Commonwealth of Virginia

Virginia Nutrient Management Standards and Criteria

Revised July 2014

Department of Conservation and Recreation
Division of Soil and Water Conservation
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Richmond, VA 23219

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VIRGINIA NUTRIENT MANAGEMENT STANDARDS AND CRITERIA

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Instructions for the Use of the Virginia Nutrient Management Standards and Criteria, Revised 2014

- When producer records are utilized to establish expected crop yields, average the three highest yields achieved over the last five crop years the particular crop was grown in the field, (i.e. exclude the two lowest crop yields before calculating the average). The corresponding soil productivity group for the field is determined by finding the expected crop yield in Table 1-2 that is closest to the above determined yield. These yields must be adjusted to reflect standard moisture levels for grains and forages as indicated in Table 1-2.

- When developing nutrient recommendations using the Virginia Agronomic Land Use Evaluation System (VALUES), first determine the soil map units (soil series) within field boundaries from the soil survey maps of the subject farm. Using this information, the soil productivity group is determined from Table 1-1 for each crop to be grown.

- Using the Virginia Agronomic Land Use Evaluation System (VALUES), Table 1-2, the expected yield of a crop for any one field may be determined in one of two ways. If any single soil productivity group comprises 67% or more of a field, this is considered a predominant soil group, and it may be used to establish the expected yield for the entire field. The other method is to use a weighted average of all soil productivity groups to determine the expected yield and nutrient recommendations. If several map units make up a field representing multiple productivity groups, none of which account for 67% or more of the field, then the weighted average method to determine the expected crop yield shall be used.

- When using the weighted average method, determine expected crop yield for each soil map unit from Table 1-2, and determine the weighted average yield for the field by summing the fractional yields for each soil map unit. After the weighted average expected yield is calculated and any yield reductions are considered, the soil productivity group of the field is determined by finding the expected crop yield in Table 1-2 which is closest to the weighted average yield.

- To establish an expected yield for a soil series complex use a weighted average formula based on the percentages for each complex as specified in the county soil survey OR with percentages of 60%-40% for complexes with two named soils and 50%-30%-20% for complexes with three named soils. In complexes, the percentages shall be applied in decending order in the same order as the soils are denoted in the complex name.

- Micronutrient or trace element recommendations should be made using Virginia Tech Soil Test Note 4: Trace Elements, (Publication 452-234) or the Commercial Vegetable Production Recommendations 2005 (Publication 456-420). With the exception of boron, micronutrient recommendations should be based on soil test levels.

- Once the expected yield for a crop is determined, a yield reduction will need to be applied if certain conditions exist within the soil profile such as eroded topsoil, slope, coarse fragments and rock outcrops. These conditions are explained with the associated yield reductions in Table 1-3.

♦ A field shall be considered an "environmentally sensitive site", where any part of the field drains into a sinkhole or if at least 33% of the area of the field contains one or a combination of the following features:

1. Soils with high potential for leaching based on soil texture or excessive drainage (Table 1-4);
2. Shallow soils less than 41 inches deep likely to be located over fractures or limestone bedrock (Table 1-4);
3. Subsurface tile drains;
4. Soils with high potential for subsurface lateral flow based on soil texture and poor drainage table 1-4);
5. Floodplains as identified by soils prone to frequent flooding in county soil surveys;
6. Lands with slopes greater than 15%.

Fields containing environmentally sensitive sites may be subdivided into separate fields, if the areas can be managed individually and the operator agrees to manage each area as written in the plan.

♦ The results of soil testing labs approved by the Department must be correlated to Virginia Tech Mehlich I using Table 2-1, and the conversion procedures in Section II. Only the Virginia Tech soil test scale and the conversion of other approved labs to the Virginia Tech soil test scale can be used to develop phosphorus and potassium recommendations when developing Virginia nutrient management plans.

♦ Nitrogen fertilizer recommendations are developed by identifying the soil productivity group for the crop to be grown in Table 1-1, and selecting a recommended application rate from the various crops listed in Section V. Phosphorus and potassium recommendations are determined based on the soil test results for the field by the accompanying table listed with each crop in Section V.

♦ Use the Virginia Tech soil test rating (such as M+) to determine Phosphorus and Potassium recommendations from Section V. If the soil test level is L, M, or H use the midpoint of the recommended nutrient application range. If the soil test level is L-, M-, or H- use the highest value of the recommended nutrient application range. If the soil test level is L+, M+, or H+ use the lowest value of the recommended nutrient application range. Where there is only a single recommendation listed for any soil test rating use the same recommendation for any of the three soil test ratings.

♦ When using soil productivity groupings to determine expected yields, if a soil is listed in Table 1-1 as not suited (NS) for a particular crop, the farmer should be advised that the particular crop is not recommended to be grown on the soil. If the crop will still be grown in that soil type, use the lowest productivity group rating for that crop to determine the expected yield (i.e, if alfalfa will be grown on a soil listed as NS, then the planner would use productivity group III to determine nutrient application rates).

Section I. Agronomic and Environmental Management of Soils and Other Site Features

Table 1-1
Soil Productivity Groupings for Various Cropping Categories

Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Abell	G	IIa	IIa	I	II	II	I
Abell variant	G	IIa	IIa	I	II	II	I
Ackwater	K	IIb	IIb	I	II	III	I
Acredale (drained)	C	Ib	Ib	II	Ib	NS*	I
Acredale (undrained)	OO	V	V	V	V	NS*	NS*
Aden (drained)	C	Ib	Ib	II	Ib	NS*	I
Aden (undrained)	OO	V	V	V	V	NS*	NS*
Airmont	BB	IVb	IVb	III	IV	NS*	III
Alaga	II	V	V	III	V	NS*	NS*
Alamance	FF	IVb	IVb	III	IV	NS*	III
Alanthus	D	Ib	Ib	I	Ib	I	I
Albano	KK	V	V	V	V	NS*	IV
Albemarle	JJ	V	V	IV	V	NS*	IV
Alderflats	NN	V	V	V	V	NS*	NS*
Aldino	W	IVa	IVa	IV	III	NS*	IV
Aldio	Y	IVa	IVa	III	III	NS*	III
Allegheny	L	IIb	IIb	I	II	III	II
Alluvial Land, wet	MM	V	V	V	V	NS*	IV
Alonemill	A	Ia	Ia	I	Ia	I	I
Alonemill, Fluvaquentic	I	IIa	IIa	I	II	NS*	I
Alonzville	L	IIb	IIb	I	II	III	II
Altavista	B	Ia	Ia	I	Ia	II	I
Altavista, variant	B	Ia	Ia	I	Ia	II	I
Alticrest	E	IIa	IIa	I	II	NS*	II
Angie	AA	IVa	IVa	II	III	NS*	IV
Angie variant	AA	IVa	IVa	II	III	NS*	IV
Appling	V	IVa	IVa	II	III	III	III
Appling gritty	V	IVa	IVa	II	III	III	III
Appomattox	O	IIb	IIb	I	II	II	II
Arapahoe	EE	IVb	IVb	III	IV	NS*	NS*
Arcola	U	IIIb	IIIb	II	II	III	II
Ardilla	W	IVa	IVa	IV	III	NS*	IV
Argent	PP	V	V	V	V	NS*	NS*
Arkaqua	I	IIa	IIa	I	II	NS*	I
Ashburn	BB	IVb	IVb	III	IV	NS*	III
Ashe	JJ	V	V	IV	V	NS*	IV
Ashlar	FF	IVb	IVb	III	IV	NS*	III
Assateague	QQ	V	V	V	V	NS*	NS*

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Athol	M	IIb	IIb	I	II	I	II
Atkins	NN	V	V	V	V	NS*	NS*
Atlee	Q	IIIa	IIIa	II	II	NS*	III
Augusta (drained)	P	IIb	IIb	II	II	NS*	III
Augusta (undrained)	Z	IVa	IVa	IV	III	NS*	NS*
Augusta variant(drained)	P	IIb	IIb	II	II	NS*	III
Augusta variant(undrained)	Z	IVa	IVa	IV	III	NS*	NS*
Aura	T	IIIb	IIIb	II	II	NS*	III
Austinville	O	IIb	IIb	I	II	II	II
Axis	PP	V	V	V	V	NS*	NS*
Aycock	R	IIIa	IIIa	II	II	III	II
Ayersville	FF	IVb	IVb	III	IV	NS*	III
Backbay	PP	V	V	V	V	NS*	NS*
Badin	X	IVa	IVa	II	III	III	II
Baile	HH	IVb	IVb	III	IV	NS*	IV
Bailegap	GG	IVb	IVb	IV	IV	NS*	III
Balsam	GG	IVb	IVb	IV	IV	NS*	III
Bama	R	IIIa	IIIa	II	II	III	II
Banister	K	IIb	IIb	I	II	III	I
Barclay	E	IIa	IIa	I	II	NS*	II
Bateau	I	IIa	IIa	I	II	NS*	I
Bayboro (drained)	C	Ib	Ib	II	Ib	NS*	I
Bayboro (undrained)	OO	V	V	V	V	NS*	NS*
Beckham	O	IIb	IIb	I	II	II	II
Bedington	FF	IVb	IVb	III	IV	NS*	III
Beech	L	IIb	IIb	I	II	III	II
Beech Grove	JJ	V	V	IV	V	NS*	IV
Belhaven	PP	V	V	V	V	NS*	NS*
Belspur	H	IIa	IIa	III	II	NS*	IV
Beltsville	BB	IVb	IVb	III	IV	NS*	III
Belvoir	BB	IVb	IVb	III	IV	NS*	III
Benthole	CC	IVb	IVb	II	IV	NS*	III
Bentley	R	IIIa	IIIa	II	II	III	II
Berks	JJ	V	V	IV	V	NS*	IV
Berks variant	JJ	V	V	IV	V	NS*	IV
Bermudian	A	Ia	Ia	I	Ia	I	I
Bertie	J	IIb	IIb	I	II	NS*	I
Bertie, variant	J	IIb	IIb	I	II	NS*	I
Bethera (drained)	C	Ib	Ib	II	Ib	NS*	I

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	**Soil Mgt Group**	**Corn**	**Grain Sorghum**	**Small Grain**	**Soybeans**	**Alfalfa**	**Tall Grass, Clover, Hay, Pasture**
Bethera (undrained)	OO	V	V	V	V	NS*	NS*
Bethesda	JJ	V	V	IV	V	NS*	IV
Bethlehem	V	IVa	IVa	II	III	III	III
Bibb	EE	IVb	IVb	III	IV	NS*	NS*
Biltmore	II	V	V	III	V	NS*	NS*
Birdsboro	L	IIb	IIb	I	II	III	II
Blackthorn	GG	IVb	IVb	IV	IV	NS*	III
Bladen (drained)	C	Ib	Ib	II	Ib	NS*	I
Bladen (undrained)	OO	V	V	V	V	NS*	NS
Blago	HH	IVb	IVb	III	IV	NS*	IV
Blairton	FF	IVb	IVb	III	IV	NS*	III
Bland	Y	IVa	IVa	III	III	NS*	III
Bleakhill	J	IIb	IIb	I	II	NS*	I
Blocktown	JJ	V	V	IV	V	NS*	IV
Bloodyhorse	JJ	V	V	IV	V	NS*	IV
Bluemont	JJ	V	V	IV	V	NS*	IV
Bohicket	PP	V	V	V	V	NS*	NS*
Bojac (ES, VA Beach, Ches.)	T	IIIb	IIIb	II	II	NS*	III
Bojac (Mainland, excluding VA Beach & Ches.)	DD	IVb	IVb	II	IV	NS*	III
Bolling	J	IIb	IIb	I	II	NS*	I
Bolling variant	J	IIb	IIb	I	II	NS*	I
Bolton	M	IIb	IIb	I	II	I	II
Bonneau	DD	IVb	IVb	II	IV	NS*	III
Bookwood	U	IIIb	IIIb	II	II	III	II
Botetourt	G	IIa	IIa	I	II	II	I
Bourne	BB	IVb	IVb	III	IV	NS*	III
Bourne variant	BB	IVb	IVb	III	IV	NS*	III
Bowmansville	I	IIa	IIa	I	II	NS*	I
Braddock	O	IIb	IIb	I	II	II	II
Brandywine	FF	IVb	IVb	III	IV	NS*	III
Brecknock	U	IIIb	IIIb	II	II	III	II
Bremo	JJ	V	V	IV	V	NS*	IV
Brentsville	FF	IVb	IVb	III	IV	NS*	III
Brevard	B	Ia	Ia	I	Ia	II	I
Brickhaven	Y	IVa	IVa	III	III	NS*	III
Brinkerton	LL	V	V	V	V	NS*	IV
Brinklow	FF	IVb	IVb	III	IV	NS*	III
Broadway	A	Ia	Ia	I	Ia	I	I
Brockroad	V	IVa	IVa	II	III	III	III
Brownsville	JJ	V	V	IV	V	NS*	IV
Brownwood	JJ	V	V	IV	V	NS*	IV

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Brumbaugh	L	IIb	IIb	I	II	III	II
Brushy	JJ	V	V	IV	V	NS*	IV
Buchanan	BB	IVb	IVb	III	IV	NS*	III
Buchanan cobbly	JJ	V	V	IV	V	NS*	IV
Buckhall	V	IVa	IVa	II	III	III	III
Buckingham	JJ	V	V	IV	V	NS*	IV
Bucks	U	IIIb	IIIb	II	II	III	II
Buckton	A	Ia	Ia	I	Ia	I	I
Buffstat	V	IVa	IVa	II	III	III	III
Bugley	JJ	V	V	IV	V	NS*	IV
Buncombe	II	V	V	III	V	NS*	NS*
Burketown	BB	IVb	IVb	III	IV	NS*	III
Burrowsville	BB	IVb	IVb	III	IV	NS*	III
Burton	FF	IVb	IVb	III	IV	NS*	III
Buzzrock	JJ	V	V	IV	V	NS*	IV
Cahaba	R	IIIa	IIIa	II	II	III	II
Calverton	BB	IVb	IVb	III	IV	NS*	III
Calvin	JJ	V	V	IV	V	NS*	IV
Calvin cobbly	JJ	V	V	IV	V	NS*	IV
Camocca	PP	V	V	V	V	NS*	NS*
Caneyville	Y	IVa	IVa	III	III	NS*	III
Cape Fear (drained)	C	Ib	Ib	II	Ib	NS*	I
Cape Fear (undrained)	OO	V	V	V	V	NS*	NS*
Captina	BB	IVb	IVb	III	IV	NS*	III
Carbo	Y	IVa	IVa	III	III	NS*	III
Carbonton	Y	IVa	IVa	III	III	NS*	III
Cardiff	FF	IVb	IVb	III	IV	NS*	III
Cardova	JJ	V	V	IV	V	NS*	IV
Caroline	AA	IVa	IVa	II	III	NS*	IV
Cartecay	I	IIa	IIa	I	II	NS*	I
Carteret	PP	V	V	V	V	NS*	NS*
Cataska	JJ	V	V	IV	V	NS*	IV
Catharpin	X	IVa	IVa	II	III	III	II
Catlett	JJ	V	V	IV	V	NS*	IV
Catlett variant	JJ	V	V	IV	V	NS*	IV
Catoctin	JJ	V	V	IV	V	NS*	IV
Catoctin variant	JJ	V	V	IV	V	NS*	IV
Catpoint	II	V	V	III	V	NS*	NS*
Caverns	I	IIa	IIa	I	II	NS*	I
Cecil	X	IVa	IVa	II	III	III	II
Cedarcreek	GG	IVb	IVb	IV	IV	NS*	III
Chagrin	A	Ia	Ia	I	Ia	I	I
Chagrin variant	A	Ia	Ia	I	Ia	I	I
Chandler	FF	IVb	IVb	III	IV	NS*	III

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Chapanoke (drained)	C	Ib	Ib	II	Ib	NS*	I
Chapanoke (undrained)	OO	V	V	V	V	NS*	NS*
Charity	N	IIb	IIb	I	II	II	II
Chastain	LL	V	V	V	V	NS*	IV
Chatuge (drained)	C	Ib	Ib	II	Ib	NS*	I
Chatuge (undrained)	OO	V	V	V	V	NS*	NS*
Chavies	U	IIIb	IIIb	II	II	III	II
Chavies variant	U	IIIb	IIIb	II	II	III	II
Chenneby	I	IIa	IIa	I	II	NS*	I
Chesapeake	B	Ia	Ia	I	Ia	II	I
Chester	D	Ib	Ib	I	Ib	I	I
Chester Loam	D	Ib	Ib	I	Ib	I	I
Chesterfield	V	IVa	IVa	II	III	III	III
Chestnut	GG	IVb	IVb	IV	IV	NS*	III
Chewacla	I	IIa	IIa	I	II	NS*	I
Chickahominy	LL	V	V	V	V	NS*	IV
Chilhowie	JJ	V	V	IV	V	NS*	IV
Chincoteague	PP	V	V	V	V	NS*	NS*
Chipley	EE	IVb	IVb	III	IV	NS*	NS*
Chiswell	JJ	V	V	IV	V	NS*	IV
Christian	AA	IVa	IVa	II	III	NS*	IV
Christiana	AA	IVa	IVa	II	III	NS*	IV
Cid	KK	V	V	V	V	NS*	IV
Claiborne	U	IIIb	IIIb	II	II	III	II
Clapham	BB	IVb	IVb	III	IV	NS*	III
Clarksburg	W	IVa	IVa	IV	III	NS*	IV
Clarksville	GG	IVb	IVb	IV	IV	NS*	III
Clearbrook	JJ	V	V	IV	V	NS*	IV
Cliffield	JJ	V	V	IV	V	NS*	IV
Clifford	X	IVa	IVa	II	III	III	II
Clifton	L	IIb	IIb	I	II	III	II
Clover	V	IVa	IVa	II	III	III	III
Cloverlick	JJ	V	V	IV	V	NS*	IV
Clubcaf	LL	V	V	V	V	NS*	IV
Clymer	U	IIIb	IIIb	II	II	III	II
Codorus	A	Ia	Ia	I	Ia	I	I
Codorus variant	A	Ia	Ia	I	Ia	I	I
Codorus stony	A	Ia	Ia	I	Ia	I	I
Codorus variant	A	Ia	Ia	I	Ia	I	I
Colescreek	L	IIb	IIb	I	II	III	II
Colfax	BB	IVb	IVb	III	IV	NS*	III
Colfax variant	BB	IVb	IVb	III	IV	NS*	III
Colleen	KK	V	V	V	V	NS*	IV
Colvard	II	V	V	III	V	NS*	NS*

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Colvard fine	II	V	V	III	V	NS*	NS*
Colvard stony	II	V	V	III	V	NS*	NS*
Combs	A	Ia	Ia	I	Ia	I	I
Comus	A	Ia	Ia	I	Ia	I	I
Conetoe	DD	IVb	IVb	II	IV	NS*	III
Congaree	A	Ia	Ia	I	Ia	I	I
Coosaw	DD	IVb	IVb	II	IV	NS*	III
Corolla	EE	IVb	IVb	III	IV	NS*	NS*
Corydon	JJ	V	V	IV	V	NS*	IV
Cotaco	G	IIa	IIa	I	II	II	I
Cotaco cobbly	G	IIa	IIa	I	II	II	I
Cotaco variant	G	IIa	IIa	I	II	II	I
Cottonbend	L	IIb	IIb	I	II	III	II
Coursey	G	IIa	IIa	I	II	II	I
Cowee	N	IIb	IIb	I	II	II	II
Coxville	LL	V	V	V	V	NS*	IV
Craggey	JJ	V	V	IV	V	NS*	IV
Craigsville	CC	IVb	IVb	II	IV	NS*	III
Craven	HH	IVb	IVb	III	IV	NS*	IV
Creedmoor	KK	V	V	V	V	NS*	IV
Creedmoor variant	KK	V	V	V	V	NS*	IV
Croton	LL	V	V	V	V	NS*	IV
Cullasaja	FF	IVb	IVb	III	IV	NS*	III
Cullen	N	IIb	IIb	I	II	II	II
Culleoka	U	IIIb	IIIb	II	II	III	II
Culpeper	X	IVa	IVa	II	III	III	II
Culpeper variant	X	IVa	IVa	II	III	III	II
Daleville (drained)	C	Ib	Ib	II	Ib	NS*	I
Daleville (undrained)	OO	V	V	V	V	NS*	NS*
Dan River	G	IIa	IIa	I	II	II	I
Dandridge	JJ	V	V	IV	V	NS*	IV
Danripple	L	IIb	IIb	I	II	III	II
Davidson	N	IIb	IIb	I	II	II	II
Dawhoo	PP	V	V	V	V	NS*	NS*
Dawhoo variant	PP	V	V	V	V	NS*	NS*
Decatur	M	IIb	IIb	I	II	I	II
Dekalb	FF	IVb	IVb	III	IV	NS*	III
Dekalb variant	FF	IVb	IVb	III	IV	NS*	III
Delanco	B	Ia	Ia	I	Ia	II	I
Delila	HH	IVb	IVb	III	IV	NS*	IV
Dellwood	CC	IVb	IVb	II	IV	NS*	III
Deloss (drained)	C	Ib	Ib	II	Ib	NS*	I

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Deloss (undrained)	OO	V	V	V	V	NS*	NS*
Derroc	CC	IVb	IVb	II	IV	NS*	III
Devotion	FF	IVb	IVb	III	IV	NS*	III
Diana Mills	V	IVa	IVa	II	III	III	III
Dillard	G	IIa	IIa	I	II	II	I
Dogue	K	IIb	IIb	I	II	III	I
Dogue variant	K	IIb	IIb	I	II	III	I
Dorovan	PP	V	V	V	V	NS*	NS*
Dothan	Q	IIIa	IIIa	II	II	NS*	III
Downer	DD	IIb	IIb	II	IV	NS*	III
Dragston	E	IIa	IIa	I	II	NS*	II
Drall	FF	IVb	IVb	III	IV	NS*	III
Drapermill	U	IIIb	IIIb	II	II	III	II
Drypond	JJ	V	V	IV	V	NS*	IV
Duckston	QQ	V	V	V	V	NS*	NS*
Duffield	G	IIa	IIa	I	II	II	I
Dulles	Y	IVa	IVa	III	III	NS*	III
Dumfries	T	IIIb	IIIb	II	II	NS*	III
Dunbar (drained)	P	IIb	IIb	II	II	NS*	III
Dunbar (undrained)	Z	IVa	IVa	IV	III	NS*	NS*
Dunning (drained)	H	IIa	IIa	III	II	NS*	IV
Dunning (undrained)	NN	V	V	V	V	NS*	NS*
Duplin	K	IIb	IIb	I	II	III	I
Durham	CC	IVb	IVb	II	IV	NS*	III
Dyke	O	IIb	IIb	I	II	II	II
Easthamlet	KK	V	V	V	V	NS*	IV
Ebbing	G	IIa	IIa	I	II	II	I
Edgehill	CC	IVb	IVb	II	IV	NS*	III
Edgehill variant	CC	IVb	IVb	II	IV	NS*	III
Edgemont	U	IIIb	IIIb	II	II	III	II
Edneytown	L	IIb	IIb	I	II	III	II
Edneyville	T	IIIb	IIIb	II	II	NS*	III
Edom	M	IIb	IIb	I	II	I	II
Elbert	LL	V	V	V	V	NS*	IV
Elbert variant	LL	V	V	V	V	NS*	IV
Elioak	X	IVa	IVa	II	III	III	II
Elk	A	Ia	Ia	I	Ia	I	I
Elkton (drained)	C	Ib	Ib	II	Ib	NS*	I
Elkton (undrained)	OO	V	V	V	V	NS*	NS*
Elliber	M	IIb	IIb	I	II	I	II
Elsinboro	L	IIb	IIb	I	II	III	II
Emory	G	IIa	IIa	I	II	II	I

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Emporia	R	IIIa	IIIa	II	II	III	II
Endcav	Y	IVa	IVa	III	III	NS*	III
Enon	Y	IVa	IVa	III	III	NS*	III
Enott	Y	IVa	IVa	III	III	NS*	III
Ernest	W	IVa	IVa	IV	III	NS*	IV
Escatawba	L	IIb	IIb	I	II	III	II
Eubanks	N	IIb	IIb	I	II	II	II
Eulonia	K	IIb	IIb	I	II	III	I
Eunola	T	IIIb	IIIb	II	II	NS*	III
Evansham	LL	V	V	V	V	NS*	IV
Evard	L	IIb	IIb	I	II	III	II
Evesboro	II	V	V	III	V	NS*	NS*
Exum	J	IIb	IIb	I	II	NS*	I
Faceville	R	IIIa	IIIa	II	II	III	II
Fairfax	D	Ib	Ib	I	Ib	I	I
Fairpoint	JJ	V	V	IV	V	NS*	IV
Fairview	X	IVa	IVa	II	III	III	II
Fairystone	X	IVa	IVa	II	III	III	II
Fallsington	E	IIa	IIa	I	II	NS*	II
Fauquier	N	IIb	IIb	I	II	II	II
Fauquier, deep phase	N	IIb	IIb	I	II	II	II
Faywood	U	IIIb	IIIb	II	II	III	II
Featherstone	PP	V	V	V	V	NS*	NS*
Fedscreek	GG	IVb	IVb	IV	IV	NS*	III
Feedstone	G	IIa	IIa	I	II	II	I
Fisherman	QQ	V	V	V	V	NS*	NS*
Fiveblock	JJ	V	V	IV	V	NS*	IV
Flatwoods	M	IIb	IIb	I	II	I	II
Fletcher	U	IIIb	IIIb	II	II	III	II
Flume	R	IIIa	IIIa	II	II	III	II
Fluvanna	Y	IVa	IVa	III	III	NS*	III
Fluvaquents	HH	IVb	IVb	III	IV	NS*	IV
Forestdale	LL	V	V	V	V	NS*	IV
Fork (drained)	P	IIb	IIb	II	II	NS*	III
Fork (undrained)	Z	IVa	IVa	IV	III	NS*	NS*
Fork variant (drained)	P	IIb	IIb	II	II	NS*	III
Fork variant (undrained)	Z	IVa	IVa	IV	III	NS*	NS*
Frankstown	U	IIIb	IIIb	II	II	III	II
Frederick	M	IIb	IIb	I	II	I	II
Frederick/ Christian	M	IIb	IIb	I	II	I	II
Frederick/Lodi	M	IIb	IIb	I	II	I	II
Freemanville	Q	IIIa	IIIa	II	II	NS*	III
French	A	Ia	Ia	I	Ia	I	I

