26	19	13	10
Hickman	26	19	14	11
Houston	26	18	13	10
Humphreys		19	14	11
Jackson		19	14	11
Jefferson		13	8.5	6.2
Johnson		15	11	8
Knox		17	12	8.8
Lake	23	16	11	8.5
Lauderdale	23	16	11	8.6
Lawrence	28	21	15	12
Lewis	28	20	15	11
Lincoln		20	15	11
Loudon		19	13	10
Macon		19	14	11
Madison	21	15	11	8.4
Marion	31	23	17	14
Marshall		20	14	11
Maury		19	14	11
McMinn		21	15	12
McNairy		17	12	9.8
Meigs		20	15	11
Monroe		22	16	13
Montgomery		17	12	9.1
Moore		21	15	12
Morgan		21	15	12
Pickett	25	18	13	10
Obion		17	12	9.5
Overton	27	19	14	11
Perry	28	20	15	12
Polk		22	17	13
Putnam	29	22	15	12
Rhea		22	16	13
Roane		20	14	11
Robertson		16	11	8.7
Rutherford		19	14	11
Scott		19	14	11
Sequatchie		23	17	14
Sevier		17	12	9.6
Shelby	21	15	10	8.1
Smith		19	13	11

County	Nitrogen Leaching Index by Hydrologic Group			
	A	B	C	D
Stewart		18	13	9.9
Sullivan		11	7.4	5.2
Sumner		17	12	9.3
Tipton	21	15	10	7.9
Trousdale		18	13	10
Unicoi	22	16	11	8.4
Union		17	12	9.5
Van Buren	29	22	16	13
Warren	27	20	14	11
Washington	18	12	7.7	5.5
Wayne	29	21	16	13
Weakley		19	13	10
White	28	21	15	12
Williamson		18	13	10
Wilson		18	13	10

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

TN Nitrogen Leaching Index Implementation Requirement

Producer: _____ **Project or Contract:** _____

Location: _____ **County:** _____

Farm Name: _____ **Tract Number:** _____

Practice Location Map

(show detailed aerial view of where practice is to be installed on farm/site, showing all major components, stationing, relative location to any landmarks, and survey benchmarks)

Index

____ Cover Sheet

____ Specifications

Utility Safety / One-Call System Information

NRCS Review Only

Designed By: _____ **Date:** _____

Checked By: _____ **Date:** _____

Approved By: _____ **Date:** _____

TN Nitrogen Index Leaching

Landowner:		**Field Number:**	
County:			

Predominate Soil Map Unit:

Soil Hydrologic Group:

☐ **A** ☐ **B** ☐ **C** ☐ **D**

County Index Rating Based on Soil Hydrologic Group:

☐ **<10** ☐ **≥10 to 16** ☐ **>16**

Nitrogen Leaching Index Score:

☐ **Low** ☐ **Medium** ☐ **High**

Medium Nitrogen Leaching Index Score requires the implementation of the following:

1. Follow Nutrient Management (590) budget based on realistic yield goals.
2. Do not apply nitrogen fertilizer until ready to plant, ideally within a few days of planting, or if possible, after germination and crop emergence.
3. Manure and litter applications shall be based on a Nutrient Management (Conservation Practice Standard 590) budget.

High Nitrogen Leaching Index Scores requires the implementation of the three requirements for a Medium risk, plus one or more of the best management practices or conservation practice standards (CPS) listed below. Put a check mark by all that apply.

☐ Use a fertilizer stabilizer when applying urea or urea ammonium nitrate (UAN).

☐ Split application of nitrogen when growing corn.

☐ Use the pre-sidedress nitrate test (PSNT) to determine the side-dress nitrogen application.

☐ Use Cover Crop (CPS 340) to scavenge residual nitrogen.

Implementation of one or more of the following NRCS conservation practice standards (check all that apply):

☐ Conservation Cover (CPS 327)
☐ Conservation Crop Rotation (CPS 328)
☐ Forage and Biomass Planting (CPS 512)
☐ Irrigation Water Management (CPS 449)
☐ Karst Sinkhole Treatment (CPS 527)
☐ Other conservation practice standard(s) that meet the quality criteria for reducing nitrogen leaching (list):