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Fripp	QQ	V	V	V	V	NS*	NS*
Funkstown	A	Ia	Ia	I	Ia	I	I
Gaila	FF	IVb	IVb	III	IV	NS*	III
Gainesboro	FF	IVb	IVb	III	IV	NS*	III
Galestown	II	V	V	III	V	NS*	NS*
Galtsmill	II	V	V	III	V	NS*	NS*
Georgeville	X	IVa	IVa	II	III	III	II
Germanna	L	IIb	IIb	I	II	III	II
Gertie	OO	V	V	V	V	NS*	NS*
Gilpin	U	IIIb	IIIb	II	II	III	II
Gilpin variant	U	IIIb	IIIb	II	II	III	II
Gladehill	A	Ia	Ia	I	Ia	I	I
Glenelg(BRH)	N	IIb	IIb	I	II	II	II
Glenelg(NV)	U	IIIb	IIIb	II	II	III	II
Glenville	W	IVa	IVa	IV	III	NS*	IV
Glynwood	GG	IVb	IVb	IV	IV	NS*	III
Glynwood variant	GG	IVb	IVb	IV	IV	NS*	III
Goblintown	V	IVa	IVa	II	III	III	III
Goldsboro	J	IIb	IIb	I	II	NS*	I
Goldston	JJ	V	V	IV	V	NS*	IV
Goldvein	BB	IVb	IVb	III	IV	NS*	III
Goldvein gritty	BB	IVb	IVb	III	IV	NS*	III
Goresville	N	IIb	IIb	I	II	II	II
Granville	R	IIIa	IIIa	II	II	III	II
Grassland	L	IIb	IIb	I	II	III	II
Greendale	A	Ia	Ia	I	Ia	I	I
Greenlee	CC	IVb	IVb	II	IV	NS*	III
Grigsby	A	Ia	Ia	I	Ia	I	I
Grimsley	GG	IVb	IVb	IV	IV	NS*	III
Gritney	T	IIIb	IIIb	II	II	NS*	III
Groseclose	M	IIb	IIb	I	II	I	II
Grover	X	IVa	IVa	II	III	III	II
Guernsey	M	IIb	IIb	I	II	I	II
Gullion	B	Ia	Ia	I	Ia	II	I
Gundy	V	IVa	IVa	II	III	III	III
Gunstock	V	IVa	IVa	II	III	III	III
Guyen	Z	IVa	IVa	IV	III	NS*	NS*
Gwinnett variant	X	IVa	IVa	II	III	III	II
Hagerstown	M	IIb	IIb	I	II	I	II
Halewood	U	IIIb	IIIb	II	II	III	II
Halifax	KK	V	V	V	V	NS*	IV
Hanceville	V	IVa	IVa	II	III	III	III
Happyland	U	IIIb	IIIb	II	II	III	II
Hartleton	FF	IVb	IVb	III	IV	NS*	III
Hartsells	CC	IVb	IVb	II	IV	NS*	III
Hatboro	HH	IVb	IVb	III	IV	NS*	IV

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	**Soil Mgt Group**	**Corn**	**Grain Sorghum**	**Small Grain**	**Soybeans**	**Alfalfa**	**Tall Grass, Clover, Hay, Pasture**
Hawksbill	CC	IVb	IVb	II	IV	NS*	III
Hawksbill cobbly	CC	IVb	IVb	II	IV	NS*	III
Hayesville	X	IVa	IVa	II	III	III	II
Haymarket	KK	V	V	V	V	NS*	IV
Hayter	L	IIb	IIb	I	II	III	II
Haywood	JJ	V	V	IV	V	NS*	IV
Hazel	JJ	V	V	IV	V	NS*	IV
Hazel channery	JJ	V	V	IV	V	NS*	IV
Hazel Run	U	IIIb	IIIb	II	II	III	II
Hazleton	JJ	V	V	IV	V	NS*	IV
Helena	KK	V	V	V	V	NS*	IV
Helena taxadjunct	KK	V	V	V	V	NS*	IV
Herndon	V	IVa	IVa	II	III	III	III
Hibler	L	IIb	IIb	I	II	III	II
Hickoryknob	N	IIb	IIb	I	II	II	II
Highsplint	CC	IVb	IVb	II	IV	NS*	III
Hiwassee	O	IIb	IIb	I	II	II	II
Hiwassee variant	O	IIb	IIb	I	II	II	II
Hoadley	BB	IVb	IVb	III	IV	NS*	III
Hobucken	PP	V	V	V	V	NS*	NS*
Holly	NN	V	V	V	V	NS*	NS*
Hollywood	LL	V	V	V	V	NS*	IV
Hublersburg	M	IIb	IIb	I	II	I	II
Huntington	A	Ia	Ia	I	Ia	I	I
Hyde (drained)	C	Ib	Ib	II	Ib	NS*	I
Hyde (undrained)	OO	V	V	V	V	NS*	NS*
Ingledove	A	Ia	Ia	I	Ia	I	I
Iotla	A	Ia	Ia	I	Ia	I	I
Iredell	KK	V	V	V	V	NS*	IV
Iredell variant	KK	V	V	V	V	NS*	IV
Irongate	DD	IVb	IVb	II	IV	NS*	III
Itman	JJ	V	V	IV	V	NS*	IV
Iuka	F	IIa	IIa	I	II	III	II
Izagora	J	IIb	IIb	I	II	NS*	I
Jackland	KK	V	V	V	V	NS*	IV
Jedburg	Z	IVa	IVa	IV	III	NS*	NS*
Jefferson	U	IIIb	IIIb	II	II	III	II
Jefferson variant	U	IIIb	IIIb	II	II	III	II
Johns (drained)	C	Ib	Ib	II	Ib	NS*	I
Johns (undrained)	OO	V	V	V	V	NS*	NS*
Johns variant	C	Ib	Ib	II	Ib	NS*	I

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	**Soil Mgt Group**	**Corn**	**Grain Sorghum**	**Small Grain**	**Soybeans**	**Alfalfa**	**Tall Grass, Clover, Hay, Pasture**
(drained)							
Johns variant (undrained)	OO	V	V	V	V	NS*	NS*
Johnston	PP	V	V	V	V	NS*	NS*
Junaluska	U	IIIb	IIIb	II	II	III	II
Kalmia	S	IIIa	IIIa	II	II	NS*	III
Kaymine	JJ	V	V	IV	V	NS*	IV
Keener	O	IIb	IIb	I	II	II	II
Kelly	KK	V	V	V	V	NS*	IV
Kempsville	S	IIIa	IIIa	II	II	NS*	III
Kenansville	DD	IVb	IVb	II	IV	NS*	III
Kenansville variant	DD	IVb	IVb	II	IV	NS*	III
Keyport	K	IIb	IIb	I	II	III	I
Kinkora (drained)	C	Ib	Ib	II	Ib	NS*	I
Kinkora (undrained)	OO	V	V	V	V	NS*	NS*
Kinston (drained)	C	Ib	Ib	II	Ib	NS*	I
Kinston (undrained)	OO	V	V	V	V	NS*	NS*
Klej	EE	IVb	IVb	III	IV	NS*	NS*
Klinesville	JJ	V	V	IV	V	NS*	IV
Konnarock	JJ	V	V	IV	V	NS*	IV
Lackstown	K	IIb	IIb	I	II	III	I
Laidig	W	IVa	IVa	IV	III	NS*	IV
Laidig cobbly	W	IVa	IVa	IV	III	NS*	IV
Lakehurst	EE	IVb	IVb	III	IV	NS*	NS*
Lakeland	II	V	V	III	V	NS*	NS
Lakin	II	V	V	III	V	NS*	NS
Landisburg	W	IVa	IVa	IV	III	NS*	IV
Lanexa	PP	V	V	V	V	NS*	NS*
Lansdale	FF	IVb	IVb	III	IV	NS*	III
Laroque	FF	IVb	IVb	III	IV	NS*	III
Lawnes	PP	V	V	V	V	NS*	NS*
Leadvale	BB	IVb	IVb	III	IV	NS*	III
Leaf (drained)	C	Ib	Ib	II	Ib	NS*	I
Leaf (undrained)	OO	V	V	V	V	NS*	NS*
Leaksville	KK	V	V	V	V	NS*	IV
Leatherwood	OO	V	V	V	V	NS*	NS*
Leck Kill	U	IIIb	IIIb	II	II	III	II
Leedsville	L	IIb	IIb	I	II	III	II
Leetonia	II	V	V	III	V	NS*	NS*
Legore	V	IVa	IVa	II	III	III	III
Lehew	JJ	V	V	IV	V	NS*	IV
Lenoir	LL	V	V	V	V	NS*	IV

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Leon	II	V	V	III	V	NS*	NS*
Levy	PP	V	V	V	V	NS*	NS*
Lew	FF	IVb	IVb	III	IV	NS*	III
Lewisberry	II	V	V	III	V	NS*	NS*
Lewisburg	CC	IVb	IVb	II	IV	NS*	III
Library	KK	V	V	V	V	NS*	IV
Lickdale (drained)	H	IIa	IIa	III	II	NS*	IV
Lickdale (undrained)	NN	V	V	V	V	NS*	NS*
Lignum	LL	V	V	V	V	NS*	IV
Lily	FF	IVb	IVb	III	IV	NS*	III
Linden	F	IIa	IIa	I	II	III	II
Lindside	A	Ia	Ia	I	Ia	I	I
Littlejoe	V	IVa	IVa	II	III	III	III
Litz	JJ	V	V	IV	V	NS*	IV
Lloyd	N	IIb	IIb	I	II	II	II
Lloyd variant	N	IIb	IIb	I	II	II	II
Lobdell	A	Ia	Ia	I	Ia	I	I
Lodi	M	IIb	IIb	I	II	I	II
Lostcove	FF	IVb	IVb	III	IV	NS*	III
Louisa	JJ	V	V	IV	V	NS*	IV
Louisa variant	JJ	V	V	IV	V	NS*	IV
Louisburg	FF	IVb	IVb	III	IV	NS*	III
Lowell	M	IIb	IIb	I	II	I	II
Lucketts	Y	IVa	IVa	III	III	NS*	III
Lucy	DD	IVb	IVb	II	IV	NS*	III
Lumbee (drained)	C	Ib	Ib	II	Ib	NS*	I
Lumbee (undrained)	OO	V	V	V	V	NS*	NS*
Lumbee variant (drained)	C	Ib	Ib	II	Ib	NS*	I
Lumbee variant (undrained)	OO	V	V	V	V	NS*	NS*
Lunt	AA	IVa	IVa	II	III	NS*	IV
Lynchburg	E	IIa	IIa	I	II	NS*	II
Macove	CC	IVb	IVb	II	IV	NS*	III
Madison	X	IVa	IVa	II	III	III	II
Madsheep	JJ	V	V	IV	V	NS*	IV
Maggodee	A	Ia	Ia	I	Ia	I	I
Magotha	PP	V	V	V	V	NS*	NS*
Malbis	W	IVa	IVa	IV	III	NS*	IV
Manassas	D	Ib	Ib	I	Ib	I	I
Mandy	JJ	V	V	IV	V	NS*	IV
Manor	FF	IVb	IVb	III	IV	NS*	III
Mantachie	I	IIa	IIa	I	II	NS*	I
Manteo	JJ	V	V	IV	V	NS*	IV

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Marbie	W	IVa	IVa	IV	III	NS*	IV
Marbleyard	FF	IVb	IVb	III	IV	NS*	III
Margo	A	Ia	Ia	I	Ia	I	I
Markes	NN	V	V	V	V	NS*	NS*
Marlboro	R	IIIa	IIIa	II	II	III	II
Marr	T	IIIb	IIIb	II	II	NS*	III
Marrowbone	JJ	V	V	IV	V	NS*	NS*
Marumsco	K	IIb	IIb	I	II	III	I
Masada	L	IIb	IIb	I	II	III	II
Massanetta	B	Ia	Ia	I	Ia	II	I
Massanutten	JJ	V	V	IV	V	NS*	IV
Matapeake	R	IIIa	IIIa	II	II	III	II
Matewan	FF	IVb	IVb	III	IV	NS*	III
Matewan	FF	IVb	IVb	III	IV	NS*	III
Matneflat	CC	IVb	IVb	II	IV	NS*	III
Mattamuskeet	PP	V	V	V	V	NS*	NS*
Mattan	PP	V	V	V	V	NS*	NS*
Mattapex	K	IIb	IIb	I	II	III	I
Mattaponi	R	IIIa	IIIa	II	II	III	II
Maurertown	NN	V	V	V	V	NS*	NS*
Maury	M	IIb	IIb	I	II	I	II
Mayodan	V	IVa	IVa	II	III	III	III
McCamy	FF	IVb	IVb	III	IV	NS*	III
McClung	M	IIb	IIb	I	II	I	II
McGary (drained)	P	IIb	IIb	II	II	NS*	III
McGary (undrained)	Z	IVa	IVa	IV	III	NS*	NS*
McLaurin	DD	IVb	IVb	II	IV	NS*	III
McQueen	B	Ia	Ia	I	Ia	II	I
Meadowfield	JJ	V	V	IV	V	NS*	IV
Meadows	JJ	V	V	IV	V	NS*	IV
Meadowville	G	IIa	IIa	I	II	II	I
Meadowville variant	G	IIa	IIa	I	II	II	I
Meckesville	W	IVa	IVa	IV	III	NS*	IV
Mecklenburg	V	IVa	IVa	II	III	III	III
Mecklenburg variant	V	IVa	IVa	II	III	III	III
Meggett (drained)	C	Ib	Ib	II	Ib	NS*	I
Meggett (undrained)	OO	V	V	V	V	NS*	NS*
Melfa	PP	V	V	V	V	NS*	NS*
Melvin (drained)	H	IIa	IIa	III	II	NS*	IV

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Melvin (undrained)	NN	V	V	V	V	NS*	NS*
Middleburg	G	IIa	IIa	I	II	II	I
Millrock	II	V	V	III	V	NS*	NS*
Mine Run	II	V	V	III	V	NS*	NS*
Minnieville	N	IIb	IIb	I	II	II	II
Mirerock	KK	V	V	V	V	NS*	IV
Misenheimer	JJ	V	V	IV	V	NS*	IV
Molena	II	V	V	III	V	NS*	NS*
Monacan	I	IIa	IIa	I	II	NS*	I
Mongle	H	IIa	IIa	III	II	NS*	IV
Monongahela	W	IVa	IVa	IV	III	NS*	IV
Montalto	N	IIb	IIb	I	II	II	II
Montonia	X	IVa	IVa	II	III	III	II
Montresso	D	Ib	Ib	I	Ib	I	I
Montross	Q	IIIa	IIIa	II	II	NS*	III
Moomaw	W	IVa	IVa	IV	III	NS*	IV
Morasonville	D	Ib	Ib	I	Ib	I	I
Morven	G	IIa	IIa	I	II	II	I
Mount Lucas	J	IIb	IIb	I	II	NS*	I
Mt. Rogers	GG	IVb	IVb	IV	IV	NS*	III
Muckalee	MM	V	V	V	V	NS*	IV
Munden	F	IIa	IIa	I	II	III	II
Murrill	L	IIb	IIb	I	II	III	II
Muskingum	JJ	V	V	IV	V	NS*	IV
Myatt (drained)	C	Ib	Ib	II	Ib	NS*	I
Myatt (undrained)	OO	V	V	V	V	NS*	NS*
Myatt variant (drained)	C	Ib	Ib	II	Ib	NS*	I
Myatt variant (undrained)	OO	V	V	V	V	NS*	NS*
Myersville	D	Ib	Ib	I	Ib	I	I
Nahunta	E	IIa	IIa	I	II	NS*	II
Nanford	V	IVa	IVa	II	III	III	III
Nansemond	F	IIa	IIa	I	II	III	II
Nason	V	IVa	IVa	II	III	III	III
Nawney	PP	V	V	V	V	NS*	NS*
Neabsco	BB	IVb	IVb	III	IV	NS*	III
Needmore	FF	IVb	IVb	III	IV	NS*	III
Nestoria	JJ	V	V	IV	V	NS*	IV
Nevarc	HH	IVb	IVb	III	IV	NS*	IV
Newark (drained)	H	IIa	IIa	III	II	NS*	IV
Newark (undrained)	NN	V	V	V	V	NS*	NS*
Newark variant (drained)	H	IIa	IIa	III	II	NS*	IV

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	**Soil Mgt Group**	**Corn**	**Grain Sorghum**	**Small Grain**	**Soybeans**	**Alfalfa**	**Tall Grass, Clover, Hay, Pasture**
Newark variant (undrained)	NN	V	V	V	V	NS*	NS*
Newbern	JJ	V	V	IV	V	NS*	IV
Newflat	LL	V	V	V	V	NS*	IV
Newhan	QQ	V	V	V	V	NS*	NS*
Newmarc	B	Ia	Ia	I	Ia	II	I
Nicelytown	A	Ia	Ia	I	Ia	I	I
Nicholson	BB	IVb	IVb	III	IV	NS*	III
Nickwasi	JJ	V	V	IV	V	NS*	NS*
Nimmo	E	IIa	IIa	I	II	NS*	II
Nixa	BB	IVb	IVb	III	IV	NS*	III
Nolichucky	O	IIb	IIb	I	II	II	II
Nolin	A	Ia	Ia	I	Ia	I	I
Nollville	G	IIa	IIa	I	II	II	I
Nomberville	A	Ia	Ia	I	Ia	I	I
Norfolk	R	IIIa	IIIa	II	II	III	II
Oak Level	V	IVa	IVa	II	III	III	III
Oakhill	FF	IVb	IVb	III	IV	NS*	III
Oaklet	Y	IVa	IVa	III	III	NS*	III
Oatlands	FF	IVb	IVb	III	IV	NS*	III
Occoquan	DD	IVb	IVb	II	IV	NS*	III
Ochlockonee	II	V	V	III	V	NS*	NS*
Ochlockonee variant	II	V	V	III	V	NS*	NS*
Ocilla	F	IIa	IIa	I	II	III	II
Ogles	CC	IVb	IVb	II	IV	NS*	III
Okeetee	LL	V	V	V	V	NS*	IV
Opequon	JJ	V	V	IV	V	NS*	IV
Orange	KK	V	V	V	V	NS*	IV
Orange variant	KK	V	V	V	V	NS*	IV
Orangeburg	R	IIIa	IIIa	II	II	III	II
Orenda	KK	V	V	V	V	NS*	IV
Oriskany	CC	IVb	IVb	II	IV	NS*	III
Orrville (drained)	C	Ib	Ib	II	Ib	NS*	I
Orrville (undrained)	OO	V	V	V	V	NS*	NS*
Orrville variant (drained)	C	Ib	Ib	II	Ib	NS*	I
Orrville variant (undrained)	OO	V	V	V	V	NS*	NS*
Orthents	JJ	V	V	IV	V	NS	IV
Osier	E	IIa	IIa	I	II	NS*	II
Ostin	II	V	V	III	V	NS*	NS*
Othello (drained)	C	Ib	Ib	II	Ib	NS*	I
Othello	OO	V	V	V	V	NS*	NS*

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
(undrained)							
Ott	JJ	V	V	IV	V	NS*	NS*
Pacolet	X	IVa	IVa	II	III	III	II
Pactolus	EE	IVb	IVb	III	IV	NS*	NS*
Paddyknob	JJ	V	V	IV	V	NS*	IV
Pagebrook	Y	IVa	IVa	III	III	NS*	III
Pamlico	PP	V	V	V	V	NS*	NS*
Pamunkey	B	Ia	Ia	I	Ia	II	I
Pamunkey variant	B	Ia	Ia	I	Ia	II	I
Panorama	U	IIIb	IIIb	II	II	III	II
Pantego (drained)	C	Ib	Ib	II	Ib	NS*	I
Pantego (undrained)	OO	V	V	V	V	NS*	NS*
Parker	GG	IVb	IVb	IV	IV	NS*	III
Partlow	HH	IVb	IVb	III	IV	NS*	IV
Pasquotank (drained)	C	Ib	Ib	II	Ib	NS*	I
Pasquotank (undrained)	OO	V	V	V	V	NS*	NS*
Peaks	JJ	V	V	IV	V	NS*	IV
Peawick	HH	IVb	IVb	III	IV	NS*	IV
Pecktonville	M	IIb	IIb	I	II	I	II
Penhook	X	IVa	IVa	II	III	III	II
Penn	FF	IVb	IVb	III	IV	NS*	III
Philo (drained)	H	IIa	IIa	III	II	NS*	IV
Philo (undrained)	NN	V	V	V	V	NS*	NS*
Philoment	D	Ib	Ib	I	Ib	I	I
Pigeonroost	N	IIb	IIb	I	II	II	II
Pilot Mountain	JJ	V	V	IV	V	NS*	IV
Pineola	L	IIb	IIb	I	II	III	II
Pineville	U	IIIb	IIIb	II	II	III	II
Pineywoods	NN	V	V	V	V	NS*	NS*
Pinkston	JJ	V	V	IV	V	NS*	IV
Pinoka	JJ	V	V	IV	V	NS*	IV
Pisgah	M	IIb	IIb	I	II	I	II
Plummer	EE	IVb	IVb	III	IV	NS*	NS*
Pocalla	DD	IVb	IVb	II	IV	NS*	III
Pocaty	PP	V	V	V	V	NS*	NS*
Pocomoke	E	IIa	IIa	I	II	NS*	II
Poindexter	FF	IVb	IVb	III	IV	NS*	III
Poindexter variant	FF	IVb	IVb	III	IV	NS*	III
Polawana	PP	V	V	V	V	NS*	NS*
Pooler variant	C	Ib	Ib	II	Ib	NS*	I

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
(drained)							
Pooler variant (undrained)	OO	V	V	V	V	NS*	NS*
Pope	A	Ia	Ia	I	Ia	I	I
Poplimento	M	IIb	IIb	I	II	I	II
Porters	FF	IVb	IVb	III	IV	NS*	III
Portsmouth (drained)	C	Ib	Ib	II	Ib	NS*	I
Portsmouth (undrained)	OO	V	V	V	V	NS*	NS*
Post	V	IVa	IVa	II	III	III	III
Pouncey	LL	V	V	V	V	NS*	IV
Poynor	GG	IVb	IVb	IV	IV	NS*	III
Psamments	II	V	V	III	V	NS*	NS*
Pungo	PP	V	V	V	V	NS*	NS*
Purcellville	D	Ib	Ib	I	Ib	I	I
Purdy (drained)	H	IIa	IIa	III	II	NS*	IV
Purdy (undrained)	NN	V	V	V	V	NS*	NS*
Quantico	R	IIIa	IIIa	II	II	III	II
Rabun	N	IIb	IIb	I	II	II	II
Rains (drained)	C	Ib	Ib	II	Ib	NS*	I
Rains (undrained)	OO	V	V	V	V	NS*	NS*
Ramsey	JJ	V	V	IV	V	NS*	IV
Rapidan	N	IIb	IIb	I	II	II	II
Rappahanock	PP	V	V	V	V	NS*	NS*
Raritan	W	IVa	IVa	IV	III	NS*	IV
Rasalo	Y	IVa	IVa	III	III	NS*	III
Rayne	U	IIIb	IIIb	II	II	III	II
Readington	W	IVa	IVa	IV	III	NS*	IV
Reaville	JJ	V	V	IV	V	NS*	IV
Redbrush	Y	IVa	IVa	III	III	NS*	III
Remlik	DD	IVb	IVb	II	IV	NS*	III
Rhodhiss	X	IVa	IVa	II	III	III	II
Rigley	CC	IVb	IVb	II	IV	NS*	III
Rion	X	IVa	IVa	II	III	III	II
Riverview	G	IIa	IIa	I	II	II	I
Rixeyville	JJ	V	V	IV	V	NS*	NS*
Roanoke (drained)	H	IIa	IIa	III	II	NS*	IV
Roanoke (undrained)	NN	V	V	V	V	NS*	NS*
Robertsville	LL	V	V	V	V	NS*	IV
Rockbam	X	IVa	IVa	II	III	III	II
Rohrersville	BB	IVb	IVb	III	IV	NS*	III
Ross	A	Ia	Ia	I	Ia	I	I
Rough	JJ	V	V	IV	V	NS*	IV

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Rowland	A	Ia	Ia	I	Ia	I	I
Rumford	DD	IVb	IVb	II	IV	NS*	III
Rushtown	FF	IVb	IVb	III	IV	NS*	III
Ruston	S	IIIa	IIIa	II	II	NS*	III
Saffell	DD	IVb	IVb	II	IV	NS*	III
Santuc	G	IIa	IIa	I	II	II	I
Sassafras	T	IIIb	IIIb	II	II	NS*	III
Saunook	L	IIb	IIb	I	II	III	II
Sauratown	CC	IVb	IVb	II	IV	NS*	III
Savannah	BB	IVb	IVb	III	IV	NS*	III
Scatterville	BB	IVb	IVb	III	IV	NS*	III
Schaffenaker	II	V	V	III	V	NS*	NS*
Seabrook	EE	IVb	IVb	III	IV	NS*	NS*
Seagate	EE	IVb	IVb	III	IV	NS*	NS*
Sedgefield	KK	V	V	V	V	NS*	IV
Sekil	FF	IVb	IVb	III	IV	NS*	III
Seneca	G	IIa	IIa	I	II	II	I
Sequatchie	B	Ia	Ia	I	Ia	II	I
Sequoia	U	IIIb	IIIb	II	II	III	II
Sewell	JJ	V	V	IV	V	NS*	IV
Shelocta	L	IIb	IIb	I	II	III	II
Shelocta variant	L	IIb	IIb	I	II	III	II
Shenval	O	IIb	IIb	I	II	II	II
Sherando	CC	IVb	IVb	II	IV	NS*	III
Sheva	KK	V	V	V	V	NS*	IV
Shottower	O	IIb	IIb	I	II	II	II
Shouns	G	IIa	IIa	I	II	II	I
Sindion	B	Ia	Ia	I	Ia	II	I
Skeeterville	KK	V	V	V	V	NS*	IV
Slabtown	G	IIa	IIa	I	II	II	I
Slagle	K	IIb	IIb	I	II	III	I
Snicksville	D	Ib	Ib	I	Ib	I	I
Snowdog	BB	IVb	IVb	III	IV	NS*	III
Spears Mountain	V	IVa	IVa	II	III	III	III
Speedwell	A	Ia	Ia	I	Ia	I	I
Spessard	CC	IVb	IVb	II	IV	NS*	III
Spivey	FF	IVb	IVb	III	IV	NS*	III
Spotsylvania	V	IVa	IVa	II	III	III	III
Spray	JJ	V	V	IV	V	NS*	IV
Spriggs	JJ	V	V	IV	V	NS*	IV
Springwood	D	Ib	Ib	I	Ib	I	I
Stanton	LL	V	V	V	V	NS*	IV
Starr	G	IIa	IIa	I	II	II	I
Starr-Dyke	O	IIb	IIb	I	II	II	II
Staser	A	Ia	Ia	I	Ia	I	I
State (ES)	T	IIIb	IIIb	II	II	NS*	III

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	**Soil Mgt Group**	**Corn**	**Grain Sorghum**	**Small Grain**	**Soybeans**	**Alfalfa**	**Tall Grass, Clover, Hay, Pasture**
State (Mainland)	B	Ia	Ia	I	Ia	II	I
Steinsburg	JJ	V	V	IV	V	NS*	IV
Stonecoal	JJ	V	V	IV	V	NS*	IV
Stoneville	X	IVa	IVa	II	III	III	II
Stott Knob	N	IIb	IIb	I	II	II	II
Stough	F	IIa	IIa	I	II	III	II
Straightstone	V	IVa	IVa	II	III	III	III
Strawfield	X	IVa	IVa	II	III	III	II
Stumptown	FF	IVb	IVb	III	IV	NS*	III
Suches	A	Ia	Ia	I	Ia	I	I
Sudley	D	Ib	Ib	I	Ib	I	I
Suffolk	T	IIIb	IIIb	II	II	NS*	III
Sugarhol	O	IIb	IIb	I	II	II	II
Sulfaquents	PP	V	V	V	V	NS*	NS*
Summers	GG	IVb	IVb	IV	IV	NS*	III
Susquehanna	KK	V	V	V	V	NS*	IV
Swamp	PP	V	V	V	V	NS*	NS*
Swampoodle	D	Ib	Ib	I	Ib	I	I
Sweetapple	FF	IVb	IVb	III	IV	NS*	III
Swimley	M	IIb	IIb	I	II	I	II
Sycoline	KK	V	V	V	V	NS*	IV
Sylco	JJ	V	V	IV	V	NS*	IV
Sylvatus	JJ	V	V	IV	V	NS*	IV
Talladega	JJ	V	V	IV	V	NS*	IV
Tallapoosa	JJ	V	V	IV	V	NS*	IV
Tallapoosa variant	JJ	V	V	IV	V	NS*	IV
Tanasee	JJ	V	V	IV	V	NS*	IV
Tankerville	N	IIb	IIb	I	II	II	II
Tankerville taxadjunct	N	IIb	IIb	I	II	II	II
Tarboro	II	V	V	III	V	NS*	NS*
Tarrus	X	IVa	IVa	II	III	III	II
Tate	O	IIb	IIb	I	II	II	II
Tate variant	O	IIb	IIb	I	II	II	II
Tatum	X	IVa	IVa	II	III	III	II
Terric Medisaprists	PP	V	V	V	V	NS*	NS*
Tetotum	K	IIb	IIb	I	II	III	I
Tetotum variant	K	IIb	IIb	I	II	III	I
Thunder	GG	IVb	IVb	IV	IV	NS*	III
Thurmont	L	IIb	IIb	I	II	III	II
Tidal Marsh	PP	V	V	V	V	NS*	NS*
Tidal Marsh, high	PP	V	V	V	V	NS*	NS*
Tidal Marsh, low	PP	V	V	V	V	NS*	NS*

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	**Soil Mgt Group**	**Corn**	**Grain Sorghum**	**Small Grain**	**Soybeans**	**Alfalfa**	**Tall Grass, Clover, Hay, Pasture**
Tidal Mudflats	PP	V	V	V	V	NS*	NS*
Tidal Pool	PP	V	V	V	V	NS*	NS*
Tifton	Q	IIIa	IIIa	II	II	NS*	III
Timberville	G	IIa	IIa	I	II	II	I
Timberville variant	G	IIa	IIa	I	II	II	I
Tioga	A	Ia	Ia	I	Ia	I	I
Toccoa	II	V	V	III	V	NS*	NS*
Toddstav	HH	IVb	IVb	III	IV	NS*	IV
Tomotley (drained)	C	Ib	Ib	II	Ib	NS*	I
Tomotley (undrained)	OO	V	V	V	V	NS*	NS*
Toms	C	Ib	Ib	II	Ib	NS*	I
Toqast	V	IVa	IVa	II	III	III	III
Torhunta	E	IIa	IIa	I	II	NS*	II
Totier	U	IIIb	IIIb	II	II	III	II
Toxaway	CC	IVb	IVb	II	IV	NS*	III
Toxaway (drained)	C	Ib	Ib	II	Ib	NS*	I
Toxaway (undrained)	OO	V	V	V	V	NS*	NS*
Trappist	U	IIIb	IIIb	II	II	III	II
Trego	W	IVa	IVa	IV	III	NS*	IV
Trenholm	KK	V	V	V	V	NS*	IV
Trimont	FF	IVb	IVb	III	IV	NS*	III
Trussell	BB	IVb	IVb	III	IV	NS*	NS*
Tuckahoe	A	Ia	Ia	I	Ia	I	I
Tuckasegee	G	IIa	IIa	I	II	II	I
Tugglesgap	CC	IVb	IVb	II	IV	NS*	III
Tumbling	O	IIb	IIb	I	II	II	II
Turbeville	O	IIb	IIb	I	II	II	II
Tusquitee	G	IIa	IIa	I	II	II	I
Tygart (drained)	P	IIb	IIb	II	II	NS*	III
Tygart (undrained)	Z	IVa	IVa	IV	III	NS*	NS*
Uchee	DD	IVb	IVb	II	IV	NS*	III
Udults	Y	IVa	IVa	III	III	NS*	III
Unison	L	IIb	IIb	I	II	III	II
Unison variant	L	IIb	IIb	I	II	III	II
Vance	Y	IVa	IVa	III	III	NS*	III
Vandalia	L	IIb	IIb	I	II	III	II
Varina	Q	IIIa	IIIa	II	II	NS*	III
Vaucluse	Q	IIIa	IIIa	II	II	NS*	III
Vertrees	M	IIb	IIb	I	II	I	II
Virgilina	KK	V	V	V	V	NS*	IV
Wadesboro	X	IVa	IVa	II	III	III	II

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Tall Grass, Clover, Hay, Pasture
Wagram	DD	IVb	IVb	II	IV	NS*	III
Wahee (drained)	C	Ib	Ib	II	Ib	NS*	I
Wahee (undrained)	OO	V	V	V	V	NS*	NS*
Wakulla	II	V	V	III	V	NS*	NS*
Wallen	JJ	V	V	IV	V	NS*	IV
Walnut	GG	IVb	IVb	IV	IV	NS*	III
Wando	II	V	V	III	IV	NS*	III
Warminster	X	IVa	IVa	II	III	III	II
Watahala	M	IIb	IIb	I	II	I	II
Watauga	V	IVa	IVa	II	III	III	III
Wateree	FF	IVb	IVb	III	IV	NS*	III
Watt	JJ	V	V	IV	V	NS*	IV
Watt variant	JJ	V	V	IV	V	NS*	IV
Waxpool	LL	V	V	V	V	NS*	IV
Waynesboro	L	IIb	IIb	I	II	III	II
Weaver	A	Ia	Ia	I	Ia	I	I
Webbtown	JJ	V	V	IV	V	NS*	IV
Wedowee	V	IVa	IVa	II	III	III	III
Weeksville (drained)	C	Ib	Ib	II	Ib	NS*	I
Weeksville (undrained)	OO	V	V	V	V	NS*	NS*
Wehadkee	MM	V	V	V	V	NS*	IV
Weikert	JJ	V	V	IV	V	NS*	IV
Westfield	V	IVa	IVa	II	IV	III	III
Westmoreland	U	IIIb	IIIb	II	II	III	II
Weston	E	IIa	IIa	I	II	NS*	II
Westphalia	II	V	V	III	V	NS*	NS*
Weverton	GG	IVb	IVb	IV	IV	NS*	III
Wharton	M	IIb	IIb	I	II	I	II
Wheeling	A	Ia	Ia	I	Ia	I	I
White Store	KK	V	V	V	V	NS*	IV
White Store variant	KK	V	V	V	V	NS*	IV
Whiteford	U	IIIb	IIIb	II	II	III	II
Wickham	B	Ia	Ia	I	Ia	II	I
Wickham variant	B	Ia	Ia	I	Ia	II	I
Widget	CC	IVb	IVb	II	IV	NS*	III
Wilkes	JJ	V	V	IV	V	NS*	IV
Wingina	A	Ia	Ia	I	Ia	I	I
Winnsboro	KK	V	V	V	V	NS*	IV
Wintergreen	O	IIb	IIb	I	II	II	II
Winton	B	Ia	Ia	I	Ia	II	I
Wolfgap	A	Ia	Ia	I	Ia	I	I
Wolftrap	K	IIb	IIb	I	II	III	I

Table 1-1 Soil Productivity Groupings for Various Cropping Categories							
Soil Series	**Soil Mgt Group**	**Corn**	**Grain Sorghum**	**Small Grain**	**Soybeans**	**Alfalfa**	**Tall Grass, Clover, Hay, Pasture**
Woodington	EE	IVb	IVb	III	IV	NS*	NS*
Woodstown	J	IIb	IIb	I	II	NS*	I
Woolvine	V	IVa	IVa	II	III	III	III
Woolwine	V	IVa	IVa	II	III	III	III
Worsham	HH	IVb	IVb	III	IV	NS*	IV
Worsham variant	HH	IVb	IVb	III	IV	NS*	IV
Wrightsboro	J	IIb	IIb	I	II	NS*	I
Wurno	JJ	V	V	IV	V	NS*	IV
Wyrick	G	IIa	IIa	I	II	II	I
Yadkin	X	IVa	IVa	II	III	III	II
Yellowbottom	V	IVa	IVa	II	III	III	III
Yemasse (drained)	C	Ib	Ib	II	Ib	NS*	I
Yemasse (undrained)	OO	V	V	V	V	NS*	NS*
Yeopim	K	IIb	IIb	I	II	III	I
Yogaville	MM	V	V	V	V	NS*	IV
York	BB	IVb	IVb	III	IV	NS*	III
Zepp	JJ	V	V	IV	V	NS*	IV
Zion	Y	IVa	IVa	III	III	NS*	III
Zion variant	Y	IVa	IVa	III	III	NS*	III
Zoar	K	IIb	IIb	I	II	III	I

*NS - Not Suited. If crop will be grown in this soil series, use the lowest Productivity Group Yield OR verifiable past crop yields as defined in 4VAC5-15-150.A.2.e.(3) of the Nutrient Management Training and Certification Regulations.

Table 1-2
Estimated Yields in Bushels (Bu) or Tons (T) per Acre (Ac) of Various Non-Irrigated Crops for Identified Soil Productivity Groups

Crop	I		II		III		IV		V
	a	b	a	b	a	b	a	b	
Corn									
Grain (Bu/Ac)	180	170	160	150	140	130	120	100	80
Silage (T/Ac) [1]	25.4	24.4	23.4	22.5	21.5	20.5	19.5	17.5	15.6
Grain Sorghum (Bu/Ac)	140	130	120	110	100		90		80
Soybeans (Bu/Ac)									
Early season	50	45	40		35		25		20
Late season [2]	40	34	34	30	25		18		15
Wheat (Bu/Ac)									
Standard	64		56		48		40		24
Intensive	80		70		60		50		30
Barley (Bu/Ac)									
Standard	100		70		60		50		30
Intensive	115		88		75		63		38
Oats (Bu/Ac)	80		80		80		60		60
Cereal Silage (T/Ac)									
Barley/Oats/Rye	>10		8-10		6-8		3-6		<3
Wheat/Triticale	>12		10-12		8-10		4-8		<4
Tallgrass Hay (T/Ac)	>4.0		3.5-4.0		3.0-3.5		<3.0		<3.0
Bermudagrass Hay (T/Ac)	>6.0		5.0-6.0		4.0-5.0		3.0-4.0		<3
Prairie Grass Hay (T/Ac)	>5.0		4.25-5		3.5-4.25		3-3.5		<3
Alfalfa (T/Ac)	>6.0		4.0-6.0		<4.0		<4.0		<4.0
Pasture (Ac/AU)*	1.0		1.1-1.5		1.6-3.0		3.1-6.5		

1. When using documented farmer records, corn silage yield may be calculated using the following formula:

   Corn Grain Yield (bu/ac) X 0.0985 + 7.6964 = **Corn Silage Yield** Tons/ac.

2. Late season beans would be planted on or after 6/21 of that year.
3. Yields are based on the following moisture levels: grain-corn-15.5%, wheat-13.5%, barley-14%, oats-14%, grain sorghum-13%, soybeans-14.5%; all silage-65%; all hay-15%.

*Animal Unit (AU) - To determine pasture carrying capacity, one animal unit = 1000 lbs of any animal type or one 1000 lb cow and calf or two 500 lb steers or five ewes with lambs.

Table 1-3
Utilizing Erosion/Slope Information

Soil mapping units provide information on severity of erosion as well as slope yield information. If multiple yield reductions occur in a field, for example, a soil with severe erosion (25% yield reduction) on a class D slope in the ridge and valley physiographic region (20% yield reduction), the single most limiting reduction would be used (25%) as opposed to an additive factor (45%).

1. Yield Adjustment According to Erosion:

Erosion Classes	% Yield Reduction
slight and moderate (1 and 2)	0
severe (3)	25

2. Yield Adjustment According to Slope:

Slope Classes	% Slope Coastal Plain	% Slope Piedmont, Mountain Regions	% Yield Reduction Row Crops and Hay*** Conv.till*	No till*	% Increase in Acres/Animal Unit**
A	0-2	0-2	-	-	-
B	2-6	2-7	-	-	-
C	6-10	7-15	6	0	-
D	10-15	15-25	20	10	25
E	15-25	25-45	too steep for tillage		50
F	25+	45+	too steep for tillage		50

* A and B are equal and are the class standard.
** A, B and C are equal and are the class standard.
*** Use No-till reduction for established hay.

3. Yield Adjustment According to Coarse Fragments: Exclude group GG since coarse fragments are part of its series criteria:

a. Fine gravelly, gravelly (gritty), cherty - 10% yield reduction
b. Cobbly, angular cobbly, channery, flaggy, slaty, shaly - 15% yield reduction
c. Very gravelly, extremely gravelly, very cherty - 20% yield reduction
d. Very cobbly, extremely cobbly, very channery, very flaggy - 25% yield reduction

4. Yield Adjustment According to Rock Outcrop:

a. Rocky - No yield reduction; subtract 10% of land area from field acreage to account for rock outcrop area
b. Bouldery, very bouldery, very rocky, stony, very stony - 25% yield reduction for pasture, not suited to row crops
c. Extremely bouldery, extremely rocky, extremely stony (rubbly) and all complexes with rock outcrop - 50% yield reduction for pasture, not suited to row crops

Section I.A Explanation of Environmentally Sensitive Sites

The regulations define "environmentally sensitive site" to mean any field which is particularly susceptible to nutrient loss to groundwater or surface water since it contains or drains to areas which contain sinkholes; or where at least 33% of the area in a specific field contains one or any combination of the following features:

1. Soils with high potential for leaching based on soil texture or excessive drainage;
2. Shallow soils less than 41 inches deep likely to be located over fractured or limestone bedrock;
3. Subsurface tile drains;
4. Soils with high potential for subsurface lateral flow based on soil texture and poor drainage;
5. Floodplains as identified by soils prone to frequent flooding in county soil surveys; or
6. Lands with slopes greater than 15%.

Table 1-4 contains environmental risk ratings for Virginia soils for criteria 1,2 and 4 listed above. Determine the percentage of field area for soils listed as H (high) for Environmental Sensitivity Rating in Table 1-4 plus any field areas that meet criteria 3, 5 or 6 above to determine if the field is an environmentally sensitive site. Soils listed as moderate risk are not defined as environmentally sensitive, but should be treated with similar caution when making nitrogen recommendations.

The primary reason for the environmental sensitivity rating for each soil listed as high or moderate risk in Table 1-4 is identified by the following key:

Leaching - Soils with potential for leaching based on soil texture or excessive drainage

Shallow - Shallow soils less than 41 inches deep likely to be located over fractured or limestone bedrock

Drainage - Soils with high potential for subsurface lateral flow based on soil texture and poor drainage

The category rating should be used to develop nitrogen application programs to address this concern through rate and timing recommendations.

Table 1-4 that follows lists the environmental sensitivity rating and category for each soil in Virginia.

Table 1-4
Nitrogen Loss Risk and Environmental Sensitivity Ratings for Virginia Soils & Soil Series Associated With Environmentally Sensitive Sites

Soil Series	Environmental Sensitivity	Category
Abell	L	
Ackwater	L	
Acredale	L	
Aden	L	
Airmont	L	
Alaga	H	Leaching
Alamance	H	Leaching
Alanthus	M	Leaching
Albano	L	
Albemarle	M	Leaching
Alderflats	L	
Aldino	L	
Allegheny	H	Shallow
Alonemill	H	Leaching
Alonzville	M	Leaching
Altavista	L	
Altavista variant	L	
Alticrest	H	Shallow
Angie	L	
Appling	L	
Appling gritty	L	
Appomattox	L	
Aqualfs	L	
Aquents	H	Drainage
Aquic Udifluvents	L	
Aquults	L	
Arapahoe	H	Drainage
Arcola	M	Leaching
Ardilla	L	
Argent	L	
Arkaqua	L	
Ashburn	L	
Ashe	H	Leaching
Ashlar	H	Leaching
Assateague	H	Leaching
Athol	L	
Atkins	H	Drainage
Atlee	L	
Augusta variant	L	
Augusta	L	
Aura	H	Leaching
Austinville	L	
Axis	H	Drainage
Aycock	L	
Ayersville	M	Leaching
Backbay	H	Drainage
Badin	L	
Baile	L	
Bailegap	M	Leaching
Balsam	H	Shallow
Bama	M	Leaching
Banister	L	
Barclay	M	Leaching
Batteau	L	
Beckham	L	
Bedington	M	Leaching
Beech	L	
Beech Grove	H	Shallow
Belhaven	H	Drainage
Bellspur	M	Leaching
Beltsville	L	
Belvoir	L	
Benthole	H	Leaching
Bentley	L	
Berks	H	Shallow
Berks variant	H	Shallow
Bermudian	M	Leaching
Berthera	L	
Bertie	L	
Bethera	L	
Bethesda	H	Leaching
Bethlehem	H	Shallow
Bibb	H	Drainage
Biltmore	H	Leaching
Birdsboro	L	
Blackthorn	L	
Bladen	L	
Blago	L	
Blairton	H	Shallow
Bland	H	Shallow
Blocktown	H	Shallow
Bloodyhorse	H	Leaching
Bluemont	M	Shallow
Bluemount	M	Leaching
Bohicket	L	
Bojac, Eastern Shore	H	Leaching
Bojac, mainland	H	Leaching
Bolling	L	
Bolling variant	L	
Bolton	M	Leaching
Bonneau	H	Leaching
Bookwood	H	Shallow
Botetourt	L	
Bourne	L	
Bourne variant	L	
Bowmansville	H	Drainage

Table 1-4
Nitrogen Loss Risk and Environmental Sensitivity Ratings for Virginia Soils & Soil Series Associated With Environmentally Sensitive Sites

Soil Series	Environmental Sensitivity	Category
Braddock	L	
Brandywine	H	Leaching
Brecknock	M	Leaching
Bremo	H	Leaching
Brentsville	H	Shallow
Brevard	M	Leaching
Brickhaven	L	
Brikerton	L	
Brinklow	M	Leaching
Broadway	L	
Brockroad	L	
Brownsville	H	Shallow
Brownwood	H	Leaching
Brumbaugh	L	
Brushy	H	Shallow
Buchanan	L	
Buckhall	L	
Buckingham	L	
Bucks	M	Leaching
Buckton	L	
Buffstat	L	
Bugley	H	Shallow
Buncombe	H	Leaching
Burketown	L	
Burrowsville	L	
Burton	H	Shallow
Buzzrock	H	Shallow
Cahaba	L	
Calverton	L	
Calvin	H	Shallow
Camocca	H	Drainage
Caneyville	H	Shallow
Captina	L	
Carbo	H	Shallow
Carbonton	L	
Cardiff	H	Leaching
Cardova	M	Leaching
Caroline	L	
Cartecay	H	Leaching
Carteret	H	Drainage
Cataska	H	Shallow
Catharpin	L	
Catlett	H	Shallow
Catoctin	H	Shallow
Catpoint	H	Leaching
Caverns	H	Leaching
Cecil	L	
Cedarcreek	H	Shallow
Chagrin	M	Leaching
Chagrin variant	H	Leaching
Chandler	H	Leaching

Soil Series	Environmental Sensitivity	Category
Chapanoke	L	
Charity	L	
Chastain	L	
Chastaina	L	
Chatuge	L	
Chavies	H	Leaching
Chavies variant	H	Leaching
Chenneby	L	
Chesapeake	M	Leaching
Chester	M	Leaching
Chestnut	H	Leaching
Chewacla	L	
Chickahominy	L	
Chilhowie	H	Shallow
Chincoteague	L	
Chipley	L	
Chiswell	H	Shallow
Christian	L	
Cid	L	
Claiborne	M	Leaching
Clapham	L	
Clarksburg	L	
Clearbrook	H	Shallow
Cliffield	H	Leaching
Clifford	L	
Clifton	L	
Clover	L	
Cloverlick	H	Leaching
Clubcaf	L	
Clymer	M	Leaching
Codorus	L	
Codorus variant	L	
Colescreek	L	
Colfax	L	
Colfax variant	L	
Colleen	L	
Colvard	H	Leaching
Combs	M	Leaching
Comus	M	Leaching
Conetoe	H	Leaching
Congaree	L	
Coosaw	L	
Corolla	L	
Corydon	H	Shallow
Cotaco	L	
Cottonbend	M	Leaching
Coursey	L	
Cowee	H	Shallow
Coxville	L	
Craggey	H	Shallow

Table 1-4
Nitrogen Loss Risk and Environmental Sensitivity Ratings for Virginia Soils & Soil Series Associated With Environmentally Sensitive Sites

Soil Series	Environmental Sensitivity	Category
Craigsville	H	Leaching
Craven	L	
Creedmoor variant	L	
Croton	L	
Cullasaja	H	Leaching
Cullen	L	
Culleoka	M	Leaching
Culpeper	L	
Daleville	L	
Dan River	M	Leaching
Dandridge	H	Shallow
Danripple	L	
Davidson	L	
Dawhoo variant	H	Drainage
Decatur	L	
Dekalb	H	Leaching
Delanco	L	
Delila	L	
Dellwood	L	
Deloss	H	Drainage
Derroc	H	Leaching
Devotion	H	Leaching
Diana Mills	L	
Dillard	L	
Dillsboro	L	
Dismal	H	Drainage
Dogue	L	
Dorovan	H	Drainage
Dothan	M	Leaching
Downer	H	Leaching
Dragston	M	Drainage
Drall	H	Leaching
Draper	M	Leaching
Drapermill	M	Leaching
Drypond	H	Shallow
Duckston	H	Drainage
Duffield	M	Leaching
Dulles	L	
Dumfries	M	Leaching
Dunbar	L	
Dunning	L	
Duplin	L	
Durham	M	Leaching
Dyke	L	
Dystrochrepts	H	Leaching
Easthamlet	L	
Ebbing	L	
Edgehill	L	
Edgehill variant	L	
Edgemont	M	Leaching

Soil Series	Environmental Sensitivity	Category
Edneytown	M	Leaching
Edneyville	H	Leaching
Edom	L	
Elbert	L	
Elbert variant	L	
Elioak	L	
Elk	L	
Elkton, drained	H	Drainage
Elkton, undrained	L	
Elliber	H	Leaching
Elsinboro	M	Leaching
Emory	L	
Emporia	M	Leaching
Endcav	L	
Enon	L	
Enott	L	
Ernest	L	
Escatawba	M	Leaching
Eubanks	M	Leaching
Eulonia	L	
Eunola	L	
Evansham	L	
Evard	M	Leaching
Evesboro	H	Shallow
Exum	L	
Faceville	L	
Fairfax	L	
Fairpoint	H	Shallow
Fairview	L	
Fairystone	L	
Fallsington	M	Drainage
Fauquier	L	
Fauquier, deep phase	L	
Faywood	H	Shallow
Featherstone	L	
Fedscreek	H	Leaching
Feedstone	L	
Fisherman	L	
Fiveblock	H	Leaching
Flatwoods	L	
Fletcher	L	
Flume	L	
Fluvanna	L	
Fluvaquents	L	
Forestdale	L	
Fork	L	
Fork variant	L	
Frankstown	M	Leaching
Frederick	L	

Table 1-4
Nitrogen Loss Risk and Environmental Sensitivity Ratings for Virginia Soils & Soil Series Associated With Environmentally Sensitive Sites

Soil Series	Environmental Sensitivity	Category
Freemanville	L	
French	L	
Fresh water swamp	H	Drainage
Fripp	H	Leaching
Funkstown	L	
Gaila	M	Leaching
Gainesboro	H	Shallow
Galestown	H	Leaching
Galtsmill	H	Leaching
Georgeville	L	
Germanna	L	
Gertie	L	
Gilpin	H	Shallow
Gladehill	H	Leaching
Glenelg	M	Leaching
Glenelg, Blue Ridge	M	Leaching
Glenelg, New River Valley	M	Leaching
Glenville	L	
Glynwood	L	
Goblintown	L	
Goldsboro	L	
Goldston	H	Leaching
Goldvein	L	
Goresville	L	
Granville	L	
Grassland	L	
Greendale	L	
Greenlee	H	Leaching
Griffinsburg	H	Shallow
Grigsby	H	Leaching
Grimsley	H	Leaching
Gritney	L	
Groseclose	L	
Grover	M	Leaching
Gullion	L	
Gundy	L	
Gunstock	H	Shallow
Guyan	L	
Gwinnett variant	L	
Hagerstown	L	
Halewood	L	
Halifax	L	
Hanceville	L	
Haplaquepts	H	Leaching
Happyland	M	Leaching
Hartleton	H	Shallow
Hartsells	M	Shallow
Hatboro	H	Drainage

Soil Series	Environmental Sensitivity	Category
Hawksbill	H	Leaching
Hayesville	L	
Haymarket	L	
Hayter	M	Leaching
Haywood	H	Leaching
Hazel	H	Shallow
Hazel (channery)	H	Shallow
Hazel Run	M	Leaching
Hazleton	H	Shallow
Helena	L	
Herndon	L	
Hibler	L	
Hickoryknob	M	Leaching
Highsplint	H	Leaching
Hiwassee	L	
Hoadly	L	
Hobucken	H	Drainage
Holly	H	Drainage
Hollywood	L	
Hubersburg	L	
Huntington	L	
Hyde	L	
Hydraquents	H	Drainage
Ingledove	M	Leaching
Iotla	L	
Iredell	L	
Irongate	H	Leaching
Itmann	H	Shallow
Iuka	L	
Izagora	L	
Jackland	L	
Jedburg	L	
Jefferson	M	Leaching
Jefferson variant	H	Leaching
Johns, drained	H	Drainage
Johns, undrained	L	
Johnston	H	Drainage
Junaluska	H	Shallow
Kalmia	M	Leaching
Kaymine	H	Shallow
Keener	M	Leaching
Kelly	L	
Kempsville	M	Leaching
Kenansville	H	Leaching
Kenansville variant	L	
Keyport	L	
Kibler	M	Leaching
Kinkora	L	

Table 1-4
Nitrogen Loss Risk and Environmental Sensitivity Ratings for Virginia Soils & Soil Series Associated With Environmentally Sensitive Sites

Soil Series	Environmental Sensitivity	Category
Kinston	L	
Klej	H	Drainage
Klinesville	H	Shallow
Konnarock	H	Shallow
Lackstown	L	
Laidig	M	Leaching
Lakehurst variant	L	
Lakeland	H	Leaching
Lakin	H	Leaching
Landsiburg	L	
Lanexa	H	Drainage
Lanside	H	Shallow
LaRoque	M	Leaching
Lawnes	H	Drainage
Leaf	L	
Leaksville	L	
Leck Kill	M	Leaching
Leedsville	M	Leaching
Leetonia	H	Shallow
Legore	M	Leaching
Lehew	H	Shallow
Lenoir	L	
Leon	H	Drainage
Levy	H	Drainage
Lew	H	Leaching
Lewisberry	H	Leaching
Library	L	
Lignum	L	
Lily	H	Shallow
Lindside	L	
Littlejoe	L	
Litz	H	Shallow
Lloyd	L	
Lloyd variant	L	
Lobdell	L	
Lodi	L	
Lostcove	H	Leaching
Louisa	H	Leaching
Louisa variant	H	Leaching
Louisburg	H	Leaching
Louisburg, hapludalfs	H	Leaching
Lowell	L	
Lucketts	L	
Lucy	H	Leaching
Lumbee	H	Drainage
Lumbee variant	H	Drainage
Lunt	L	
Lynchburg	L	
Macove	H	Leaching

Soil Series	Environmental Sensitivity	Category
Madison	L	
Madsheep	H	Shallow
Magotha	H	Drainage
Manassas	L	
Mandy	H	Shallow
Manor	H	Leaching
Mantachie	L	
Manteo	H	Shallow
Marbie	L	
Marbleyard	H	Leaching
Margo	L	
Markes	H	Drainage
Marlboro	L	
Marr	M	Leaching
Marrowbone	H	Shallow
Masada	L	
Massanetta	L	
Massanutten	H	Shallow
Matapeake	L	
Matewan	H	Leaching
Matneflat	H	Leaching
Mattamuskeet	H	Drainage
Mattan	H	Drainage
Mattapex	L	
Mattaponi	L	
Maurertown	L	
Maury	L	
Mayodan	L	
McCamy	M	Leaching
McClung	M	Leaching
McGary	L	
McLaurin	H	Leaching
McQueen	L	
Meadowfield	H	Shallow
Meadows	H	Shallow
Meadowville	M	Leaching
Meckesville	L	
Mecklenburg	L	
Mecklenburg variant	L	
Meggett	L	
Melfa	H	Drainage
Melvin	L	
Middleburg	M	Leaching
Millrock	H	Leaching
Mine Run	H	Leaching
Minnieville	L	
Mirerock	L	
Misenheimer	H	Shallow
Mixed alluvium, poorly drained	H	Drainage

Table 1-4
Nitrogen Loss Risk and Environmental Sensitivity Ratings for Virginia Soils & Soil Series Associated With Environmentally Sensitive Sites

Soil Series	Environmental Sensitivity	Category
Mixed alluvium, well drained	L	
Molena	H	Leaching
Monacan	L	
Mongle	L	
Monongahela	L	
Montalto	L	
Montonia	M	Leaching
Montross	L	
Moomaw	L	
Morven	M	Leaching
Mount Lucas	L	
Mt Rogers	H	Leaching
Muckalee	H	Drainage
Munden	M	Leaching
Murrill	M	Leaching
Muskingum	H	Shallow
Myatt, drained	M	Leaching
Myatt, undrained	L	
Myatt variant, drained	M	Leaching
Myatt variant, Undrained	L	
Myersville	M	Leaching
Nahunta	L	
Nanford	L	
Nansemond	M	Leaching
Nason	L	
Nathalie	L	
Nawney	L	
Neabsco	L	
Needmore	M	Shallow
Nestoria	H	Shallow
Nevarc	L	
Newark variant	L	
Newark	L	
Newark, undrained	L	
Newbern	H	Shallow
Newflat	L	
Newhan	H	Leaching
Newmarc	L	
Nicelytown	L	
Nicholson	L	
Nikwasi	H	Drainage
Nimmo	H	Drainage
Nixa	L	
Nolichucky	M	Leaching
Nolin	L	
Nollville	L	
Nomberville	L	

Soil Series	Environmental Sensitivity	Category
Norfolk	M	Leaching
Oak Level	L	
Oakhill	H	Leaching
Oaklet	L	
Oatlands	M	Leaching
Occoquan	M	Leaching
Ochlockonee	H	Leaching
Ochlockonee variant	L	
Ochraquults	L	
Ochrepts, A/D	L	
Ochrepts, B/D	L	
Ochrepts, D	L	
Ocilla	L	
Ogles	H	Leaching
Okeetee	L	
Opequon	H	Shallow
Orange	L	
Orange variant	L	
Orangeburg	M	Leaching
Orenda	L	
Oriskany	H	Leaching
Orrville, Drained	M	Leaching
Orrville, Undrained	L	
Orrville variant Drained	M	Leaching
Orriville vairant undrained	L	
Orthents	L	
Osier	H	Drainage
Ostin	M	Leaching
Othello	L	
Ott	M	Leaching
Pacolet	L	
Pactolus	L	
Paddyknob	H	Shallow
Pagebrook	L	
Palms variant	H	Drainage
Pamlico	H	Drainage
Pamunkey	M	Leaching
Pamunkey Variant	M	Leaching
Panorama	M	Leaching
Pantego	L	
Parker	H	Leaching
Partlow	M	Drainage
Pasquotank	H	Drainage
Peaks	H	Shallow
Peawick	L	
Pecktonville	L	

Table 1-4
Nitrogen Loss Risk and Environmental Sensitivity Ratings for Virginia Soils & Soil Series Associated With Environmentally Sensitive Sites

Soil Series	Environmental Sensitivity	Category
Penhook	L	
Penn	M	Leaching
Philo (Dr.)	M	Leaching
Philomont	H	Leaching
Pigeonroost	H	Shallow
Pilot Mountain	H	Leaching
Pineola	M	Leaching
Pineville	M	Leaching
Pineywoods	L	
Pinkston	H	Leaching
Pinoka	M	Leaching
Pisgah	L	
Plummer	M	Drainage
Pocalla	M	Leaching
Pocaty	L	
Pocomoke	M	Drainage
Poindexter	M	Leaching
Polawana	H	Drainage
Pooler variant	L	
Pooler	L	
Pope	H	Leaching
Poplimento	L	
Porters	M	Leaching
Portsmouth	M	Drainage
Pouncey	L	
Poynor	H	Leaching
Psamments, mod well	L	
Psamments, somewhat poorly	L	
Psamments, well drained	H	Leaching
Pungo	H	Drainage
Purcellville	L	
Purdy	L	
Quantico	L	
Rabun	L	
Rains	L	
Ramsey	H	Shallow
Rapidan	L	
Rappahannock	H	Drainage
Raritan	L	
Rasalo	L	
Rayne	M	Leaching
Readington	L	
Reaville	L	
Redbrush	L	
Remlik	H	Leaching
Rhodhiss	M	Leaching
Rigley	H	Leaching
Rion	M	Leaching

Soil Series	Environmental Sensitivity	Category
Riverview	M	Leaching
Rixeyville	H	Shallow
Roanoke	L	
Robertsville	L	
Rockbarn	L	
Rohrersville	L	
Ross	M	Leaching
Rough	H	Shallow
Rowland	L	
Rumford	H	Leaching
Rushtown	H	Leaching
Ruston	M	Leaching
Saffell	H	Shallow
Santuc	L	
Sassafras	M	Leaching
Saunook	M	Leaching
Sauratown	M	Leaching
Savannah	L	
Scattersville	L	
Schaffenaker	H	Leaching
Seabrook	L	
Seagate	H	Drainage
Sedgefield	L	
Sekil	H	Leaching
Seneca	L	
Sequatchie	L	
Sequoia	H	Shallow
Sewell	H	Shallow
Shelocta	M	Leaching
Shelocta variant	L	
Shenval	L	
Sherando	H	Leaching
Sheva	L	
Shottower	L	
Siloam	L	
Sindion	L	
Skeeterville	L	
Slabtown	L	
Slagle	L	
Snowdog	L	
Spears Mountain	L	
Speedwell	M	Leaching
Spessard	H	Leaching
Spivey	H	Leaching
Spotsylvania	L	
Spray	M	Leaching
Spriggs	M	Leaching
Springwood	L	
Starr	M	Leaching

Table 1-4
Nitrogen Loss Risk and Environmental Sensitivity Ratings for Virginia Soils & Soil Series Associated With Environmentally Sensitive Sites

Soil Series	Environmental Sensitivity	Category
Starr Dyke	L	
Stasser	L	
State	M	Leaching
Statler	M	Leaching
Steinsburg	H	Leaching
Stonecoal	H	Shallow
Stoneville	L	
Stott Knob	M	Leaching
Stough	L	
Straightstone	L	
Strawfield	L	
Stumptown	H	Leaching
Suches	M	Leaching
Sudley	M	Leaching
Suffolk	M	Leaching
Sugarhol	L	
Sulfaquents	L	
Summers	H	Shallow
Susquehanna	L	
Swamp	H	Drainage
Swampoodle	L	
Sweetapple	H	Leaching
Swimley	L	
Sycoline	L	
Sylco	H	Shallow
Sylvatus	H	Shallow
Talladega	H	Shallow
Tallapoosa	L	
Tallapoosa variant	L	
Tanasee	H	Leaching
Tankerville	H	Shallow
Tarboro	H	Leaching
Tarrus	L	
Tate	M	Leaching
Tatum	L	
Terric Haplohemists	H	Drainage
Tetotum	L	
Tetotum variant	L	
Thunder	H	Leaching
Thurmont	M	Leaching
Tifton	L	
Timberville	L	
Timberville variant	M	Leaching
Tioga	H	Leaching
Tipples	H	Shallow
Toast	L	
Toddstav	L	
Tomotley	L	
Toms	L	

Soil Series	Environmental Sensitivity	Category
Torhunta	H	Drainage
Totier	L	
Toxaway	M	Drainage
Trappist	M	Shallow
Trego	M	Leaching
Trenholm	L	
Trimont	M	Leaching
Trussell	L	
Tuckahoe	M	Leaching
Tuckasegee	M	Leaching
Tugglesgap	L	
Tumbling	L	
Turbeville	L	
Tusquitee, coarse loamy	H	Leaching
Tusquitee, fine loamy	M	Leaching
Tygart	L	
Typic Udorthents	L	
Uchee	H	Leaching
Udalfs	H	Drainage
Udifluvents, fine loamy	L	
Udipsamments, mod well	L	
Udipsamments, well	L	
Udults, well drained	L	
Unison	L	
Unison variant	L	
Vance	L	
Vandalla	L	
Varina	L	
Vaucluse	M	Leaching
Vertrees	L	
Virgilina	L	
Wadesboro	L	
Wadesboro	L	
Wagram	M	Leaching
Wahee	L	
Wallen	H	Shallow
Walnut	H	Leaching
Wando	H	Leaching
Warminster	L	
Watahala	M	Leaching
Watauga	M	Leaching
Wateree	H	Leaching
Watt	H	Shallow
Watt variant	H	Shallow
Waxpool	L	

Table 1-4
Nitrogen Loss Risk and Environmental Sensitivity Ratings for Virginia Soils & Soil Series Associated With Environmentally Sensitive Sites

Soil Series	Environmental Sensitivity	Category
Waynesboro	L	
Weaver	L	
Webbtown	H	Shallow
Wedowee	L	
Weeksville	M	Drainage
Wehadkee	L	
Weikert	H	Shallow
Westfield	L	
Westmoreland	M	Leaching
Weston	H	Drainage
Westphalia	H	Leaching
Weverton	H	Leaching
Wharton	L	
Wheeling	M	Leaching
White Store	L	
White Store variant	L	
Whiteford	M	Leaching
Wickham	M	Leaching
Wickham variant	M	Leaching
Widgett	H	Leaching
Wilkes	L	
Wingina	M	Leaching
Winnsboro	L	
Wintergreen	L	

Soil Series	Environmental Sensitivity	Category
Winton	L	
Wolfgap	M	Leaching
Wolftrap	L	
Woodington	H	Drainage
Woodstown	L	
Woolwine	L	
Worsham	L	
Worsham variant	L	
Wrightsboro	L	
Wurno	H	Shallow
Wyrick	M	Leaching
Yellowbottom	L	
Yemasse, drained	H	Drainage
Yemasse, undrained	L	
Yeopim	L	
Yogaville	L	
York	L	
Zepp	H	Leaching
Zion	L	
Zion variant	L	
Zoar	L	

Section I.B Recommended Setback Areas

In addition to other management practices discussed in this section, animal waste or biosolids shall not be applied within the following setback areas around the specific features listed. Select the category which applies to the plan you are writing. The set-back requirements exist for animal waste and biosolids primarily to reduce the potential for pathogens (such as fecal coliform) to enter surface and ground waters.

- Setbacks for plans **not** associated with Biosolids applications, VPA permitted animal operations or DEQ industrial waste application permits.
  - 100 feet from wells or springs
  - 50 feet from surface water if surface applied
  - 25 feet from surface water if injected
  - 50 feet from sinkholes*
  - 50 feet from limestone rock outcrops
  - 25 feet from other rock outcrops

* In addition to the 50 feet setback, manure and biosolids should **not** be applied in areas subject to concentrated flow generated by runoff from storm events that drains into sinkholes.

- Setback distances for manure applications in plans written as part of a VPA or VPDES permit for confined animal feeding operations.
  - 100 feet from wells or springs
  - 100 feet from surface waters (no vegetated buffer) or 35 feet with a vegetated buffer** in place or a DEQ approved conservation practice that will achieve at least equivalent pollutant reductions.
  - 50 feet from sinkholes*
  - 50 feet from limestone rock outcrops
  - 25 feet from other rock outcrops
  - 10 feet from agricultural drainage ditches (5 feet if injected)
  - 200 feet from occupied dwellings (unless waived in writing by the occupant)

* Waste shall not be applied in such a manner that it would discharge into sinkholes.

** Vegetated buffer is a permanent strip of dense vegetation established parallel to the contours of and perpendicular to the dominant slope of the field.

♦ Setback distances for fields receiving Biosolids applications in nutrient management plans.

Minimum distances to Land Application Area			
Adjacent Features	Surface Application (ft)[1]	Incorporation (ft)	Winter (ft) [2]
Occupied Dwellings	200	200	200
Water Supply wells and springs	100	100	100
Property Lines	100	50	100
Perennial streams and other surface waters except intermittent streams	50	35	100
Intermittent streams/drainage ditches	25	25	50
All improved roadways	10	5	10
Rock outcrops	25	25	25
Limestone rock outcrops and sinkholes	25	25	25
Agricultural drainage ditches with slopes equal to or less than 2.0%	10	5	10

<u>Notes</u>:

If slopes are greater than 7.0% and biosolids will be applied between November 16 and March 15, standard buffer distances to perennial streams other surface water bodies shall be doubled.

(1) Not plowed or disked to incorporate within 48 hours
(2) Application occurs on average site slope greater than 7.0% during the time between November 16 of one year and March 15 of the following year

The stated setbacks to adjacent property boundaries and drainage ditches constructed for agricultural operations may be reduced by 50% for subsurface application (includes same day incorporation) unless state or federal regulations provide more stringent requirements.

In cases where more than one buffer distance is involved, only the single most restrictive distance shall be used.

Section II. Soil Test Calibrations and Correlations

Table 2-1
Virginia Tech Soil Test Calibrations

Calibration of Phosphorus (P) & Potassium (K) Tests, Mehlich I
Virginia Tech Soil Testing Laboratory

Fertility Rating	P – lbs/ac	P - PPM	P_20_5 – lbs/ac*
L-	0-3	0-2	0-7
L	4-8	2-4	9-18
L+	9-11	5-6	21-25
M-	12-20	6-10	28-46
M	21-30	11-15	48-69
M+	31-35	16-18	71-80
H-	36-55	18-28	82-126
H	56-85	28-43	128-195
H+	86-110	43-55	197-252
VH	110+	55+	252+

Fertility Rating	K – lbs/ac	K - PPM	K_20 – lbs/ac*
L-	0-15	0-8	0-18
L	16-55	8-28	19-66
L+	56-75	28-38	68-90
M-	76-100	38-50	92-121
M	101-150	51-75	122-181
M+	151-175	76-88	182-211
H-	176-210	88-105	212-253
H	211-280	106-140	254-337
H+	281-310	141-155	339-373
VH	310+	155+	373+

* Gaps exist between the fertility ratings because of the conversion from elemental lbs/ac to the phosphate and potash forms. When converting from another lab into the phosphate and potash forms choose the closest Fertility Rating to the converted value.

Virginia Tech Soil Test results - lbs/ac converted to ppm

Va Tech P lbs/ac x 0.5 = Va Tech P ppm
Va Tech K lbs/ac x 0.5 = Va Tech K ppm

Correlation of Soil Analysis Results for Plan Writing in Virginia

Soil test results dated after 12/31/05 which are used to write nutrient management plans in Virginia shall use the Mehlich I procedure to determine the phosphorus soil level. Mehlich III to Mehlich I is the only acceptable correlation, using the following criteria.

Approved soil test labs correlated to the Va Tech soil test lab using the Mehlich III procedure for phosphorus analysis are A & L Agricultural Laboratories, Brookside Laboratories, and Spectrum Analytical Laboratories.

Waters Agricultural Laboratories uses the Mehlich I procedure therefore the phosphorus soil test results can be interpreted the same as Va Tech phosphorus soil test results.

Table 2-2
Correlation of Soil Analysis Results for Phosphorus from Mehlich III to Mehlich I

When converting Mehlich III ppm soil test phosphorus to Mehlich I ppm soil test phosphorus**, two different formulas are used**. One is used for soil test values up to and including **205 ppm** Mehlich III phosphorus, as shown in the table below.

For phosphorus soil test values of 206 ppm Mehlich III and greater, use the formula shown under the heading Mehlich III Phosphorus (206 ppm and greater) Conversion to Mehlich I. When converting the soil test phosphorus values from labs using the Mehlich III procedure, be sure to use the appropriate formula.

Mehlich III (0-205 ppm) Conversion to Mehlich I

Mehlich III			Mehlich I		
P_2O_5 #/ac	P #/ac	P ppm	P #/ac	P ppm	**Fertility Rating**
0	0	0	0	0	L-
46	20	**10**	2	1	L-
53	23	12	4	2	L- / L
74	32	16	8	4	L
83	36	18	10	5	L+
92	40	**20**	12	6	L+ / M-
138	60	**30**	20	10	M-
143	62	31	22	11	M
184	80	**40**	30	15	M
193	84	42	32	16	M+
212	92	46	36	18	M+ / H-
230	100	**50**	40	20	H-
276	120	**60**	48	24	H-
313	136	68	56	28	H- / H
322	140	**70**	58	29	H
368	160	**80**	66	33	H
414	180	**90**	76	38	H
460	200	**100**	86	43	H / H+
506	220	**110**	94	47	H+
552	240	**120**	104	52	H+
584	254	127	110	55	H+ / VH
598	260	**130**	112	56	VH
644	280	**140**	122	61	VH
690	300	**150**	130	65	VH
736	320	**160**	140	70	VH
782	340	**170**	150	75	VH
828	360	**180**	158	79	VH
874	380	**190**	168	84	VH
920	400	**200**	176	88	VH
943	410	**205**	181	90.6	VH

For soil test values not shown in the table above, use the following formula to convert Mehlich III to Mehlich I and select the closest fertility rating for the Mehlich I ppm from the table above:

Mehlich III Phosphorus less than or equal to 205:

[Mehlich III (205 ppm P or less) X 0.458] - 3.26 = Mehlich I ppm

Mehlich III Phosphorus (206 ppm and greater) Conversion to Mehlich I

Mehlich III Phosphorus Soil Test Conversions to Mehlich III Phosphorus ppm

P_2O_5 #/ac. (Mehlich III) X 0.22 = P ppm (Mehlich III)
P #/ac. (Mehlich III) X 0.5 = P ppm (Mehlich III)

Conversion Formula for Mehlich III Phosphorus ppm to Mehlich I Phosphorus ppm

To calculate the Mehlich I ppm, if not expressed on the soil test report, use the following formula. Mehlich I ppm phosphorus must be used when determining the Applied Fertilizer Dissolved Reactive Orthophosphate factor in a P-Index calculation.

[Mehlich III (206 ppm P or greater) X 0.945] - 103.5 = Mehlich I P ppm

The table below shows a sample of soil test values converting Mehlich III to Mehlich I. The Mehlich I upper limit, above which no phosphorus shall be applied to a field, based on either the Threshold Method or the P - Index and the associated physiographic region are shown in bold.

Mehlich III			**Mehlich I**		
P_2O_5 #/ac	P #/ac	P ppm	P #/ac	P ppm	**Phosphorus Procedure/Physiographic Regions**
948	412	206	182	91	
1164	506	253	270	**135**	Threshold/ Eastern Shore & Lower Coastal Plain
1168	508	254	272	**136**	Threshold/Middle & Upper Coastal Plain & Piedmont
1293	562	281	324	**162**	Threshold/Ridge and Valley
1380	600	300	320	180	
1610	700	350	454	227	
1840	800	400	550	275	
2070	900	450	644	322	
2332	1014	507	750	**375**	P- Index/ Middle & Upper Coastal Plain & Piedmont
2737	1190	595	916	**458**	P-Index/ Eastern Shore & Lower Coastal Plain
3064	1332	666	1050	**525**	P-Index/ Ridge and Valley

Table 2-3
Correlation of Soil Analysis Results for Potassium from Mehlich III to Mehlich I

A & L Laboratories:

A & L Potassium ppm X 0.71 = Va Tech - K ppm

Brookside Laboratories:

Brookside K lbs/acre X 0.36 = Va Tech - K ppm

Spectrum Analytical Laboratories:

Spectrum Available Potassium (K) lbs/acre X 0.31 = Va Tech - K ppm

Waters Agricultural Laboratories:

Waters Potassium (K) lbs/acre X 0.53 = Va Tech - K ppm

Section III. Lime Recommendations for Virginia Crops (Except Commercial Turf, Surface-Mined Area Crops, Greenhouse, and Nursery Production)

Optimum pH for Various Crops

Tobacco-The target pH 5.8 column shows recommendations applicable to mainly tobacco, where the lower pH is desired.

Most Agronomic Crops - Lime rates shown for target pH 6.2 column are recommendations that provide an adequate rate of agricultural limestone to adjust the pH to an acceptable range for most agronomic crops.

Alfalfa - Lime rates shown for target pH 6.8 column are recommendations that provide an adequate rate of agricultural limestone to adjust the pH to an acceptable range for alfalfa.

Lime Stabilized Biosolids

The target pH 6.5 column shall be used as one factor to determine maximum rates for lime stabilized biosolids applied **within** the Coastal Plain area. This table shows higher rates of lime stabilized biosolids, than would normally be applied to meet the lime need, to get more use out of the other nutrients contained in the biosolids. Exceeding the rates shown for target pH 6.5 may exceed the desirable pH range, and this may cause induced deficiencies of some nutrients while increasing availability of other nutrients to a toxic level for the crop being grown.

The target pH 6.8 column shall be used as one factor to determine maximum rates for lime stabilized biosolids **outside** the Coastal Plain area of Virginia. This table shows higher rates of lime stabilized biosolids than would normally be applied to meet the lime need for most agronomic crops, to get more use out of the other nutrients contained in the biosolids. Exceeding the rates shown for target pH 6.8 may exceed the desirable pH range and this may cause induced deficiencies of some nutrients while increasing availability of other nutrients to a toxic level for the crop being grown.

While these are higher than normal application of lime, application rates of biosolids can not exceed the nitrogen or phosphorus needs, which ever is less, as established in the nutrient management plan.

Virginia Tech Soil analysis showing a Buffer pH test

For Virginia Tech soil samples showing a soil pH and a buffer pH use the table designated as Lime Rates based on Va Tech Soil buffer pH. The Lime Recommendations for Virginia Crops table can only be used with soil test buffer pH readings from Virginia Tech soil test.

Table 3-1
Lime Recommendations for Virginia Crops (tons/acre)
Lime Rates based on Va Tech Soil buffer pH

	Target Soil pH					
Buffer pH	5.2	5.8.	6.2	6.5	6.8	Acidity meq/100g
6.60	0.00	0.00	0.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00	0.00	0.00	0.03
6.40	0.00	0.00	0.00	0.00	0.50	0.06
6.38	0.00	0.00	0.25	0.25	0.50	0.12
6.36	0.00	0.00	0.25	0.25	0.75	0.24
6.34	0.00	0.00	0.25	0.50	0.75	0.36
6.32	0.00	0.00	0.50	0.50	0.75	0.48
6.30	0.00	0.00	0.50	0.75	1.00	0.59
6.28	0.00	0.25	0.75	0.75	1.00	0.71
6.26	0.00	0.25	0.75	1.00	1.25	0.83
6.24	0.00	0.25	0.75	1.00	1.25	0.95
6.22	0.00	0.50	1.00	1.00	1.50	1.07
6.20	0.00	0.50	1.00	1.25	1.50	1.19
6.18	0.00	0.75	1.25	1.25	1.75	1.30
6.16	0.00	0.75	1.25	1.50	1.75	1.42
6.14	0.25	0.75	1.50	1.50	2.00	1.54
6.12	0.25	1.00	1.50	1.75	2.00	1.66
6.10	0.50	1.00	1.50	1.75	2.25	1.78
6.08	0.50	1.25	1.75	2.00	2.25	1.90
6.06	0.50	1.25	1.75	2.00	2.25	2.02
6.04	0.75	1.25	2.00	2.00	2.50	2.13
6.02	0.75	1.50	2.00	2.25	2.50	2.25
6.00	1.00	1.50	2.00	2.25	2.75	2.37
5.95	1.00	1.75	2.25	2.50	3.00	2.67
5.90	1.25	2.00	2.50	3.00	3.25	2.96
5.85	1.50	2.25	2.75	3.25	3.50	3.26
5.80	1.75	2.50	3.25	3.50	3.75	3.56
5.75	2.00	2.75	3.50	3.75	4.25	3.85
5.70	2.25	3.00	3.75	4.00	4.50	4.15
5.65	2.50	3.25	4.00	4.25	4.75	4.45
5.60	2.75	3.50	4.25	4.50	5.00	4.74
5.55	3.00	3.75	4.50	4.75	5.25	5.04
5.50	3.25	4.00	4.75	5.25	5.50	5.34
5.40	3.75	4.50	5.25	5.75	6.25	5.93
5.30	4.25	5.00	5.75	6.25	6.75	6.52

Lime recommendations in the table above are based on the use of a liming material equivalent in neutralizing power to 100% $CaCO_3$. For application rates of liming material that is less than 100% neutralizing power of $CaCO_3$ (pure calcium carbonate) use the table in this section, Lime Rate Adjustment for CCE.

Lime Recommendations Using Other Testing Labs

For approved labs other than Virginia Tech, use the lime recommendations given by the lab. **IF** there are no recommendations with the soil analysis, use the table below for A&L Agricultural, Spectrum Analytical, and Brookside Laboratories.

Table 3-2
Lime Application Rate[1] (tons/acre) to achieve desired pH based on SMP Buffer Test

Soil-Buffer pH	Target Soil pH 5.2	5.8	6.2	6.5	6.8
6.9	0	0.25	0.50	0.50	0.75
6.8	0.50	0.75	1.00	1.00	1.25
6.7	1.00	1.50	1.50	1.75	2.00
6.6	1.50	1.75	2.00	2.25	2.50
6.5	2.00	2.25	2.50	3.00	3.25
6.4	2.75	3.00	3.25	3.75	4.00
6.3	3.25	3.50	4.00	4.50	5.00

[1] Ag-ground lime of 90% plus total neutralizing power (TNP) or $CaCO_3$ equivalent, and fineness of 40% < 100 mesh, 50% < 60 mesh, 70% < 20 mesh and 95% < 8 mesh. Adjustments in the application rate should be made for liming materials with different particle sizes, or neutralizing value.

Waters Agricultural Laboratories uses the Adams and Evans single buffer method which uses a different table for recommendations than the Mehlich or the SMP tables supplied here. In the event you would have lab reports from Waters Lab, which do not have lime recommendations, contact the lab for recommendations based on their analysis procedure.

Lime Rate Adjustment for CCE

Using the lime application rate to achieve the desired target pH based on the soil test buffer pH, use the table below to adjust that rate based on the % CCE of the liming material to be applied.

Table 3-3
Lime Application Rate Adjustment Based on % CCE of Material

	% CCE of Your Liming Material										
T/ac*	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**
0.5	1.00	0.75	0.75	0.75	0.50	0.50	0.50	0.50	0.50	0.25	0.25
1.0	2.00	1.75	1.50	1.25	1.00	1.00	1.00	0.75	0.75	0.75	0.75
1.5	3.00	2.50	2.25	2.00	1.75	1.50	1.25	1.25	1.25	1.00	1.00
2.0	4.00	3.25	2.75	2.50	2.25	2.00	1.75	1.75	1.50	1.50	1.25
2.5	5.00	4.25	3.50	3.25	2.75	2.50	2.25	2.00	2.00	1.75	1.75
3.0	6.00	5.00	4.25	3.75	3.25	3.00	2.75	2.50	2.25	2.25	2.00
3.5	7.00	5.75	5.00	4.50	4.00	3.50	3.25	3.00	2.75	2.50	2.25
4.0	8.00	6.75	5.75	5.00	4.50	4.00	3.75	3.25	3.00	2.75	2.75

* Lime recommendation to adjust pH as determined from soil test analysis.

Limestone Application Methods

Applications of 2 tons or less per acre - Adding this amount in a single application either before or after plowing will usually give best results. Limestone applied before plowing should be disked into the soil and then plowed. Limestone applied after plowing should be disked into the soil as thoroughly as possible.

Applications of more than 2 tons per acre - For the best results, apply one-half of the limestone, disk into the soil, plow under and then apply the second-half and disk into the soil. This method offers the best incorporation of limestone into the soil and is particularly important when the soil pH is very low and large amounts of limestone are needed.

For no-till cropping systems - Where incorporation of limestone is not possible, single applications should be limited to no more than 2 tons per acre. Where more than 2 tons per acre are recommended (indicating very low pH), limestone should be incorporated as mentioned above for best results. If incorporation is not feasible, apply one-half the total amount one year and the other half the next year.

Time of application - The best time to apply limestone is several months ahead of planting. This allows for more complete reaction of the limestone with the soil. However, if this cannot be done, apply it as early as possible, before the crop is planted. Failing to apply limestone because it could not be applied at the best time is worse than applying it late.

Section IV. Phosphorus Management

Phosphorus application rates shall be managed to minimize adverse water quality impacts consistent with procedures contained in this section.

- ♦ Phosphorus applications from inorganic nutrient sources shall not exceed crop nutrient needs over the crop rotation based on a soil test.

- ♦ Phosphorus applications shall be indicated as zero in nutrient management plans for soils exceeding 65% phosphorus saturation levels as listed in Table 4-1 regardless of the outcome of other procedures specified in this section.

Table 4-1
Virginia Tech Mehlich 1 Phosphorus (as ppm P) for 65% Phosphorus Saturation Level where Phosphorus Shall Not be Applied
(Must use approved conversion factors if results are from another lab)

Region	Mehlich I Soil Test P (ppm)
Eastern Shore and Lower Coastal Plain	>458
Middle and Upper Coastal Plain and Piedmont	>375
Ridge and Valley	>525

Note: All Soil Test P values in this table are shown as elemental phosphorus, expressed as a Mehlich I Virginia soil test value. Section II. provides conversion formulas for approved labs which report results as Mehlich III.

- ♦ A single phosphorus application may be recommended to address multiple crops in the crop rotation identified within the nutrient management plan if; (a) the single application does not exceed the sum of the appropriate application rates for individual crops as determined by this subsection.

For fields that do not exceed the maximum phosphorus saturation levels listed in Table 4-1, one of the following options must be used to determine maximum organic nutrient source phosphorus applications for fields contained in nutrient management plans. The Environmental Threshold and the Virginia Phosphorus Index Version 2.0 Technical Guide, Revised October 2005, are only applicable to organic nutrient sources. Additionally, plant available nitrogen in nutrient management plans shall not exceed the crop nutrient needs for any individual crop.

Soil Test Method

With this method phosphorus recommendations are made using: (1) the soil test level for the field and (2) recommendations for the crop as shown in Section V.

<u>Alternative phosphorus application methods when the Soil Test Method cannot address management of organic nutrient sources.</u>

Environmental Threshold Method

Table 4-2 can be used to determine allowable phosphorus applications rates for organic materials.

Table 4-2
Phosphorus Environmental Thresholds

Eastern Shore and Lower Coastal Plain	
VPI&SU Soil Test (Mehlich I) P ppm	**Maximum Phosphorus Application Rate**
<55	Nitrogen cannot exceed N needs; Phosphorus applications should be managed to reduce adverse water quality impacts.
55 - 135	Nitrogen cannot exceed N needs; Phosphorus applications shall not exceed crop removal.**
>135	Nitrogen cannot exceed N needs; no Phosphorus shall be applied during the life of the plan.

Middle and Upper Coastal Plain and Piedmont	
VPI&SU Soil Test (Mehlich I) P ppm	**Maximum Phosphorus Application Rate**
<55	Nitrogen cannot exceed N needs; Phosphorus applications should be managed to reduce adverse water quality impacts.
55- 136	Nitrogen cannot exceed N needs; Phosphorus applications shall not exceed crop removal.**
>136	Nitrogen cannot exceed N needs; no Phosphorus shall be applied during the life of the plan.

Ridge and Valley	
VPI&SU Soil Test (Mehlich I) P ppm	**Maximum Phosphorus Application Rate**
<55	Nitrogen cannot exceed N needs; Phosphorus applications should be managed to reduce adverse water quality impacts.
55 - 162	Nitrogen cannot exceed N needs; Phosphorus applications shall not exceed crop removal**
>162	Nitrogen cannot exceed N needs; no Phosphorus shall be applied during the life of the plan

** Phosphorus crop removal may be calculated as an application to meet each crop need or a single application per rotation to meet the total removal of all the crop needs for that rotation within the valid life of the nutrient management plan. The Virginia Nutrient Management Planning P_2O_5 Removal Table for Grain and Forage Crops, Table 4-7, must be used to calculate the crop removal of phosphorus in this method.

Notes explaining criteria associated with the Environmental Threshold Method continued on next page.

Phosphorus Environmental Threshold (notes continued)

An index to counties and cities by region can be found in the Virginia Phosphorus Index Version 2.0 Technical Guide, Revised October 2005.

Other laboratories' results shall only be used if conversion factors are published in Virginia Nutrient Management Standards and Criteria, Revised July 2014 and the appropriate conversion factor is utilized.

The Virginia Nutrient Management Planning P_2O_5 Removal Table for Grain and Forage Crops, Table 4-7, must be used to calculate the crop removal of phosphorus in this method.

Phosphorus Index Method

This method consists of a series of calculations to determine a Phosphorus Index Value which is then used to determine a management strategy for phosphorus sources that are land applied. The complete description of the Phosphorus Index methodology with supporting instructions and data tables is found in the Virginia Phosphorus Index Version 2.0 Technical Guide, Revised October 2005. T he determination of acceptable phosphorus rates of application with this method must be consistent with the Virginia Phosphorus Index Version 2.0 Technical Guide, Revised October 2005 unless otherwise specified below. Any use of the term "should" contained in the "Summary Interpretation of Phosphorus Index" table and in Table 2 – "Screening criteria based on phosphorus saturation levels for application of the Virginia Phosphorus Index", as contained in the Virginia Phosphorus Index Version 2.0 Technical Guide, Revised October 2005 must be treated as "shall" (mandatory requirements) by certified nutrient management planners.

Phosphorus Index Formula

(Erosion Risk Factor* X 8.5)

+ (Runoff Risk Factor X 8.5)

+ (Subsurface Risk Factor X 8.5) =

Phosphorus Index Value

Table 4-3

Interpretation of Phosphorus Index Value		
P Index Value	**Potential Water Quality Impact**	**Phosphorus Management Strategy based on factors used in P-Index calculations**
0-30	Low	Nitrogen cannot exceed N needs; Phosphorus applications should be managed to reduce adverse water quality impacts.
31-60	Medium	Nitrogen cannot exceed N needs; Phosphorus applications shall not exceed 1.5 times crop removal**
61-100	High	Nitrogen cannot exceed N needs; Phosphorus applications shall not exceed crop removal**
> 100	Very High	Nitrogen cannot exceed N needs; no Phosphorus shall be applied during the life of the plan

* In the Erosion Risk Factor calculation of the Phosphorus Index the soil loss must be determined by using either the RUSLE 2 method or the "Erosion Risk Assessment Procedure (ERA)" outlined below. If soil loss for use in the Phosphorus Index is developed using RUSLE2, the crop rotations and tillage practices in the nutrient management plan shall be consistent with RUSLE2 inputs as documented on the RUSLE2 Profile Erosion Calculation Record.

** Phosphorus crop removal may be calculated as an application to meet each crop need or a single application per rotation to meet the total removal of all the crop needs for that rotation within the valid life of the nutrient management plan**.** The Virginia Nutrient Management Planning P_2O_5 Removal Table for Grain and Forage Crops, Table 4-7, must be used to calculate the crop removal of phosphorus in this method.

*** If risk factor components vary within an individual field (for example-a portion of the field has subsurface tile drains, but the remainder of the field has a subsurface risk factor of zero), the planner shall either subdivide the management of the field or use a weighted average of the sub-field areas for the risk factor.

Erosion Risk Assessment Procedure (ERA)

The following procedure may be used to determine the ERA soil loss value which can be substituted for the soil loss value in the Erosion Risk Factor equation, which is part of the Phosphorus Index determination. **NOTE:** This Erosion Risk Assessment can only be used to determine this factor and should not be substituted for the RUSLE 2 soil loss method in any other program.

$$\left[\sum_{i=1}^{i=n} (\text{Map Unit } TC_i \times \text{Map Unit } K_i \times \%\text{Map Unit}_i) \right] \times TM = \text{Erosion Risk Assessment (ERA)}$$

Where: **TC -** Topography and Climate Factor
K - Soil Erodibility Factor
TM - Tillage Management Factor

For each field, estimate the area for each soil map unit and use the table below as a template to calculate the Topography and Climate Factor and the K Factor, using the tables provided, as a weighted average for the field, then apply the remaining factor to the entire field.

Table 4-4
Erosion Risk Assessment Formula

Topography & Climate (TC)	X	Soil Erodibility (K)	X	% Area of Field = Subtotal (express as a decimal)	
				0.__	
				0.__	
				0.__	
				0.__	
Total of Weighted Averages for TC and K					

__________ x TM = __________Tons/ac. (ERA soil loss value)

ERA-TC Factors

These factors represent a combination of the Topography and Climate factors for the areas of Virginia listed below designated by map unit slope.

Table 4-5
Topography and Climate Factors

Coastal Plain (East of I-95)

Soil Survey Map Unit Slope	Hay/Pasture TC	Crop TC
A	.40	.44
B	1.24	1.41
C	2.48	2.78
D	4.35	4.92
E	7.80	8.57
F	11.58	10.87

Northern Piedmont (North of James River-West of I-95)

Soil Survey Map Unit Slope	Hay/Pasture TC	Crop TC
A	.29	.33
B	.96	1.17
C	2.40	2.67
D	4.63	5.17
E	7.17	7.20
F	11.33	11.07

Southern Piedmont (South of James River-West of I-95)

Soil Survey Map Unit Slope	Hay/Pasture TC	Crop TC
A	.33	.37
B	1.08	1.32
C	2.69	3.00
D	5.20	5.80
E	8.05	8.09
F	12.72	12.43

Mountain and Valley

Soil Survey Map Unit Slope	Hay/Pasture TC	Crop TC
A	.26	.28
B	.85	.97
C	2.19	2.40
D	4.35	4.59
E	7.99	8.42
F	11.20	11.25

K Factor

This factor represents the soil erodibility factor based on soil texture and designated by county and map unit symbol. The K factor for specific soils can be found in the USDA-NRCS electronic Field Office Technical Guide.

ERA - TM Factors

This factor represents the Tillage Management designated by crop or crop rotation being grown.

Table 4-6
Tillage Management

Annual Crop Rotation	Tilled	Mixed *	No-till
Corn Silage - Continuous	30	-	15
Corn Silage / Small Grain Silage	22	19	16
Corn Silage / Small Grain	18	9	7
Corn Grain - Continuous	12	-	3
Corn Grain / Small Grain	6	5	1
Corn Grain / Small Grain Silage	13	7	6
Small Grain / DC Soybeans	10	6	4
Soybeans – Full Season	17	-	8
Peanuts	19	-	-
Peanuts / Small Grain	11	8	3
Cotton	20	-	12
Cotton / Small Grain	11	8	3
Tobacco	46	-	-
Tobacco / Small Grain	30	25	18
Vegetables	35	-	16
Vegetables / Small Grain	20	16	8
Other Row Crops (Grain)	17	-	8
Other Summer Annuals with Small Grain	13	8	7
Other Summer Annuals with Small Grain Silage	22	19	16
Hay – Legume (maintenance)	-	-	2
Hay – Grass or Mixed (maintenance)	-	-	1
Pasture < 50% cover or heavily grazed	-	-	4
Pasture 50-75% cover not heavily grazed	-	-	2
Pasture >75% cover and lightly grazed	-	-	1
Hay or Pasture Establishment**	11	-	3

***Mixed** = double crop with one crop tilled and one crop no-till
**Fall Establishment-use previous crop sequence TM Factor or Establishment Factor – whichever is greater. For Spring Establishment use number shown.

- The TM factor is determined by the rotation and the tillage types, regardless of the beginning season of the plan.
  (Notes continued on next page)

- Add the TM factor for each year of the rotation, not to exceed a three year plan life, and divide by the number of years to determine the TM factor to be used for that field during the life of the plan.
- If the crop rotation is not included in the table above, RUSLE 2 must be used to determine the soil loss for that rotation.
- If tillage or crop rotation is changed, the TM must be re-calculated and the P-Index must be re-calculated.
- Corn Grain assumes all stalks remain on field after harvest.
- Small Grain = cover crop or grain harvest only, no straw removal. If straw is removed use silage TM Factor

Table 4-7
Virginia Nutrient Management Planning P_2O_5 Removal Table for Grain and Forage Crops

Use the following table to determine the pounds of P_2O_5 removed per unit of harvest. See Note 1 for yield moisture criteria.

CROP	YIELD UNIT	LBS P_2O_5 PER YIELD UNIT
GRAINS		
Barley (cover crop)	NA	0
Barley	bushels	0.40
Barley straw (per bushel grain)	bushels	0.11
Barley-soybean dbl crop	bushels	**
Buckwheat	bushels	0.36
Canola	bushels	1.3
Corn	bushels	0.38
Oat (cover crop)	NA	0
Oat	bushels	0.33
Oat straw (per bushel grain)	bushels	0.09
Proso millet	bushels	0.39
Rye (cover crop)	NA	0
Rye	bushels	0.45
Rye straw (per bushel grain)	bushels	0.17
Sorghum	bushels	0.4
Soybean	bushels	0.89
Sunflower	tons	27
Triticale (cover crop)	NA	0
Triticale	bushels	0.39
Wheat (cover crop)	NA	0
Wheat	bushels	0.51
Wheat straw (per bushel grain)	bushels	0.11

CROP	YIELD UNIT	LBS P_2O_5 PER YIELD UNIT
SILAGE		
Barley silage	tons	5.1
Corn silage	tons	4.2
Grass silage	tons	5.7

Table 4-7
Virginia Nutrient Management Planning P_2O_5 Removal Table for Grain and Forage Crops

CROP	YIELD UNIT	LBS P_2O_5 PER YIELD UNIT
SILAGE		
Oats silage	tons	5
Rye silage	tons	5.6
Sorghum silage	tons	5.4
Soybean silage	tons	10
Triticale silage	tons	5.6
Wheat silage	tons	4.2

CROP	YIELD UNIT	LBS P_2O_5 PER YIELD UNIT
FORAGES		
Alfalfa hay	tons	14.5*
Alfalfa-grass hay	tons	14.5*
Bermudagrass hay	tons	10.4*
Bermudagrass pasture	NA	****
Birdsfoot trefoil	tons	21*
Bluegrass	tons	18*
Bromegrass	tons	13*
Bluestem species	tons	10*
Clover and grass	tons	14*
Fescue grass hay	tons	16*
Fescue grass-Ladino clover hay	tons	14*
Gamagrass	tons	11
Hay/Pasture	***	16*
Hairy vetch	tons	14
Indiangrass	tons	10
Legume cover crop	NA	0
Lespedeza	tons	10*
Millet	tons	8.4
Native/unimproved pasture	NA	****
Orchardgrass hay	tons	16*
Orchardgrass hay-Ladino clover	tons	16*
Orchardgrass/Fescue pasture	NA	****
Perennial ryegrass	tons	17*

Table 4-7
Virginia Nutrient Management Planning P_2O_5 Removal Table for Grain and Forage Crops

CROP	YIELD UNIT	LBS P_2O_5 PER YIELD UNIT
FORAGES		
Red clover	tons	10*
Red clover-grass hay	tons	14*
Reed canarygrass	tons	12*
Small grain hay	tons	10
Sorghum	tons	8.4
Sorghum x sudangrass (Sudax)	tons	10
Sorghum-sudan, millet, sudan (hay)	tons	10
Soybean and sorghum	tons	9.2
Soybean hay	tons	10
Soybean and millet	tons	9.2
Soybean and Sudangrass	tons	10
Switchgrass	tons	10*
Sudangrass	tons	10
Tall fescue hay	tons	16*
Timothy	tons	14*
Weeping lovegrass	tons	10*

CROP	YIELD UNIT	LBS P_2O_5 PER YIELD UNIT
SEED CROPS		
Crimson clover seed	pounds	0.018
Lespedeza seed	pounds	0.016
Red clover seed	pounds	0.016
White clover seed	pounds	0.030

CROP	YIELD UNIT	LBS P_2O_5 PER YIELD UNIT
VEGETABLES		
Asparagus	cwt	0.13
Beet (root)	cwt	0.092
Beet (top)	cwt	0.12
Broccoli	cwt	0.18
Brussels sprout	cwt	0.29
Cabbage	tons	1.8

Table 4-7
Virginia Nutrient Management Planning P_2O_5 Removal Table for Grain and Forage Crops

CROP	YIELD UNIT	LBS P_2O_5 PER YIELD UNIT
VEGETABLES		
Carrot	cwt	0.092
Cauliflower	cwt	0.14
Celery	cwt	0.083
Chive	cwt	0.12
Collard	cwt	0.13
Cucumber	tons	1.1
Eggplant	cwt	0.050
Endive	cwt	0.051
Escarole	cwt	0.032
Garlic	cwt	0.39
Kale	cwt	0.13
Leek	cwt	0.080
Lettuce (head)	cwt	0.79
Lettuce (leaf)	cwt	0.10
Lima bean	cwt	0.34
Mustard green	cwt	0.10
Okra	cwt	0.15
Onion (dry)	cwt	0.60
Onion (green)	cwt	0.084
Parsley	cwt	0.092
Parsnip	cwt	0.16
Pea	cwt	0.57
Pepper	cwt	0.066
Potato	cwt	0.14
Pumpkin	tons	1.7
Radish	cwt	0.064
Rutabaga	cwt	0.092
Snap bean	cwt	0.23
Spinach	cwt	0.15
Squash (summer)	cwt	0.064
Squash (winter)	cwt	0.079
Sweet corn	cwt	0.14
Sweet potato	cwt	0.12

Table 4-7
Virginia Nutrient Management Planning P_2O_5 Removal Table for Grain and Forage Crops

CROP	YIELD UNIT	LBS P_2O_5 PER YIELD UNIT
VEGETABLES		
Tomato	tons	2.0
Turnip (root)	cwt	0.065
Turnip (green)	cwt	0.14

CROP	YIELD UNIT	LBS P_2O_5 PER YIELD UNIT
FRUITS		
Apple	bushels	0.020
Grape	tons	2.0
Honeydew melon	tons	1.3
Muskmelon	tons	3.5
Peach	bushels	0.033
Watermelon	tons	0.47
Strawberry	cwt	0.043

CROP	YIELD UNIT	LBS P_2O_5 PER YIELD UNIT
MISCELLANEOUS		
Cotton (seed & lint)	tons	26
Cotton (stalk, leaf & bur)	tons	10
Tobacco (leaf & stalk - based on harvest leaf weight)	lb leaves	.009
Peanuts	pounds	.007

NOTES:

1.Yields are based on the following moisture levels: grain-corn-15.5%, wheat-13.5%, barley-14%, oats-14%, grain sorghum-13%, soybeans-14.5%; all silage-65%; all hay-15%. For all other crops, yield should be based on moisture at which, no deduction would be accessed when sold, crop can be safely stored without any additional drying, or in the case of fresh market vegetables crop has reached marketable stage of growth.

* Use 1/2 of the yield from VALUES if planted in the spring, 0 if planted in the fall, to calculate crop removal for the establishment year.

** For double crops, add removal for each crop

*** Use 2/3 hay yield from VALUES or use the actual yield from field records, to calculate crop removal.

**** 30 lbs P_2O_5 Removal for Productivity Group I
30 lbs P_2O_5 Removal for Productivity Group II
25 lbs P_2O_5 Removal for Productivity Group III
20 lbs P_2O_5 Removal for Productivity Group IV

Section V. Crop Nutrient Needs

Phosphorus and potash soil test levels in this table are based on Mehlich I soil test results. Only soil test levels correlated to Mehlich I using methods contained in this document are acceptable.

Corn Grain Nutrient Needs*

Productivity Group	N - Nutrient Needs
IA	180
IB	170
IIA	160
IIB	150
IIIA	140
IIIB	130
IVA	120
IVB	100
V	80

***See nitrogen management recommendations for Corn.**

Soil Productivity Groups I , II

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	100-140	100-140
M	60-100	60-100
H	20-60	20-60
VH	0	0

Soil Productivity Groups III, IV, V

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	80 -120	80 -120
M	40 - 80	40 - 80
H	20 - 40	20 - 40
VH	0	0

Corn Silage Nutrient Needs*

Productivity Group	N - Nutrient Needs (a)
IA	200
IB	185
IIA	175
IIB	165
IIIA	155
IIIB	145
IVA	130
IVB	110
V	90

***See nitrogen management recommendations for Corn.**

Corn Silage Nutrient Needs (cont)

Soil Productivity Groups I , II

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	140-200	240-300
M	100-140	180-240
H	40-100	100-180
VH	0	0

Soil Productivity Groups III , VI, V

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	120-160	200-240
M	80-120	140-200
H	40-80	60-140
VH	0	0

When using documented farmer records, corn silage yield may be calculated using the following formula:
Corn Grain Yield (bu/ac) X 0.0985 + 7.6964 = **Corn Silage Yield** Tons/acre.

Nitrogen Management Recommendations for Corn

On soils with a High nitrogen loss risk, at least 50% of the inorganic nitrogen applications shall be applied as a sidedress application. On Moderate and Low nitrogen loss risk soils this management method is preferred, but not required. The combination of row starter, at planting nitrogen applications and sidedress applications cannot exceed the nitrogen need listed for that crop in that field.

It is recommended that fields which contain high environmental risk soils for nitrogen loss where organic nutrient sources are used to meet most of the nitrogen need for corn should include a split application of nitrogen which is at least 33% of the nitrogen needs to be applied as a sidedress application. If no pre-plant nitrogen will be broadcast and planting conditions exist where the cold soil temperatures may be limiting mineralization of nitrogen, starter nitrogen may aid in plant establishment and ear ly season growth. The combination of row starter, at planting nitrogen applications, plant available nitrogen supplied from organic sources, and sidedress applications cannot exceed the nitrogen need listed for that crop in that field.

For cereal silage/corn silage rotations only, 20 lbs/acre of nitrogen may be applied as part of a banded starter application at planting, in addition to the nitrogen need designated for the field. IF no starter is applied as a banded appl ication, only the nitrogen need des ignated for the field shall be recommended.

To determine nitrogen needs for corn yields above those listed in Table 1-2, Estimated Yields in Bushels or Tons per Acre of Various Non-Irrigated Crops for Identified Soil Productivity Groups, use 1 lb of nitrogen per bushel for grain yields, and 1.1 lbs of nitrogen per bushel of grain yield for silage corn tonnage converted back to bushels using the formula:

$$\left(\frac{\text{corn silage tons/acre} - 7.6964}{0.0985}\right) = \text{Corn grain yield}$$

Irrigated Corn
These expected yields and nitrogen recommendations in the table below should not be used for fields where manure is applied through an irrigation system unless supplemental clean water irrigation is utilized, since manure applications should usually occur prior to the times of peak moisture demand by crops to allow time for mineralization. Irrigated nitrogen recommendations shall only be used when the water source can supply at least 6 inches of water to the entire field per growing season.

Corn Grain production using Center Pivot Irrigation *

Soil Management Groups	Expected Corn Yield, Bu/Ac	N - Nutrient Needs
A,B,D	210	210
C,E,F,G,J,K,L,M,N,O,Q,R,S,T	200	200
I,DD	190	190
V,W,X	180	180
AA,BB,II	170	170
Y	160	160
KK	140	140

Soil Test Level	Nutrient Needs (lbs/ac) P_2O_5	K_2O
L	130 - 170	130 - 170
M	80 - 120	80 - 120
H	30 - 70	30 - 70
VH	0	0

*An adjustment to irrigated grain yields is needed for traveling gun systems, because typically yield response will be highly variable depending upon management of the system. A reasonable estimate of planning yield is 90% of the above estimates for properly scheduled irrigation.

Corn Silage Production using Traveling Gun Irrigation

Soil Management Groups	Expected Corn Yield, Tons/Ac	N - Nutrient Needs
A,B,D	26.3	210
C,E,F,G,J,K,L,M,N,O,Q,R,S,T	25.4	200
I,DD	24.5	190
V,W,X	23.6	180
AA,BB,II	22.7	170
Y	21.9	160
KK	20.1	140

Soil Test Level	Nutrient Needs (lbs/ac) P_2O_5	K_2O
L	140-200	240-300
M	100-140	180-240
H	40-100	100-180
VH	0	0

Notes for all irrigated corn silage and corn grain fields:

Irrigation of soils in the following soil management groups is not recommended; factors other than water-holding capacity may be the yield limiting factor; H, P, U, Z, CC, EE, FF, GG, HH, LL, MM, NN, OO, PP, QQ. Use dryland yields in Table 1-2.

Nitrogen use efficiency by irrigated corn can be increased by splitting the total sidedress rate of nitrogen into two applications, with the second of the two applications occurring just before the corn is too tall to drive through with the application equipment. If this second application is applied through the irrigation system, it should be applied about 7-10 days before silking, or split into smaller multiple applications.

Pre-Sidedress Soil Nitrate Test (PSNT)

Sample collection essentials for PSNT for corn:

Select fields where organic sources of nitrogen have been applied, according to the timing criteria listed in the Virginia Nutrient Management Training and Certification Regulations under Nutrient Application Timing, to supply nitrogen to the present corn crop

Sample collection - At least 10-20 cores per field, 12 inches deep, between rows to avoid starter bands and areas where roots have not depleted nitrogen.

Sample time - corn should be 10” to 15” tall at the whorl as it stands, **NOT** to the tallest part of the plant.

Only **one** of the following options can be used to determine sidedress rate adjustment in any one season, based on the criteria outlined for each option.

Option 1 - Adjustment of Nitrogen Sidedress Recommendations

Nitrogen needs and timing of applications for corn shall be calculated based on criteria outlined in Section VAC 5-15-150.A.2.e. of the Virginia Nutrient Management Training and Certification Regulations. When organic nutrient sources have been used to supply a significant portion of the nitrogen need i n present or past years and a nitrogen sidedress application rate has been recommended, the PSNT results and the guidance below shall be used to adjust the sidedress rate when applicable. This guidance should be us ed as one factor along with rate of organic material applied, field history, seasonal conditions, and an understanding of the effects of soil properties and management practices related to nitrogen availability to corn. All these factors need to be considered to adjust the sidedress nitrogen rate stated in the nutrient management plan to improve the economics of crop production and to enhance water quality.

Nitrate-N Conc.	N Rate Recommendation
< 11 ppm	Apply full rate of sidedress N that is specified for the field in the nutrient management plan.
11-20 ppm	Apply 50 - 75% of sidedress N that is specified for the field in the nutrient management plan. The decision to reduce the recommended nitrogen rate must be made on a site-by site basis and s hould take into account previous field history, organic N additions, and management practices.
> 20 ppm	Nitrate nitrogen at a level to meet the yield goal without any sidedress nitrogen needed.

Option 2 - Adjustment of Nitrogen Sidedress Recommendations Considering suspected high nitrogen leaching loss or low mineralization of organic nitrogen sources(s).

If: (a) extreme weather conditions occur, such as two or more rainfall events exceeding 2 inches since the nitrogen application, which have caused significant amounts of nitrogen to be l eached below the root zone, or (b) mineralization of organic nitrogen sources are much lower than expected, a one t ime corrective nitrogen sidedress application can be m ade consistent with the following table **if:** a) nitrogen applications have been made such that rate and timing of applications have been consistent with the criteria in 4VAC 5-15-150, b) and corn shows visual signs of nitrogen deficiency, c) and a PSNT indicates NO_3-N is below 20 ppm in the top 12" of the soil profile.

Nitrate-N Conc.	N Rate Recommendation
< 6 ppm	Apply planned sidedress N that is specified for the field **OR** 70% of the nitrogen needs shown in the nutrient management plan for that field, whichever is greater.
6 - 11 ppm	Apply planned sidedress N that is specified for the field **OR** 40% of the nitrogen needs shown in the nutrient management plan for that field, which ever is greater.
12 - 20 ppm	Apply 50 - 75% of sidedress N that is specified for the field **OR** 30% of the nitrogen needs shown in the nutrient management plan for that field.
> 20 ppm	Nitrate nitrogen at a level to meet the yield goal without any sidedress nitrogen needed.

Grain Sorghum

Productivity Group	Nitrogen Needs
IA	140
IB	130
IIA	120
IIB	110
IIIA	100
IIIB	90
IVA	90
IVB	90
V	80

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	80 -120	80 -120
M	40 - 80	40 - 80
H	20 - 40	20 - 40
VH	0	0

Soybeans - All Productivity Groups

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	80 -120	80 -120
M	40 - 80	40 - 80
H	20 - 40	20 - 40
VH	0	0

Small Grain Management Options: Choose nutrient needs based on the intended use of the crop by the farmer.

1. **Small Grain Silage** - this crop is planted for the intended purpose of harvest in early spring for silage. Similar fall tiller management practices should be applied as used in Standard/Intensive Management of Wheat and Barley.

2. **Wheat and Barley**- Standard/Intensive Grain Production- this crop is to be managed based on a program to maximize grain yield by planting within the window of acceptable dates according to location within the state, careful tiller management through the fall and winter months and spring split application rates of nitrogen based on tiller counts and tissue tests.

3. **Cover Crop** - this crop is grown for the purpose of scavenging any residual nitrogen from the previous crop due to lower than expected yield, or mineralization of organic nutrient materials applied to the previous crop is expected to occur after the crop is harvested. Cover crop may also be used to manage on farm manure storage facilities by application of low rates of manure in the fall and winter when needed.

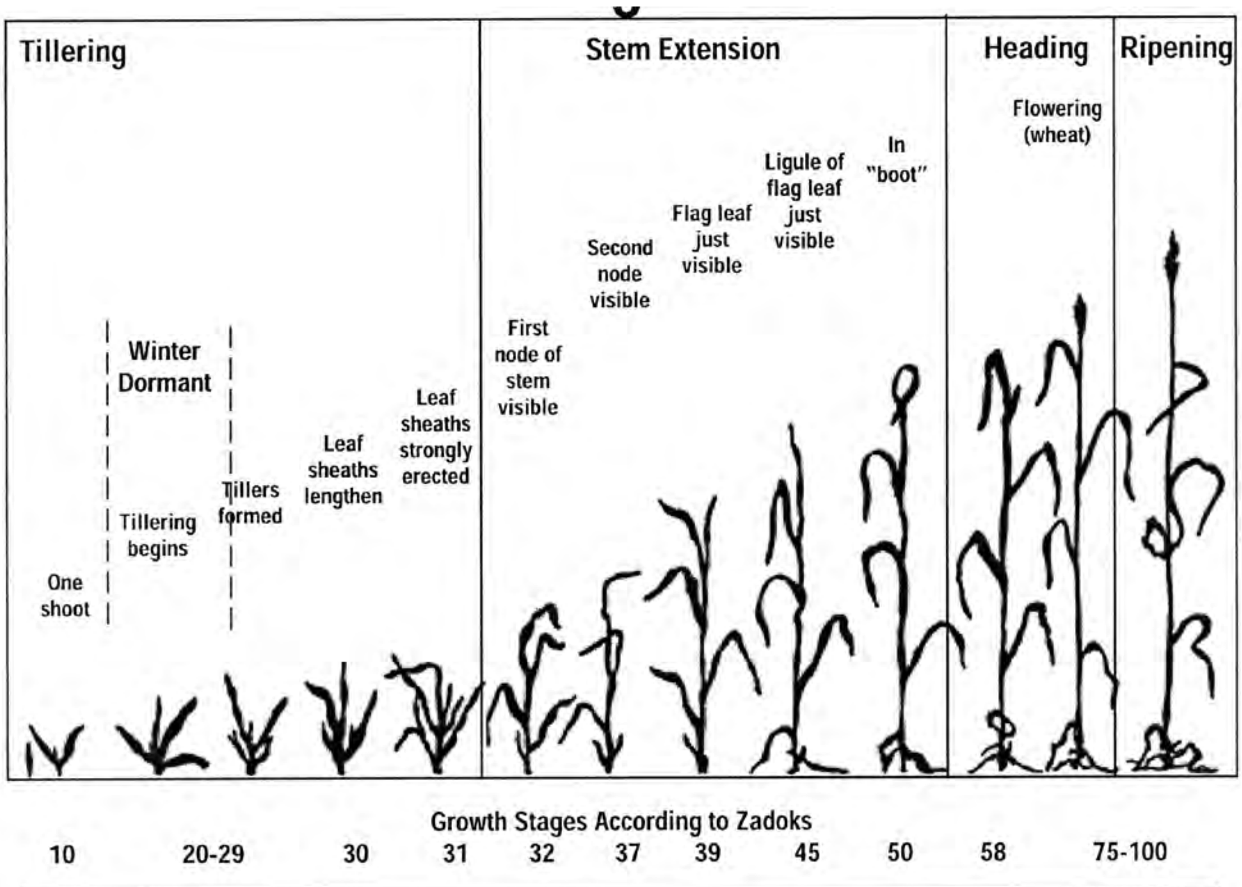
4. **Trap Crop** - the sole purpose of this crop is to provide fields which can receive manure, biosolids, or other organic nutrient source applications through the fall and winter months for management of limited storage facilities of these materials.

   This is a less desirable option because the nitrogen need for the following spring crop, or some part of the nitrogen need, may be used to determine rate of nitrogen for the winter application. **IF** the intention is to base the application rate of nitrogen on the total nitrogen need of the following spring crop, then application shall be in compliance with Timing of Organic Nutrient Sources in Section I.A and at least 30 pounds of nitrogen need must be withheld at the time of application to be used as part of a banded starter at planting. Also, all phosphorus applied though this application will be credited to the Spring crop or to the phosphorus application of the rotation.

   The only purpose of the trap crop is for the management of organic nutrient sources where limited or no storage facilities are available. Fall or winter application of a nitrogen rate based on a spring crop, commits the farmer to planting that crop in a timely manner to assure successful establishment of the intended spring crop.

Zadoks Scale of Small Grain Growth Stages

Many nutrient applications are based on timing related to the growth stage of the small grain crop. The figure below is provided as reference for planners when writing plans and explaining application times to clients.



Detailed description of pertinent nutrient management program Growth Stages are:

- GS 23 - Main Shoot and 3 Tillers
- GS 25 - Main Shoot and 5 Tillers
- GS 30 - Leaf Sheaths lengthened with Erect Stems

A tiller may be counted when it has three fully developed leaves on its stem.

Nutrient Recommendations by Small Grain Program

Cover Crop

Crop should be planted early enough in the fall to be quickly established after the harvested crop. The main purpose of the Cover Crop is to scavenge residual nitrogen from the previous crop. However, fields designated to be planted to a cover crop may also be used to spread manure at low rates (less than 40 pounds of nitrogen) through the fall and winter to properly manage on farm storage manure facilities, to assure adequate storage capacity is available until the spring applications can begin.

1. Eligible Fields:

a. Acceptable small grains are barley, wheat, rye, triticale
b. Seeding of all seed types must be established by the dates indicated in the table below.

Region	Established Date
Cites of Chesapeake & VA Beach	November 30
Coastal Plain	November 15
Piedmont	November 1
Mountain and Valley	October 25

2. Fall - Winter Nitrogen Rates

Nitrogen rates will be calculated using Spring or early Fall applied coefficients for manures and Year of Application coefficient for biosolids to calculate the PAN for the organic fraction and appropriate coefficient for PAN ammonium fraction for all materials.

Nitrogen rate for application to manage on farm manure storage facilities:

Nutrient Needs (lbs/ac)		
Nitrogen	P_2O_5	K_2O
0-40	0	0

All phosphorus applied though this application will be credited to the spring crop or the phosphorus application of the rotation.

3. Late Winter - Early Spring Nitrogen Rates

a. Cover crop will be killed before Spring crop is planted - No Nitrogen applied

OR

If at any time the management of this crop is changed from the original cover crop status, then the following nitrogen management recommendations shall be us ed. Performance and final yield of this crop may not be comparable to proper management of the specific crop outlined in other parts of this booklet.

NOTE: This change in management of the cover crop will affect eligibility for state and/or federal cost-share payments.

a. Cover crop will be harvested for silage:

Triticale - Maximum of 70 lbs/ac.
Rye - Maximum of 70 lbs/ac.
Wheat - Maximum of 60 lbs/ac.
Barley - Maximum of 50 lbs/ac.

OR

b. Cover crop will be harvested for grain - Follow recommendations in table below. **Warning** - Using maximum N rates listed in table below may cause lodging of crop when a high rate of Nitrogen was applied in the Fall.

(Feb. - Early March)	Tiller Count:	N Application Program
Single Application:	<70/sq. ft.	80 lbs/acre-Feb.(Growth Stage 25)
	>100; plants dark green; tissue N levels >3.75%	30-40 lbs/acre-late March (Zadoks Growth Stage 30)
Split Application:		
February (Zadoks Growth Stage 25)	<60/sq. ft.	60 lbs N/acre
	60-100/sq. ft.	40 lbs N/acre
	>100/sq. ft. and dark green color	none; tissue test at growth stage 30
March (growth stage 30 tissue test)		No more than 120 lbs N/acre; **<u>the total of Growth Stages 25 and 30</u>**

Trap Crop

Nutrient Needs (lbs/ac)*		
Nitrogen	**P_2O_5**	**K_2O**
0	0	0

*Specific to the Trap Crop itself.

The purpose of the following recommendations are to provide fields which can receive manure, biosolids and other organic nutrient source applications through the fall and winter months if the priority is for management of limited storage facilities, rather than achieving expected yield of future crops. Applications shall not occur before the trap crop reaches Zadoks growth stage 23 (one main shoot and 3 tillers) or greater AND having a uniform stand throughout the entire area to be spread of at least 20 plants per square foot. Application rate shall not exceed the nutrient needs described below and shall not smother the crop. Application shall only occur when the spreading equipment and associated operations will cause minimal damage to the crop during application.

Nitrogen rate for application based on Spring Crop nitrogen needs:
Nitrogen needs of spring crop to be planted minus at least 30 pounds of nitrogen to be applied as a banded application at planting.

Nitrogen rates will be calculated using Spring or Early Fall Applied coefficients for manures and Year of Application coefficient for biosolids to calculate the PAN for the organic fraction and appropriate coefficient for PAN ammonium fraction for all materials.

No more nitrogen shall be applied to the trap crop or the following spring crop using this option, with the exception of the amount of nitrogen deducted from the nitrogen needs at the time of application. This remaining nitrogen shall be applied as a banded application at planting of the spring crop. It should be noted that this program of nitrogen application may result in a lack of adequate nitrogen available to the spring crop to produce the expected yield. Less than adequate nitrogen would be due to immobilization of nitrogen by the trap crop and loss of the applied nitrogen through runoff and leaching.

All phosphorus applied though this application will be credited to the spring crop or the phosphorus application of the rotation.

Rye Grown for Grain

1. Soil productivity groups are the same as for wheat and barley

2. Nitrogen recommendations:

    a. At planting - 25-30 lbs N/acre

    b. Late winter - a single application made in February
        (1) For grain production - 45 lbs N/acre

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	80 -120	80 -120
M	40 - 80	40 - 80
H	20 - 40	20 - 40
VH	0	0

Small Grain for Silage

1. Soil productivity groups are the same as for wheat and barley

2. Nitrogen recommendations:

    a. At planting - 0-30 lbs N/acre
        - use lower rate on fields, which will be timely planted, with a history of frequent manure applications, and good growing conditions are expected 10 days after planting.

    b. Late winter - a single application made in February
        (1) Triticale, Rye, Wheat silage production - 40-90 lbs N/acre
        (2) Barley, Oats silage production - 40-70 lbs N/acre
            (a) Preferred application period would be after green-up occurs and before first joint has emerged.
            (b) Use lower rates on field which are well established, have dark green color, and a history of lodging.

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	80 -120	80 -120
M	40 - 80	40 - 80
H	20 - 40	20 - 40
VH	0	0

Wheat and Barley for Grain - Nitrogen Management Applications

Standard/Intensive

1. At planting:

    a. With NO_3^- soil test from top 6 inches measuring above 30 ppm, no nitrogen needed at planting.

    b. If soil test is below 30 ppm, apply 15-30 pounds of nitrogen.
    c. Without NO_3^- soil test results:

        (1) Conventional tillage: broadcast and incorporate 1-2 inches, 25-30 lbs N/acre during land preparation for planting. Reduce N application if high residual N levels are expected.

        (2) No-till: broadcast 30-40 lbs N/acre shortly before planting, if heavy residue (60% or greater cover) is present. Follow N recommendations for conventional planting if light residue (less than 60% cover) or no residue is present.

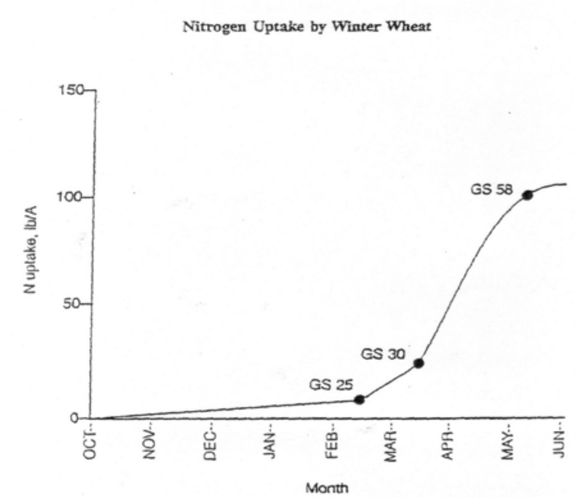
Intensive Management Only

2. Midwinter (December-January)

    If:

    a. Significant leaching rains have occurred during the October-December period, i.e., two or more rainfall events of 2.0 inches or more, and
    b. there has been very little tiller development, i.e., less than 3 tillers per plant, and the crop has a pale green color, and
    c. there is an expectation of several days during January and February when maximum daily temperature will exceed 50^0F; **apply:** 30 lbs N/acre as a topdress.

Figure 5-1



Source: Alley, M. M., Peter Scharf, D. E. Brann, W. E. Beathgen, S. J. Donohue. 1991. Efficient N Fertilization of Winter Wheat, Principles and Recommendations. Virginia Cooperative Extension Service.

Management of Spring Nitrogen

3. Late Winter (February-early March)

   a. Single Spring application of N, (Standard management):

      (1) Fields with less than 70 tillers per sq.ft., **apply** 80 lbs/acre in February. Fertilize those fields with less than 60 tillers per sq.ft. first.

      OR

      (2) Fields with 70 to 100 tillers per sq.ft., and plants are pale green and tissue test levels are lower than 3.75%, **apply:** 60 lbs/acre in February.

      OR

      (3)Fields have 70 to 100 tillers per sq.ft., plants are dark green and N tissue test levels are 3.75% or higher, **apply:** 30-40 lbs/acre in late March (Zadoks growth stage 30.)

      OR

      (4) Fields have more than 100 tillers per sq.ft., plants are dark green and tissue test levels are 3.75% or higher **apply:** 30-40 lbs/acre in late March (Zadoks growth stage 30.)

   b. Split applications of Spring N (Intensive small grain management):

      (1) February (Zadoks growth stage 25.)

         (a) Fields with less than 60 tillers per sq. ft. - apply 60 lbs N/acre.

         OR

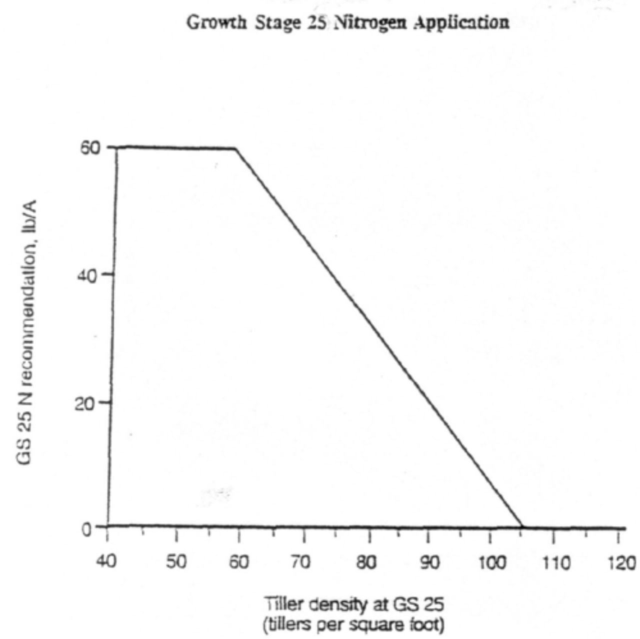
         (b) Fields with 60 to 100 tillers per sq. ft. - apply 40 lb N/acre.

         OR

         (c) Fields with more than 100 tillers per sq. ft. and the crop has a good green color - do not apply nitrogen at this time. Tissue test at Zadoks growth stage 30 to determine N application needs.

Use **Figure 5-2** for more detailed nitrogen application rates based on exact tiller counts.

Figure 5-2



Source: Alley, M. M., D. E. Brann, E. L. Stromberg, E. S. Hagood, A. Herbert, E. C. Jones, W. K. Griffith. 1993. Intensive Soft Red Winter Wheat Production. Virginia Cooperative Extension.

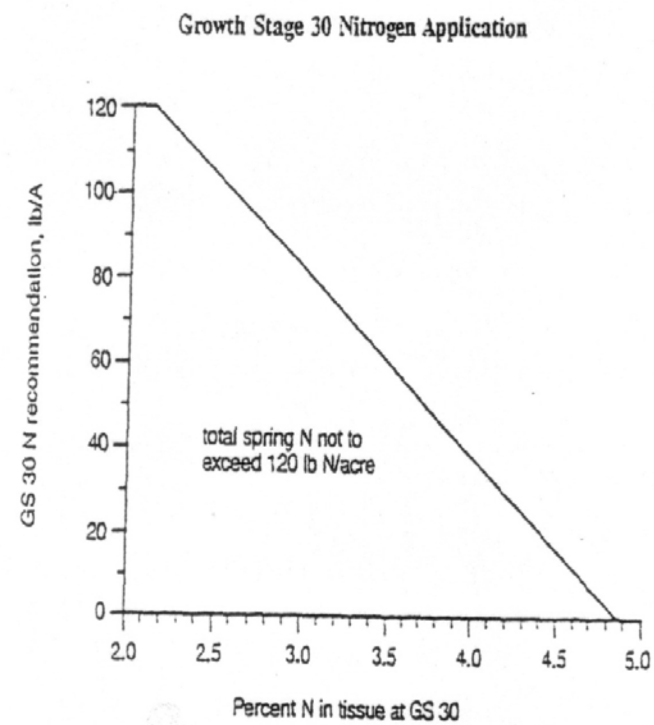
To determine the rate for the growth stage 25 application, one needs to determine the number of tillers per square foot in the field. If there are less than 60 per square foot, apply 60 pounds per acre at growth stage 25. If there are between 60 and 100 tillers, determine the rate from Figure 5-2. If there are more than 100 tillers per square foot and the crop has a dark green color, do not apply any nitrogen at this time.

(Spring N management continued on next page)

(2) March (Zadoks growth stage 30).

(a) N application rate for wheat based on the % N in a plant tissue sample taken at Zadoks growth stage 30 using Fig. 5-3. **NOTE:** Observations have shown that barley topdress rate should be decreased by 0.5% N.

Figure 5-3



Source: Alley, M. M., D. E. Brann, E. L. Stromberg, E. S. Hagood, A. Herbert, E. C. Jones, W. K. Griffith. 1993. Intensive Soft Red Winter Wheat Production. Virginia Cooperative Extension.

Nitrogen Application Recommendations for Wheat and Barley (Summary)

Season	Application Criteria	N Application Program
I. Planting	**Nitrate Soil Test**	
	>30 ppm (top 6 inches)	None
	<30 ppm (top 6 inches)	Apply 15-30 lbs/ac. N
	None	Conventional Tillage-broadcast & incorporate to 1-2 inches, 25-30 lbs/ac N; No-Till-broadcast 25-30 lb N/acre
II. Midwinter (Dec.-January)		
Precipitation	2 or more rainfalls >2.0 inches **AND**	
Tiller Development	<3 tillers per plant; pale green **AND**	
Max. Daily Temp.	>50^{0}F	**THEN:** Apply 30 lbs N/acre topdressed
III. Late Winter (Feb. - Early March)	**Tiller Count:**	
Single Application:	<70/sq. ft.	80 lbs/ac. N-Feb.(Growth Stage 25)
	>100; plants dark green; tissue N levels >3.75%	30-40 lbs/ac. N- late March (Zadoks Growth Stage 30)
Split Application:		
February (Zadoks Growth Stage 25)	<60/sq. ft.	60 lbs ac.N
	60-100/sq. ft.	40 lbs/ac. N
	>100/sq. ft. and dark green color	none; tissue test at growth stage 30
March (growth stage 30 tissue test)	Refer to Figure 5-3 for N rates based on tissue test	No more than 120 lbs N/acre - **total of Growth Stages 25 and 30**

Phosphorus and Potassium Nutrient Needs
(Standard/Intensive Small Grain Management)

Soil Test Level	Nutrient Needs (lbs/ac) P_2O_5	Nutrient Needs (lbs/ac) K_2O
L	80 – 120	80 – 120
M	40 – 80	40 – 80
H	20 – 40	20 – 40
VH	0	0

Canola

Nitrogen Fertilization:

1. Apply 30 - 40 lbs/ac. N at planting time. Broadcast and disc-in before planting.

2. Apply 90 - 120 lbs/ac. N in late February just before spring growth begins. For soils which are a High environmental risk for nitrogen loss, the late winter application should be split with the first 45 to 60 lbs/ac being applied in late February and the second 45 to 60 lbs/ac being applied 4 weeks later.

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	80 -120	80 -120
M	40 - 80	40 - 80
H	20 - 40	20 - 40
VH	0	0

Peanuts

Phosphorus and Potassium Nutrient Needs:

The phosphorus and potassium nutrient needs for peanuts can be applied at the same time the crop preceding peanuts in the rotation is fertilized. If not applied at that time, it should be plowed down before peanuts are planted.

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	100-200	80 -120
M	55 – 85	0
H	0 - 40*	0
VH	0	0

*Apply 40 lbs/ac at H-. No P_20_5 recommended at H and H+.

Apply ½ pound of elemental boron per acre per year at early bloom stage in a compatible labeled pesticide spray or dust or as a separate foliar application. (Va. Tech Soil Test Note 4).

Cotton

Nitrogen Needs:

The planned rate of total nitrogen application should take into consideration the crop that cotton will be following and the soil on which it will be grown. The following suggestions consider both:

Soil Management Groups on Which Cotton Will Be Grown		Total N Application Lbs/Acre
I.	A, AA, B, C, E, J, K	50-60
II.	F, Q, R, S, T, DD, II	60-90
III.	N, O, V, X	50-70
IV.	Soil Management Groups that are not suited for cotton production: P, Z, BB, CC, EE, FF, HH, JJ, KK, LL, MM, NN, OO, PP, QQ.*	
V.	Soil Management Groups on which cotton will not be grown: D, G, H, I, J, L, M, U, W, Y, GG.	

* **"Soils in this field are not suited for cotton production. If at all possible, select another field, but if cotton will be grown, apply 50-70 lbs of N per acre."**

Reduce the planned rate of nitrogen application by 10 pounds per acre if cotton will be following soybeans and by 20 pounds per acre if it will follow peanuts.

Timing of Nitrogen Application on Cotton

Only about 20 per cent of the total nitrogen uptake will have occurred by early square formation (approximately 45 days after planting). To avoid possible stimulation of excessive vegetative growth and loss of unneeded nitrogen through leaching, apply only one third of the planned nitrogen application rate at planting. The most effective method of application of this nitrogen is in a starter fertilizer which would also supply 20 to 40 pounds of P_2O_5 depending upon P_2O_5 needs as shown by a soil test. This can be done by using either a 1:1:0 ratio fertilizer such as 15-15-0, a 1:2:0 ratio fertilizer such as 18-46-0 or a 1:3:0 fertilizer such as 10-34-0. Use of a starter fertilizer has been shown to stimulate the early growth rate and increase lint cotton yields by 60 to 100 pounds per acre, both of which are desirable.

The preferred placement of this starter fertilizer is two inches to one side of the seed and at least as deep as the seeds are planted but preferably one to two inches below seed level. Placing the starter fertilizer in the row behind the subsoiler shank while ripping under the row has also been shown to be an effective placement. However, applying the starter fertilizer in a 3 to 4 inch wide band on the soil surface in front of the press wheel has not proven to be an effective placement method in research conducted in North Carolina.

The remainder of the planned nitrogen application can be applied at first square formation (approximately 45 days after planting).

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	80 – 120	80 -120
M	40 – 80	40 - 80
H	20 – 40	20 - 40
VH	0	0

Apply ½ pound of elemental boron per acre per year in a compatible labeled pesticide spray or dust or as a separate foliar application. (Va. Tech Soil Test Note 4).

White Potatoes - All Soil Productivity Groups

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	125-150*	200	300
M	125-150*	150	200
H	125-150*	100	100
VH	125-150*	30**	50

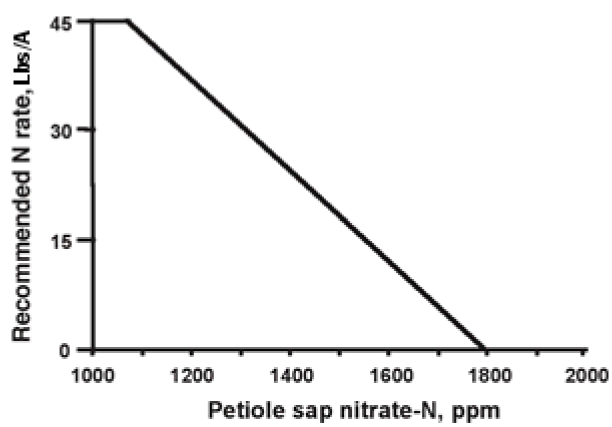
* Nitrogen recommendation for yields up to 250 cwt/acre. Split apply nitrogen with 1/3 of the rate applied at planting and remaining 2/3 to be applied 1-2 weeks after emergence.

** For phosphorus soil test levels exceeding 65% saturation as shown in Table 4-1,Section IV, or if the Phosphorus Index rating is greater than 100, no phosphorus application shall be made to the field, including starter.

When documented yields for the field (average of the high 3 yields in the last 5 years) indicate an expected yield of greater than 250 cwt/acre use .6 (six-tenths) X the expected tuber yield (cwt/ac) to determine the nitrogen recommendation. At this higher nitrogen recommendation, use a three way split as follows, 1/6 -1/3 of the total recommendation at planting, 1/2 to 2/3 of the total recommendation at emergence, and 1/6 of the total recommendation at flowering. The combination of nitrogen applications applied before flowering shall not exceed 5/6 of the total nitrogen need when using this program.

For more efficient nitrogen management application at flowering, apply the remaining nitrogen from the 3-way nitrogen split, or use the figure below showing petiole sap concentrations at flowering to adjust nitrogen application rate.

Figure 5-4 White Potato Petiole Sap Nitrate Concentration before Flowering



Note: At greater than 1500 ppm, response to additional nitrogen is unlikely.

Sudangrass, Sudan-Sorghum Hybrids and Millet Plantings

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	70*	100-120	100-120
M	70*	70-90	70-90
H	70*	40-60	40-60
VH	70*	0	0

* The N recommendation is for application at planting. If additional pasture, hay, silage production is desired, apply 40-60 lbs/A N after each cutting, or 30-40 lbs/ac. N after each grazing. Do not apply more than 130 lbs/A N per year.

Alfalfa and Alfalfa-Orchardgrass Establishment

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	150-170	150-170
M	120-140	120-140
H	50-110	50-110
VH	0	0

Alfalfa and Alfalfa-Grass Hay Maintenance, Soil Productivity Group I

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	100-120	390-450*
M	70-90	300-360*
H	40-60	40-210*
VH	0	0

* For K_2O rates greater than 200 lbs/ac, split the application, applying 1/2 in the fall and 1/2 in the spring. (Alternate recommendation where field sampled in spring - apply 1/2 in early spring, and 1/2 after the first cutting).

Apply 2 to 4 pounds of elemental boron per acre per year with a broadcast fertilizer.(Va. Tech Soil Test Note 4).

Alfalfa and Alfalfa-Grass Hay Maintenance, Soil Productivity Group II

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	100-120	280-330*
M	70-90	220-270*
H	40-60	60-200
VH	0	0

* For K_2O rates greater than 200 lbs/acre, split the application, applying 1/2 in the fall and 1/2 in the spring. (Alternate recommendation where field sampled in spring - apply 1/2 in early spring, and 1/2 after the first cutting).

Apply 2 to 4 pounds of elemental boron per acre per year with a broadcast fertilizer.(Va. Tech Soil Test Note 4).

Alfalfa and Alfalfa-Grass Hay Maintenance, Soil Productivity Group III, IV, V

Soil Test Level	Nutrient Needs (lbs/ac)	
	P_2O_5	K_2O
L	70-90	200-240*
M	40-60	160-180
H	40	40-140
VH	0	0

* For K_2O rates greater than 200 lbs/ac, split the application, applying 1/2 in the fall and 1/2 in the spring. (Alternate recommendation where field sampled in spring - apply 1/2 in early spring, and 1/2 after the first cutting).

Apply 2 to 4 pounds of elemental boron per acre per year with a broadcast fertilizer.(Va. Tech Soil Test Note 4).

Red Clover-Orchardgrass, Orchardgrass/Fescue-Ladino Clover, Orchardgrass and Fescue Establishment

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	40*	150-170	150-170
M	40*	120-140	120-140
H	40*	40-110	40-110
VH	40*	0	0

***** Apply the nitrogen at the time the grass is seeded in late summer, early fall or early spring. Overseed the grass with clover the following February.

Red Clover-Grass Hay Maintenance, Soil Productivity Groups I, II

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	0	100-120	200-240
M	0	70-90	160-180
H	0	40-60	40-140
VH	0	0	0

Red Clover-Grass Hay Maintenance, Soil Productivity Groups III, IV

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	0	70-90	120-150
M	0	40-60	80-110
H	0	40	40-70
VH	0	0	0

Stockpiled Tall Fescue, Soil Productivity Groups I, II

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	60-100*	100-120	100-120
M	60-100*	40-90	40-90
H	60-100*	0	0
VH	60-100*	0	0

* Remove animals by early August and apply the N between August 1-15. Keep animals off pasture until November to allow stand to mature. Where clover makes up more than 25% of the stand, use the 60 lbs/ac. N rate. If clover is not present and you desire maximum production, apply the 100 lbs/ac. N rate.

Stockpiled Tall Fescue, Soil Productivity Groups III, IV, V

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	50-80*	40-60	60-80
M	50-80*	30	30-50
H	50-80*	0	0
VH	50-80*	0	0

* Remove animals by early August and apply the N between August 1-15. Keep animals off pasture until November to allow stand to mature. Where clover makes up more than 25% of the stand, use the 50 lbs/ac. N rate. If clover is not present and you desire maximum production, apply the 80 lbs/ac. N rate.

Orchardgrass/Fescue-Clover Pastures, Soil Productivity Groups I, II

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	0*	100-120	100-120
M	0*	40-90	40-90
H	0*	0	0
VH	0*	0	0

* If stand contains less than 25% clover, apply 50-80 lbs/ac. of N.

If additional production is needed later on, apply 40 to 60 lbs/ac. of N in late summer.

If you are planning to overseed a legume into the stand, do not apply any N.

If organic nutrient sources are utilized, up to 120 lbs/ac. of N may be applied if the application is no more frequent than once every 2 years. When applying organic nutrient sources pasture should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Orchardgrass/Fescue-Clover Pastures, Soil Productivity Groups III, IV, V

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	0*	40-60	60-80
M	0*	30	30-50
H	0*	0	0
VH	0*	0	0

* If stand contains less than 25% clover, apply 40-60 lbs/ac. of N.

If additional production is needed later on, apply 40 to 60 lbs/ac. of N in late summer.

If you are planning to overseed a legume into the stand, do not apply any N.

If organic nutrient sources are utilized, up to 100 lbs of N may be applied if the application is no more frequent than once every 2 years When applying organic nutrient sources, pasture should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Native or Unimproved Pastures, Soil Productivity Groups I, II

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	0*	150-200	150-200
M	0*	75-125	75-125
H	0*	0	0
VH	0*	0	0

* If stand contains less than 25% clover, apply 40-60 lbs/ac. of N.

For phosphorus and potassium - apply once every three or four years.
If you are planning to overseed a legume into the stand, omit the N application.

When applying organic nutrient sources, pasture should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Native or Unimproved Pastures, Soil Productivity Groups III, IV

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	0*	100-120	100-120
M	0*	40-90	40-90
H	0*	0	0
VH	0*	0	0

* If stand contains less than 25% clover, apply 40-60 lbs/ac. N.

When applying organic nutrient sources, pasture should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

For phosphorus and potassium - apply once every three or four years.

Orchardgrass/Fescue (Tall Grass) Hay Production, Soil Productivity Groups I, II

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	80-100*	100-120	200-240
M	80-100*	70-90	160-180
H	80-100*	40-60	40-140
VH	80-100*	0	0

* The N recommendation is for a March application of commercial fertilizer.

If additional hay production is needed, apply 80 lbs/ac N after each cutting during the growing season. Use the number of cuttings to determine total nitrogen rate with a maximum annual rate not to exceed 250 lbs/acre per year.

Organic nutrient sources may be applied in one or more applications, not to exceed 250 lbs/acre plant available nitrogen annually. If applied after 9/1 of any year until 3/1 of the following year, application rates during this period shall not exceed ½ of the total nitrogen rate (125 lbs/acre).

When applying organic nutrient sources, fields should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Orchardgrass/Fescue (Tall Grass) Hay Production, Soil Productivity Groups III, IV

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	60-80*	70-90	120-150
M	60-80*	40-60	80-110
H	60-80*	40	40-70
VH	60-80*	0	0

* N recommendation is for a March application of commercial fertilizer.

For additional fall hay production apply 60-80 lbs N/acre in late August/early September. Do not apply more than 160 lbs N/acre/year.

Organic nutrient sources may be applied in one or more applications, not to exceed 160 lbs/acre plant available nitrogen annually. If applied after 9/1 of any year until 3/1 of the following year, application rates during this period shall not exceed ½ of the total nitrogen rate (80 lbs/acre).

When applying organic nutrient sources, fields should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Bermudagrass Establishment

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	70	100-120	100-120
M	70	70-90	70-90
H	70	40-60	40-60
VH	70	0	0

Bermudagrass Pastures - Soil Productivity Groups I, II

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	175-225*	100-120	100-120
M	175-225*	40-90	40-90
H	175-225*	0	0
VH	175-225*	0	0

* The N recommendation represents the total amount of Nitrogen to be applied during the season. Split the N into three applications - April, June and July.

Organic nutrient sources may be applied in one or more applications, not to exceed 225 lbs./ac. plant available nitrogen annually. If applied after 7/1, application rates shall not exceed ½ the total nitrogen rate (112 lbs/ac.) based on above criteria while crop is still actively growing up to 9/15, with the remaining rate not to be applied until after 4/1 of the following year.

When applying organic nutrient sources, pastures should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Bermudagrass Pastures - Soil Productivity Groups III, IV, V**

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	120-180*	100-120	100-120
M	120-180*	40-90	40-90
H	120-180*	0	0
VH	120-180*	0	0

* The N recommendation represents the total amount of N to be applied during the season. Split the N into three applications - April, June and July.

** Use the lower end of range for Group V soils.

Organic nutrient sources may be applied in one or more applications, not to exceed 180 lbs/ac. plant available nitrogen annually. If applied after 7/1 application rates shall not exceed ½ the total nitrogen rate (90 lbs/ac.) based on above criteria while crop is still actively growing up to 9/15, with the remaining rate not to be applied until after 4/1 of the following year.

When applying organic nutrient sources, pastures should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Bermudagrass Hay Production, Soil Productivity Groups I, II
(Use Tall Grass Productivity Group)

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	240-300*	100-120	235-275
M	240-300*	70-90	185-225
H	240-300*	40-60	40-165
VH	240-300*	0	0

* Total application of N should be divided equally between an early April application and applications made after the first and second harvests.

Organic nutrient sources may be applied in one or more applications, not to exceed 300 lbs/ac. plant available nitrogen annually. If applied after 7/1, application rates shall not exceed ½ the total nitrogen rate (150 lbs/ac.) based on above criteria while crop is still actively growing up to 9/15, with the remaining rate not to be applied until after 4/1 of the following year.

When applying organic nutrient sources, fields should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Bermudagrass Hay Production, Soil Productivity Groups III, IV, V**
(Use Tall Grass Productivity Group)

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	210-260*	100-120	235-275
M	210-260*	70-90	185-225
H	210-260*	40-60	40-165
VH	210-260*	0	0

* Total application of N should be divided equally between an early April application and applications made after the first and second harvests.

** Use the lower end of range for Group V soils.

Organic nutrient sources may be applied in one or more applications, not to exceed 260 lbs/ac. plant available nitrogen annually. If applied after 7/1 application rates shall not exceed ½ the total nitrogen rate (130 lbs/ac.) based on above criteria while crop is still actively growing up to 9/15, with the remaining rate not to be applied until after 4/1 of the following year.

When applying organic nutrient sources fields should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Annual Ryegrass Hay Production, Soil Productivity Groups I and II
(Use Tall Grass Productivity Group)

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	40-50*	100-120	200-240
M	40-50*	70-90	160-180
H	40-50*	40-60	40-140
VH	40-50*	0	0

* The above N rates are recommended at seeding during the Fall. For additional production 30-40 lbs/ac of N should be added after each grazing, not to exceed 160 lbs/ac. annually. For hay production 40-60 lbs/ac N after each cutting, not to exceed 200 lbs/ac. annually.

When applying organic nutrient sources, fields should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Annual Ryegrass Hay Production, Soil Productivity Groups III and IV (Use Tall Grass Productivity Group)

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	40-50*	70-90	120-150
M	40-50*	40-60	80-110
H	40-50*	40	40-70
VH	40-50*	0	0

* The above N rates are recommended at seeding during the Fall. For additional production, 30-40 lbs/ac of N should be added after each grazing, not to exceed 140 lbs/ac annually. For hay production, 40-60 lbs/ac N after each cutting, not to exceed 180 lbs/ac annually.

When applying organic nutrient sources, fields should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Prairie Grass (Matua) Hay Production, Soil Productivity Groups I and II (Use Tall Grass Productivity Group)

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	80-100*	100-120	280-330
M	80-100*	70-90	220-270
H	80-100*	40-60	60-200
VH	80-100*	0	0

* The N recommendation is for a March application. Apply 40-60 lbs/ac after hay or silage cutting. Do not exceed 300 lbs/ac per year for hay. When pastured after hay harvest, apply 30-40 lbs/ac after each grazing. Do not exceed 200 lbs/ac per year for intensive rotational grazing.

When applying organic nutrient sources, fields should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Prairie Grass (Matua) Hay Production, Soil Productivity Groups III and IV (Use Tall Grass Productivity Group)

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	60-80*	100-120	200-240
M	60-80*	70-90	160-180
H	60-80*	40-60	40-140
VH	60-80*	0	0

* The N recommendation is for a March application. Apply 40-60 lbs/A after hay or silage cutting. Do not exceed 250 lbs/A per year for hay. When pastured after hay harvest, apply 30-40 lbs/ac after each grazing. Do not exceed 180 lbs/ac per year for intensive rotational grazing.

When applying organic nutrient sources, fields should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Switchgrass - All Soil Productivity Groups

Soil Test Level	Nutrient Needs (lbs/ac)		
	N*	P_2O_5	K_2O
L	40-60	100-120	100-120
M	40-60	40-90	40-90
H	40-60	0	0
VH	40-60	0	0

*If stand contains greater than 25% legumes, no Nitrogen is required.

For establishment no Nitrogen is needed, follow P_2O_5 and K_2O soil test recommendations shown above.

When applying organic nutrient sources, fields should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Caucasian Bluestem (hay or pasture), All Soil Productivity Groups

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	60-120*	100-120	100-120
M	60-120*	40-90	40-90
H	60-120*	0	0
VH	60-120*	0	0

*This is an annual nitrogen rate. Annual nitrogen rate should be applied in split applications, such as between grazings or cuttings if used for hay.

If organic nutrient sources are utilized, up to 120 lbs of N may be applied if the application is no more frequent than once every 2 years.

When applying organic nutrient sources, fields should be maintained at no less than three inches in height in order to reduce runoff and assure adequate regrowth of crop.

Tobacco Recommendations:

Flue-Cured

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L		290-330	150-175
M	60-70	60-100	100-150
H		40	100
VH		40*	100

* For phosphorus soil test levels exceeding 65% saturation as shown in Table 4-1,Section IV, or if the Phosphorus Index is greater than 100, no phosphorus application shall be made to the field, including starter.

- 50% of the total nitrogen need should be in the nitrate nitrogen form.
- Pre-plant broadcast fertilizer should not exceed 40 lbs/ac of nitrogen and 120 lbs/ac. of potash. Balance of nutrient recommendation can be applied as a sidedress application.
- Use of soluble fertilizer in transplant water is discouraged where soil test levels are M+ and higher. For phosphorus soil test levels Medium or below, soluble fertilizer may be used. Select a product approved for direct application in the row with the plant. Total phosphorus applied can not exceed phosphorus nutrient need.
- Potassium source should not contain any chloride compounds.

Dark-Fired

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	**P_2O_5**	**K_2O**
L		290-330	150-175
M	135	60-100	100-150
H		40	100
VH		40*	100

* For phosphorus soil test levels exceeding 65% saturation as shown in Table 4-1,Section IV, or if the Phosphorus Index is greater than 100, no phosphorus application shall be made to the field, including starter.

- 50% of the total nitrogen need should be in the nitrate nitrogen form.
- Pre-plant broadcast fertilizer should not exceed 60-70 lbs/ac. of nitrogen and 120 lbs/ac. of potash. Balance of nutrient recommendation can be applied as a sidedress application.
- Use of soluble fertilizer in transplant water is discouraged where soil test levels are M+ and higher. For phosphorus soil test levels Medium or below, soluble fertilizer may be used. Select a product approved for direct application in the row with the plant. Total phosphorus applied can not exceed phosphorus nutrient need.
- Potassium source should not contain any chloride compounds.

Burley

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	**P_2O_5**	**K_2O**
L		290-330	250-350
M	175 - 200	60-100	200-250
H		40	100-200
VH		40*	100

* For phosphorus soil test levels exceeding 65% saturation as shown in Table 4-1,Section IV, or if the Phosphorus Index is greater than 100, no phosphorus application shall be made to the field, including starter.

- 50% of the total nitrogen need should be in the nitrate nitrogen form.
- Pre-plant broadcast fertilizer should not exceed 100 lbs/ac. of nitrogen and 120 lbs/ac. of potash. Balance of nutrient recommendation can be applied as a sidedress application.
- Use of soluble fertilizer in transplant water is discouraged where soil test levels are M+ and higher. For phosphorus soil test levels Medium or below, soluble fertilizer may be used. Select a product approved for direct application in the row with the plant. Total phosphorus applied can not exceed phosphorus nutrient need.
- Potassium source should not contain any chloride compounds.

Hardwood and Pine Nutrient Application Rates and Timing

All references to age of trees or stands starts as of the time the trees were planted at the site and not the age of the seedling tree at planting.

Hardwood and Pine Plantation Establishment (0 - 3 years of age) - All Soil Productivity Groups

Soil Test Level	Nutrient Needs, (lbs/ac)		
	N	**P_2O_5**	**K_20**
L	0	50-70	50-80
M	0	10-40	10-40
H	0	0	0
VH	0	0	0

- Phosphorus and potassium may be applied by incorporation before planting, or by broadcast on the soil surface or by banding along the planting row.
- Acceptable pH ranges for pines are pH 4.5 to 6 and should not exceed pH 6.5. Acceptable pH ranges for hardwoods are pH 5 to 7 and should not exceed pH 7.5. If the soil pH falls within these ranges, it is not necessary to apply lime.
- Control of competing vegetation, including both woody and herbaceous species, may be required within the stand following planting to avoid overtopping of the seedlings and thus decrease tree survival.

Pine* and Hardwood Maintenance (3 to 10 years of age) – All Soil Productivity Groups

Soil Test Level	Nutrient Needs, (lbs/ac)		
	N	**P_2O_5**	**K_20**
L	See detailed nitrogen management below	50-70	50-80
M		10-40	10-40
H		0	0
VH		0	0

*Pines Species includes loblolly, short leaf, Virginia, and white pine.
Long leaf pine should not exceed 100 lbs/ac N at any age.

Nitrogen intervals and rates for Pine and Hardwood Maintenance

- **Between ages 3-10**, one application of N at a rate of 50 to 100 lbs/acre can be made to the stand. Applications in pines at this stage of growth shall be made no sooner than one month before the average date of the last killing frost in the Spring (Fig. 6-2, Section VI) and ending no later than two months before the average date of the first killing frost in the Fall. (Fig 6-1, Section VI).

- **After age 10**, applications of nitrogen can be made using one of the nitrogen rates and application intervals listed in the table below. The applications can continue at the selected interval and rate until approximately 5 years before expected harvest of the trees.

Interval between Nitrogen applications	Nitrogen Application Rate (lbs/ac)per Application Interval[a]
4-6 yrs.	100
OR	
6-8 yrs.	150
OR	
8-10 yrs.	200

[a] - Long leaf pine may receive no more than 100 lbs/ac of nitrogen after age >10 years, every 4-6 years.

Season of Nitrogen Application

- No applications shall be made when the soil is saturated or standing water is present on the surface of the soil, regardless of the time of year.

- Pine: Applications in pine stands greater than 10 years of age may be made at any time of the year that the soil is not saturated or standing water is not present on the soil surface.

- Hardwood: Applications in hardwoods shall be limited to the growing season. Applications in hardwood forests shall be made no sooner than one month before the average date of the last killing frost in the Spring (Fig. 6-2, Section VI) and ending no later than two months before the average date of the first killing frost in the Fall. (Fig 6-1, Section VI).

Understory vegetation

Moderate amounts of understory vegetation that is below the canopy of the planted trees is acceptable in mid-rotation stands. This vegetation will take up nutrients and reduce runoff. However, if understory vegetation is excessive, that is, it is as tall or taller than the planted trees, suppression of the understory vegetation may be needed. Consult a local Virginia Department of Forestry forester to develop an understory management program.

- In all cases Best Management Practices for nutrient applications, such as adhering to buffers for wells and surface waters is required.

Christmas Trees - Establishment (broadcast before planting)
White Pine, Virginia Pine, Scotch Pine

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	100-120	90-150	100-160
M	100-120	40-80	50-90
H	100-120	30	40
VH	100-120	0	0

Christmas Trees – Establishment (broadcast before planting)
Fraser Fir, Norway Spruce, Hemlock, Blue Spruce, Red Cedar

Soil Test Level	Nutrient Needs (lbs/ac)		
	N	P_2O_5	K_2O
L	100-120	160-300	150-250
M	100-120	60-150	60-150
H	100-120	30-50	30-50
VH	100-120	0	0

Christmas Trees – Maintenance

- A nitrogen application of 50-60 lbs/acre should be made with the first Spring application to be made about 2 weeks before budbreak. A Fall application of 50-60 lbs/acre can be made anytime beginning in September, but no later than the end of October.

- Use the Fertilizer Recommendations table under **Establishment** for the appropriate rate for the specific species. Base P_2O_5 and K_2O applications on soil test results taken before planned maintenance applications.

- Maintenance fertilizer applications should be uniformly applied in 2 to 3 foot wide bands between the trees along the planted row.

OR

- For a rate per tree, determine the fertilizer rate in ounces (lbs/ac X 16) then divide by the number of trees per acre. (100 lbs/ac of N X 16 ozs/lb = 1600 ozs. Then 1600 ozs ÷ no. of trees/ac = ozs/tree).

Section VI. Turfgrass Nutrient Recommendations for Home Lawns, Office Parks, Public Lands and Other Similar Residential/Commercial Grounds

Definitions

For the purposes of this section, the following definitions, as presented by the Association of American Plant Food Control Officials (AAPFCO), apply:

"Enhanced efficiency fertilizer" describes fertilizer products with characteristics that allow increased plant nutrient availability and reduce the potential of nutrient losses to the environment when compared to an appropriate reference product.

"Slow or controlled release fertilizer" means a fertilizer containing a plant nutrient in a form which delays its availability for plant uptake and use after application, or which extends its availability to the plant significantly longer than a reference "rapidly available nutrient fertilizer" such as ammonium nitrate, urea, ammonium phosphate or potassium chloride. A slow or controlled release fertilizer must contain a minimum of 15 percent slowly available forms of nitrogen.

"Water soluble nitrogen", "WSN", or "readily available nitrogen" means: Water soluble nitrogen in either ammonical, urea, or nitrate form that does not have a controlled release, or slow response.

Recommended Season of Application For Nitrogen Fertilizers - Applies to all Turf

A nitrogen fertilization schedule weighted toward fall application is recommended and preferred for agronomic quality and persistence of cool season turfgrass; however, the acceptable window of applications is much wider than this for nutrient management. The nutrient management recommended application season for nitrogen fertilizers to cool season turfgrasses begins six weeks prior to the last spring average killing frost date and ends six weeks past the first fall average killing frost date (see Figures 6-1 & 6-2). Applications of nitrogen during the intervening late fall and winter period should be avoided due to higher potential leaching or runoff risk, but where necessary, apply no more than 0.5 pounds per 1,000 ft^2 of water soluble nitrogen within a 30-day period. Higher application rates may be used during this late fall and winter period by using materials containing slowly available sources of nitrogen, if the water soluble nitrogen contained in the fertilizer does not exceed the recommended maximum of 0.5 pounds per 1,000 ft^2 rate. Do not apply nitrogen or phosphorus fertilizers when the ground is frozen.

The acceptable nitrogen fertilizer application season for non-overseeded warm season turfgrass begins no earlier than the last spring average killing frost date and ends no later than one month prior to the first fall average killing frost date (see Figures 6-1 & 6-2).

Figure 6-1

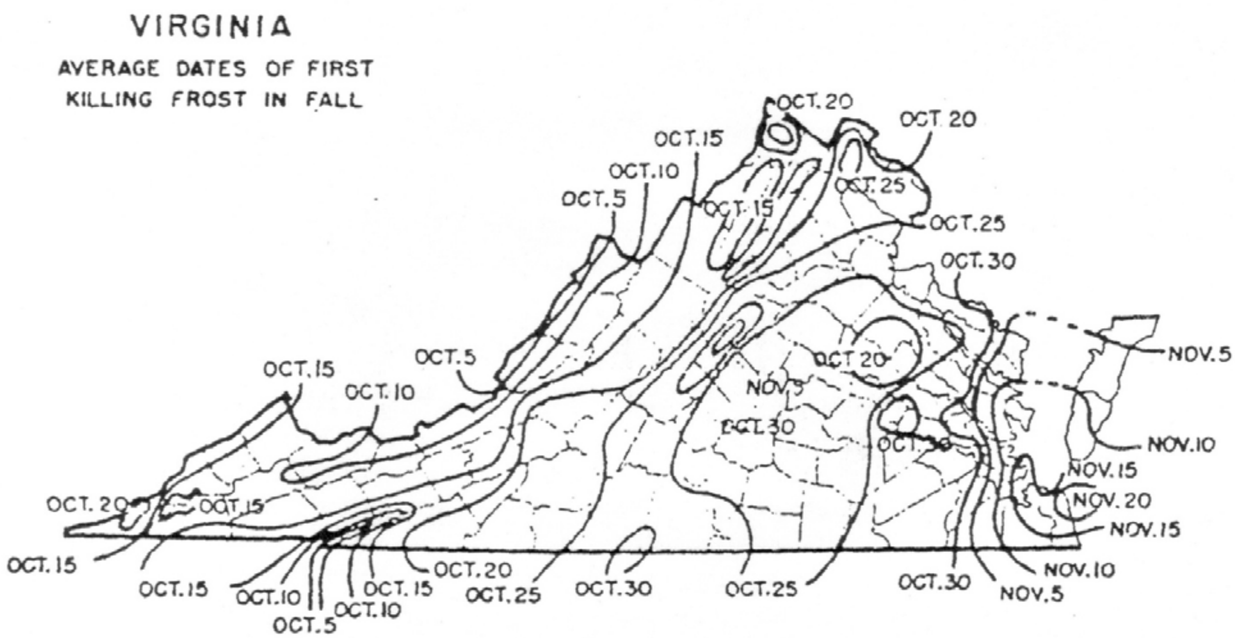
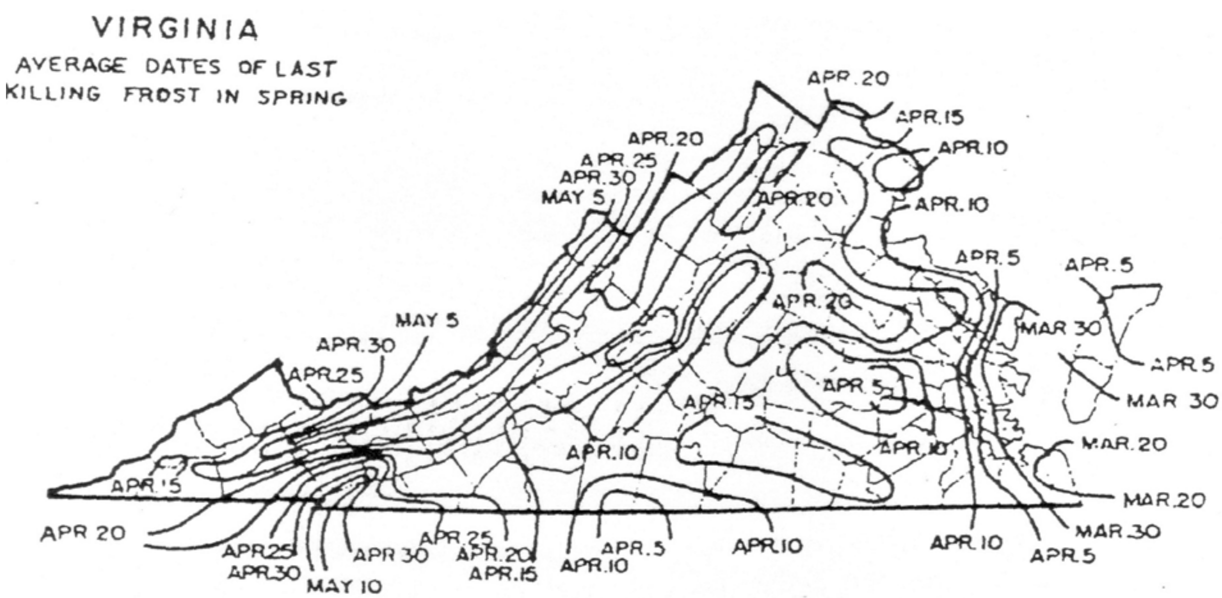


Figure 6-2



Per Application Rates

Do not apply more than 0.7 pounds of water soluble nitrogen per 1,000 ft^2 within a 30-day period. For cool season grasses, do not apply more than 0.9 pounds of total nitrogen per 1,000 ft^2 within a 30-day period. For warm season grasses, do not apply more than 1.0 pounds of total nitrogen per 1,000 ft^2 within a 30-day period. Lower per application rates of water soluble nitrogen sources or use of slowly available nitrogen sources should be utilized on very permeable sandy soils, shallow soils over fractured bedrock, or areas near water wells.

Annual Application Rates for Home Lawns and Commercial Turf

Up to 3.5 pounds per 1,000 ft^2 of nitrogen may be applied annually to cool season grass species or up to 4 pounds per 1,000 ft^2 may be applied annually to warm season grass species using 100 percent water soluble nitrogen sources. Lower rates of nitrogen application may be desirable on those mature stands of grasses that require less nitrogen for long-term quality. As a result, lower application rates will probably be more suited to the fine leaf fescues (hard fescue, chewings fescue, creeping red fescue, and sheep fescue) and non-overseeded zoysiagrass. Lower rates should also be used on less intensively managed areas.

Use of Slowly Available Forms of Nitrogen

For slow or controlled release fertilizer sources, or enhanced efficiency fertilizer sources, no more than 0.9 pounds of nitrogen per 1,000 ft^2 may; be applied to cool season grasses within a 30-day period and no more than 1.0 pounds of nitrogen per 1,000 ft^2 may be applied to warm season grasses within a 30-day period.

Provided the fertilizer label guarantees that the product can be used in such a way that it will not release more than 0.7 pounds of nitrogen per 1,000 ft^2 in a 30-day period, no more than 2.5 pounds of nitrogen per 1,000 ft^2 may be applied in a single application. Additionally, total annual applications shall not exceed 80 percent of the annual nitrogen rates for cool or warm season grasses.

Phosphorus and Potassium Nutrient Needs (Established Turf)

Apply phosphorus (P_2O_5) and potassium (K_2O) fertilizers as indicated necessary by a soil test using the following guidelines:

Soil Test Level	Nutrient Needs (pounds per 1,000 ft^2)*	
	P_2O_5	K_2O
L	2-3	2-3
M	1-2	1-2
H	0.5-1	0.5-1
VH	0	0

* For the lower soil test level within a rating, use the higher side of the range and for higher soil test level within a rating use the lower side of the recommendation range. (For example the recommendation for a P_2O_5 soil test level of L- would be 3 pounds per 1,000 ft^2.)

Do not use high phosphorus ratio fertilizers such as 10-10-10 or 5-10-10, unless soil tests indicate phosphorus availability below the M+ level.

Recommendations for Establishment of Turf

These recommendations are for timely planted turfgrass, that is, the seed or vegetative material (sod, plugs, and /or sprigs), are planted at a time of the year when temperatures and moisture are adequate to maximize turfgrass establishment. These recommended establishment periods would be late summer to early fall for cool-season turfgrasses and late spring through mid-summer for warm-season turfgrasses.

Nitrogen Applications

At the time of establishment, apply no more than 0.9 pounds per 1,000 ft^2 of total nitrogen for cool season grasses or 1.0 pounds per 1,000 ft^2 of total nitrogen for warm season grasses, using a material containing slowly available forms of nitrogen, followed by one or two applications beginning 30 days after planting, not to exceed a total of 1.8 pounds per 1,000 ft^2 total for cool season grasses and 2.0 pounds per 1,000 ft^2 for warm season grasses for the establishment period. Applications of WSN cannot exceed more than 0.7 pounds per 1,000 ft^2 within a 30-day period.

Phosphorus and Potassium Recommendations for Establishment

Soil Test Level	Nutrient Needs (pounds per 1,000 ft^2) *	
	P_2O_5	K_2O
L	3-4	2-3
M	2-3	1-2
H	2-1	0.5-1
VH	0	0

* For the lower soil test level within a rating, use the higher side of the range and for higher soil test level within a rating use the lower side of the recommendation range.

Nutrient Recommendations for Golf Courses

Nitrogen Timing

The beginning and ending dates for application of nitrogen shall be determined using guidance and frost date maps contained in the Season of Application for Nitrogen section, Figures 6-1 and 6-2.

If the full rate or the highest rate of the recommendation range for a monthly application is applied in a single application, then the interval of application for nitrogen shall be at least 30 days to allow turf to utilize previous nitrogen applications. If several applications are to be made for the monthly nitrogen rate, then the timing of the applications shall be at approximately even intervals, with the rate per application to be evenly divided between each application with the total nitrogen applied not to exceed the maximum monthly rate. Use of Water Insoluble Nitrogen forms of Nitrogen is encouraged.

Nitrogen Rates

	Grass Type	Maximum WSN Rate Per Application - pounds per 1,000 ft^2	Total Annual Nitrogen Rate - pounds per 1,000 ft^2 [a]
Greens		0.7 (b)	3-6
Tees		0.7 (b)	2-5
Fairways	Cool Season	0.7 (c)	2-3
	Warm Season	0.7 (c)	3-4
Fairways – Intensive Management	Cool Season	0.5 (d)	3-4
	Warm Season	0.5 (d)	3.5-4.5
Overseeding Warm Season Fairways		.5	1.25
Roughs		0.7 (e)	1-3

Fairways-Overseeding Warm Season Fairways

- For warm season grasses, up to 0.7 pounds of nitrogen per 1,000 ft^2 in a 30-day period may be applied in the Fall after perennial ryegrass overseeding is well established. An additional nitrogen application of 0.7 pounds per 1,000 ft^2 may be made in February-March to overseeded perennial ryegrass if growth and color indicate need. Applications using WSN may not exceed 0.7 pounds per 1,000 ft^2 within a 30-day period.

- Soluble nitrogen rates of 0.25 pounds per 1,000 ft^2 or less which may be a component of a pesticide or minor element application, may be applied any time during the application windows described in Recommended Season of Application for Nitrogen Fertilizers of this section, but must be considered with the total annual nitrogen application rate.

(a)Use higher rates for intensively used turf where accelerated growth and/or rapid recovery are required, use lower rates for maintenance of lesser used areas; do not exceed total annual nitrogen levels as stated above.

(b)Greens and Tees – Per application timing must be a minimum of 30 days between applications. A rate of 0.9 pounds per 1,000 ft^2 of total nitrogen may be applied for cool season grasses or 1.0 pounds per 1,000 ft^2 of total nitrogen may be applied for warm season grasses using a material containing slowly available forms of nitrogen.

(c) Fairways-Normal Management (Non-Irrigated or Irrigated) - Per Application timing must be a minimum of 30 days between applications. Total nitrogen application rates of 0.9 pounds per 1,000 ft^2 of total nitrogen may be applied for cool season grasses or 1.0 pound per 1,000 ft^2 of total nitrogen may be applied for warm season grasses using a material containing slowly available forms of nitrogen.

(d) Fairways-Intensive Management (Irrigated)- Per Application timing must be a minimum of 15 days between applications. This option requires optimized timing of more frequent applications of nitrogen with lesser rates per application. Alternatively, a maximum application rate of 0.9 pounds per 1,000 ft^2 of total nitrogen for cool season grasses or 1.0 pounds per 1,000 ft^2 of total nitrogen for warm season grasses using a material containing slowly available forms of nitrogen may be applied with a minimum of 30 days between applications.

(e) Foliar fertilizer may be applied to warm season grasses within 30 days prior to the first killing frost in the fall, at a rate not to exceed 0.1 pounds per 1,000 ft^2 of nitrogen per application. This application must be accounted for in the total annual nitrogen rate.

Phosphorus and Potassium Recommendations for Established Golf Courses

Apply phosphorus (P_2O_5) and potassium (K_2O) fertilizers as indicated by a soil test using the following guidelines:

Soil Test Level	**Nutrient Needs (pounds per 1,000 ft^2)***	
	P_2O_5	**K_2O**
L	2-3	2-3
M	1-2	1-2
H	0.5-1	0.5-1
VH	0	0

* For the lower soil test level within a rating, use the higher side of the range and for higher soil test level within a rating use the lower side of the recommendation range.

- For irrigated turf grown on Naturally Occurring and Modified Sand Based soils only, up to 0.5 pounds of P_2O_5 per 1,000 ft^2 may be applied, if needed, to aid in recovery of damaged turf during times of extreme use. No phosphorus applications shall be made when the soil phosphorus test level is above 65% saturation, based on the soil test phosphorus values and region as listed in Table 4-1 of Section IV.

- Avoid the general use of high phosphorus ratio fertilizers such as 10-10-10 or 5-10-10, unless soil tests indicate phosphorus availability below the M+ level.

Nitrogen Management on Athletic Fields - Cool Season Grasses

- This program is intended for those fields which are under heavy use.

- Nitrogen recommendations are based on the assumption that there is adequate soil moisture to promote good turf growth at the time of application. If no rainfall has occurred since the last application, further applications should be delayed until significant soil moisture is available.

Cool Season Grasses	Maintenance Program[a] Normal	Intensive
When to Apply[b]	Pounds per 1,000 ft^2 Nitrogen	
After August 15	------	0.5
September	0.7	0.7[c]
October	0.7[c]	0.7[c]
November	0.5	0.7[c]
April 15 - May 15	0.5	0.5
June 1 - June 15	----	0.5

Notes:

- Soluble nitrogen rates of 0.25 pounds per 1,000 ft^2 or less which may be a component of a pesticide or minor element application may be applied any time the turf is actively growing, but must be considered with the total annual nitrogen application rate.
- WSN = water soluble nitrogen; WIN = water insoluble nitrogen

(a) Intensive managed areas must be irrigated.

(b) The beginning and ending dates for application of nitrogen shall be determined using guidance and frost date maps contained in the preceding Season of Application for Nitrogen section, using Figures 6-1 and 6-2.

(c) Rates up to 0.9 pounds per 1,000 ft^2 of total nitrogen can be applied using a material containing slowly available forms of nitrogen, with a minimum of 30 days between applications.

(d) Make this application only if turf use warrants additional nitrogen for sustaining desirable growth and /or color.

Nitrogen Management on Athletic Fields - Warm Season Grasses

The following comments apply to both Naturally Occurring or Modified Sand based Fields and Predominantly Silt/Clay Soil Fields:

- Annual nitrogen rates for warm season grasses shall not exceed **4 pounds** in areas which have the average first killing frost on or before October 20, and shall not exceed **5 pounds** in areas which have the average first killing frost after October 20 as shown in Figure 6-1. Nitrogen rates and timings for overseeding warm season grasses are not included in these rates.

- April 15 - May 15 applications should not be made until after complete green-up of turf.

- Nitrogen applications June through August should be coordinated with anticipated rainfall if irrigation is not available.

- Use the lower end of the ranges for non-irrigated fields and the higher end of the ranges should be used on fields with irrigation.

- Nitrogen rates towards the higher end of the ranges may be applied on heavily used fields to accelerate recovery, however per application and annual rates cannot be exceeded.

Bermudagrass - Predominantly Silt/Clay Soil Fields [a]		
When to Apply[b]	**Pounds per 1,000 ft² Nitrogen[e]**	**First Fall Killing Frost Date[b]**
April 15 - May 15	0.5- 0.7[(c)]	Before Oct. 20
June	0.7	
July	0.5 – 0.7 [(d)]	
August	0.5 - 0.7 [(d)]	
Sept 1 - Sept 15	0.5 -0.7 [(c)]	After Oct. 20
If overseeded with perennial ryegrass		
Oct - Nov	0.5 [(e)]	
Feb-Mar	0.5 [(e)]	

Bermudagrass - Naturally Occurring or Modified Sand based Fields [a]		
When to Apply[b]	**Pounds per 1,000 ft² Nitrogen**	**First Fall Killing Frost Date[b]**
April 15 - May 15	0.5 -0.7[(c)]	Before Oct. 20
June1	0.7[(c)]	
July	0.7[(c)]	
August	0.7[(c))]	
Sept 1 - Sept 15	0.7[c]	After Oct. 20
If overseeded with perennial ryegrass		
Oct - Nov	0.5 [(e)]	
Feb - Mar	0.5 [(e)]	

The following notes apply to both of the Bermudagrass tables above:

(a) In the Piedmont and the Ridge and Valley areas of Virginia, the existing native soil will normally be comprised predominantly of clay and/or silt and these soils have inherently lower water infiltration and percolation rates and greater nutrient holding capacity. However, most areas of the Coastal Plain have existing native soils that are predominantly sandy textured soils and other facilities throughout the state may choose to install modified soil root zones that are predominantly sand (>50%) in order to maximize drainage and reduce compaction tendency. If subsurface drain tile surrounded by sand and/or gravel has been installed under the playing surface of any of these fields, their nitrogen programs should be managed as predominantly sand-based systems to minimize nutrient leaching.

(b) The beginning and ending dates for application of nitrogen shall be determined using guidance and frost date maps contained in the Season of Application for Nitrogen section, Figures 6-1 and 6-2.

(c) WSN must be applied as two applications not to exceed 0.35 pounds per 1,000 ft² each with a minimum of 15 days between applications. Alternatively, using a material that contains slowly available nitrogen sources, split applications of 0.5 pounds per 1,000 ft² may be applied with a minimum of 15 days between applications.

(d) If a material containing slowly available forms of nitrogen is used, rates up to 1.0 pounds of nitrogen per 1,000 ft^2 may be applied in a single application with a minimum of 30 days between applications.

(e) For overseeded warm season grasses, an additional 0.7 pounds per 1,000ft^2 of WSN may be applied in the Fall after the perennial ryegrass overseeding is well established. The WSN must be applied as two applications not to exceed 0.35 pounds per 1,000 ft^2 of nitrogen each, with a minimum of 15 days between applications. Additional WSN application of 0.5 pounds per 1,000 ft^2 may be made in February-March to overseeded perennial ryegrass if growth and color indicate need. Alternatively, split applications of 0.5 pounds of nitrogen per 1,000 ft^2 each with a minimum of 15 days between applications may be applied using a material containing slowly available nitrogen sources.

Phosphorus and Potassium Recommendations Athletic Fields

Apply phosphorus (P_2O_5) and potassium (K_2O) fertilizers as indicated by a soil test using the following guidelines:

Soil Test Level	Nutrient Needs (pounds per 1,000 ft^2)*	
	P_2O_5	**K_2O**
L	2-3	2-3
M	1-2	1-2
H	0.5-1	0.5-1
VH	0	0

* For the lower soil test level within a rating, use the higher side of the range and for higher soil test level within a rating use the lower side of the recommendation range.

- For irrigated turf grown on Naturally Occurring and Modified Sand Based soils only, up to 0.5 pounds of P_2O_5 per 1,000 ft^2 may be applied, if needed, to aid in recovery of damaged turf during times of extreme use. No phosphorus applications shall be made when the soil phosphorus test level is above 65% saturation, based on the soil test phosphorus values and region as listed in Table 4-1 of Section IV.

- Avoid the general use of high phosphorus ratio fertilizers such as 10-10-10 or 5-10-10, unless soil tests indicate phosphorus availability below the M+ level.

Establishment/Grow-In Recommendations for Golf Courses, Athletic Fields, and Sod Production

(These rates replace normal maintenance fertilizer applications that would have occurred during these time periods.)

Warm Season Grasses:

Predominantly Silt/Clay Soils

- Plant Date - late May -June for sprigs, plugs, sod, or seeding.
- Apply P_2O_5 and K_2O as needed based on soil test recommendations, incorporate into the top 2 inches if possible.
- At Planting - Up to 1.0 pounds of nitrogen per 1,000 ft^2 using a material containing slowly available forms of nitrogen may be applied as one application or lesser amounts applied at regular intervals, through the first 4 weeks, not to exceed a total of 1.0 pounds of nitrogen per 1,000ft^2.
- Four weeks after planting - 0.25 pounds.of WSN per 1,000 ft^2 per week for the next 4 weeks.

Naturally Occurring or Modified Sand Based Soils

- Plant Date - late May -June for sprigs, plugs, sod, or seeding.
- Apply P_2O_5 and K_2O as needed based on soil test recommendations, incorporate into the top 2 inches if possible.
- At Planting - Up to 1.0 pounds of nitrogen per 1,000 ft^2 using a material containing slowly available forms of nitrogen may be applied as one application or lesser amounts at regular intervals through the first 4 weeks, not to exceed a total of 1.0 pounds of nitrogen per 1,000 ft^2.
- Four weeks after planting - 0.25 pounds per1,000 ft^2 using a material containing slowly available forms of nitrogen per week for the next 4 weeks.

Cool Season Grasses:

Predominantly Silt/Clay Soils

- Plant Date - August - September (preferred)
- Apply P_2O_5 and K_2O as needed based on soil test recommendations, incorporate into the top 2 inches if possible.
- At Planting - up to 0.9 pounds of nitrogen per 1,000 ft^2 using a material containing slowly available forms of nitrogen may be applied; 30 days after planting, apply up to 0.5 pounds of nitrogen per 1,000 ft^2 every week for the next 4 weeks.

Naturally Occurring or Modified Sand Based Soils

- Plant Date - August -September (preferred)
- Apply P_2O_5 and K_2O as needed based on soil test recommendations, incorporate into the top 2 inches if possible.
- At Planting - up to 0.9 pounds of nitrogen per 1,000 ft^2 using a material containing slowly available forms of nitrogen may be applied.
- Apply up to 0.25 pounds of nitrogen per 1,000 ft^2 per week after germination is complete, for the next 8 weeks. If using a material that contains slowly available forms of nitrogen, up to 0.5 pounds of nitrogen per 1,000 ft^2 every two weeks may be applied after germination is complete for the next 8 weeks.

Sod Installations:

Site preparation should include a soil test, which can be done several months before the project begins in order to have time to get test results back. Phosphorus, potassium and lime applications should be based on soil test analysis to increase the likelihood of a successful installation. Shallow incorporation of material into the top 2 inches of the soil is preferred prior to sod installation, especially if lime is required.

No more than 0.7 pounds of nitrogen per 1,000 ft^2 of WSN may be applied before sod is installed. Alternatively, using a material with slowly available forms of nitrogen, 0.9 pounds of nitrogen per 1,000 ft^2 for cool season grasses or 1.0 pounds of nitrogen per 1,000 ft^2 for warm season grasses may be applied before sod is installed.

After installation apply adequate amounts of water to maintain sufficient soil moisture (i.e. to prevent visible wilt symptoms). Excessive water will limit initial root development. After roots begin to establish (as verified by lightly tugging on the sod pieces), shift irrigation strategy to a deep and infrequent program in order to encourage deep root growth. Apply approximately 1 inch of water per week (either by rainfall or irrigation), making sure that the water is being accepted by the soil profile without running off. This will insure thorough wetting of the soil profile.

After sod has completed rooting and is well established, initiate the normal nitrogen management program as described for the appropriate use shall be recommended.

Phosphorus and Potassium Recommendations for Establishment/Grow-In/Installation

Soil Test Level	Nutrient Needs (pounds per 1,000 ft^2) *	
	P_2O_5	K_2O
L	3-4	2-3
M	2-3	1-2
H	2-1	0.5-1
VH	0	0

* For the lower soil test level within a rating, use the higher side of the range and for higher soil test level within a rating use the lower side of the recommendation range.

Other Turf Management Considerations for Golf Courses, Athletic fields, and Home Lawns

Lime Recommendations

Lime should be recommended based on a soil test to maintain soil pH within an agronomic range for turfgrass.

For new seedings where lime is recommended, incorporate the lime into the topsoil for best results.

Returning Grass Clippings

Recycling of clippings on turf should be encouraged as an effective means of recycling nitrogen, phosphorus, and potassium. Proper mowing practices that ensure no more than 1/3 of the leaf blade is removed in any cutting event will enhance turf appearance and performance when clippings are returned. Return all leaf clippings from mowing events to the turf rather than discharging them onto sidewalks or streets. Rotary mulching mowers can further enhance clipping recycling by reducing the size of clippings being returned to the turfgrass canopy.

Management of Collected Clippings

If clippings are collected they should be disposed of properly. They may be composted or spread uniformly as a thin layer over other turf areas or areas where the nutrient content of the clippings can be recycled through actively growing plants. They should not be blown onto impervious surfaces or surface waters, dumped down stormwater drains, or piled outside where rainwater will leach out the nutrients creating the potential for nutrient loss to the environment.

Use of Iron

Iron applications (particularly foliar applications) may periodically be used for enhanced greening as an alternative to nitrogen. These applications are most beneficial if applied in late spring through summer for cool season grasses and in late summer/fall applications for warm-season grasses.

Impervious Surfaces

Do not apply fertilizers containing nitrogen or phosphorus to impervious surfaces (sidewalks, streets, etc.). Remove any granular materials that land on impervious surfaces by sweeping and collecting, and either put the collected material back in the bag, or spread it onto the turf and /or using a leaf blower etc. to return the fertilizer back to the turfgrass canopy.

Section VII. Estimated Nitrogen Availability to Succeeding Crops From Legumes

Table 7-1

Estimated Nitrogen Availability to Succeeding Crops From Legumes

Crop	% Stand	Description	Residual N (Lbs/ac)
Alfalfa	50-75	Good (>4 T/A)	90
	25-49	Fair (3-4 T/A)	70
	<25	Poor (<3 T/A)	50
Red Clover or Crimson Clover	>50	Good (>3 T/A)	80
	25-49	Fair (2-3 T/A)	60
	<25	Poor (<2 T/A)	40
Hairy Vetch (cover crop)	80-100	Good	100
	50-79	Fair	75
	<50	Poor	50
Peanuts	-	-	45
Soybeans	1/2 lb. N per bushel of yield, if previous yield unknown, 20 lbs.		

Section VIII. Manure Management

Table 8-1
Manure Ammonium Nitrogen Availability Coefficients

Method of Application	Semi-Solid Manure	Liquid Manure Slurry	Lagoon Liquid	Dry Litter
Injection	-	0.95	0.95	-
Broadcast with incorporation immediate	0.75	0.75	0.90	0.90
Incorporated after 2 days	0.65	0.65	0.80	0.80
Incorporated after 4 days	0.40	0.40	0.60	0.65
Incorporated after 7 days or no incorporation	0.25	0.25	0.45	0.50
Irrigation without incorporation	-	0.20	0.50	-

To utilize the table, the pounds of NH_4-N per ton or 1000 gallons of manure is determined from a manure test. M ultiply the NH_4-N content of the manure by the availability coefficient in the table to obtain plant available nitrogen from the manure ammonium content.

Table 8-2
Coefficients for Organic N Availability in Manures[1]

	Spring or Early[2] Fall Applied	Winter Topdress/ Spring Residual[3]	Perennial Grass
Dairy Manure	.35	.20/.15	.35
Poultry Manure	.60	.30/.30	.60
Swine Manure	.50	.25/.25	.50

1. Multiply the organic nitrogen content by the coefficient in the table to obtain expected available nitrogen.

2. Manure applied in spring for summer annuals such as corn, or early fall (prior to December 1) for small grains. This coefficient shall also be used to calculate Orgainc N availability when the nitrogen need of the next spring crop is being used to determine a nitrogen application rate for fall or winter applications to a trap crop.

3. Use the first coefficient to calculate Organic N released from manure applied in early winter on w inter annuals such as rye, wheat, or barley as a topdressing. Use the second coefficient to calculate Organic N released the following Spring.

Table 8-3
Manure Residual Factors for Previous Applications*

Historical Frequency of Manure Application on the Field	Residual Factor
Rarely Received Manure in Past (0-1 years in last 5)	0
Frequent Past Applications (2-3 out of 5 years)	0.10
Continuously Received Manure (4-5 out of 5 years)	0.20

* The appropriate rate of manure to use in residual calculations is generally the average rate applied for years in which manure was land applied to the field.

* Multiply the initial organic N content by the appropriate manure residual factor to obtain an estimate of residual nitrogen from past manure applications.

* If more detailed manure history information is available, a residual availability of the initial organic nitrogen content of .12, .05, .02 may be used for one, two, and three years respectively following application.

Primary Nutrient Availability for Manures

Manure Phosphorus

Available P_2O_5 = Manure Analysis P_2O_5

If soils are testing M+ or above in phosphorus and the manure will supply enough phosphorus for the crop according to the formula Available P_2O_5 = Total P_2O_5, no fertilizer phosphorus should be used due to unlikely crop response and water quality concerns.

For soils testing Medium or below, starter applications of fertilizer phosphorus should be made even if the manure contains sufficient phosphorus since it is contained in slow release organic forms. For soils testing low, higher levels of phosphorus starter fertilizer are recommended.

Manure Potassium

Available K_2O = Manure Analysis K_2O

Table 8-4
Average Analysis for Manure Tested in Virginia

Manure Type	**TKN**	**NH_4**	**P_2O_5**	**K_2O**	**% Moisture**
Liquid Dairy Slurry (518)*	19.22	8.88	9.08	17.35	94.60
Semi-Solid Dairy (167)	15.34	3.47	7.58	14.33	67.35
Semi-Solid Beef (47)	18.00	2.36	9.88	19.02	63.13
Dry Chicken Broiler Litter (937)	64.86	11.48	52.18	53.36	27.83
Dry Chicken Layer/Breeder (172)	47.87	8.51	60.79	43.68	29.49
Dry Turkey Litter (475)	62.03	13.05	50.23	38.31	28.64
Dry Turkey Breeder (62)	58.82	12.64	61.23	36.18	25.48
Liquid Swine Lagoon (250)*	7.20	5.66	2.81	12.23	99.35
Liquid Swine Pit (38)*	23.56	15.29	16.71	15.74	97.48

* Nutrient values presented in pounds/1000 gallons. All other nutrient values in pounds/ton.

The above table is a compilation of average values for Virginia manure samples from October 2001 through October 2004, analyzed by Clemson University Agricultural Service Lab. Numbers in parentheses indicate the number of samples analyzed for each category.

Table 8-5
Animal Manure Production Rates[1]

Animal	Daily Manure Production Per 1,000 lb weight				% Dry Matter
	Animal Size	lbs.	cu. ft.	gals	
Cattle					
Dairy	150 - 1,500	82	1.4	10.0	13
Beef	400 – 1,400	60	1.0	7.5	12
Veal	100 – 350	63	1.0	7.5	1.6
Swine					
Pigs	35 – 200	65	1.1	7.5	9
Gestation Sow	275	32	0.5	4.0	9
Sow and 8 pigs	375	88	1.4	10.6	9
Boar	350	31	0.5	4.0	9
Sheep	100	40	0.6	4.6	25
Horse	1,000	45	0.7	5.6	20
Poultry					
Poultry[2] Liquid	-	300	-	-	5
Fresh, wet, sticky and caked	-	61	-	-	25
Moist crumbly to sticky	-	32	-	-	50
Crumbly	-	22	-	-	70
Dry	-	18	-	-	85

1. Does not include bedding, wash water, runoff water and other inputs which increase manure volume.
2. Storage losses already deducted.

Broiler houses generate approximately 1.25 tons of litter per 1000 birds during each cycle. Six cycles per year is average. Houses are cleaned out at variable intervals ranging from after each cycle to once every two years.

Turkey Tom production generates approximately 10 tons of litter per 1000 birds during each cycle for 4 cycles per year. Turkey hens produce about 8 tons per 1000 birds during each of 5 cycles per year.

Complete clean outs of poultry houses should be scheduled during spring or summer, consistent with the availability of a suitable crop for uptake of N, unless covered storage is available, to minimize water quality impacts and maximize agronomic efficiency.

Table 8-6
Annual Liquid Animal Waste Volume Available for Land Application

A. Manure Production

Animal Type	Ave. Wt*		Gal/Yr		# Animals		% Confined		Volume (Gals)
Feeder Swine	___	x	2.74	x	___	x	___ . ___	=	___
Sow & Litter	___	x	3.84	x	___	x	___ . ___	=	___
Gestation Sow	___	x	1.46	x	___	x	___ . ___	=	___
Boar	___	x	1.46	x	___	x	___ . ___	=	___
Beef Cattle	___	x	2.74	x	___	x	___ . ___	=	___
Dairy Cattle	___	x	3.65	x	___	x	___ . ___	=	___
			Subtotal Annual Manure Production ______ gallons						

*Typical Weights					
	Lbs.				Lbs.
Feeder Swine	145		Dairy Cattle		
Sow & Litter	375		Mature		1400
Gestation Sow	275		Heifers	16-24 Mo	1050
Boar	350			9-16 Mo	680
Beef Cattle (Finishing)	1000			2-9 Mo	350
			Calves	0-2 Mo	150

B. Process Wastewater

Type	# Animals		Gals. Per Day		365 Days/Yr.		Total Wastewater
Dairy	___	x	___	x	365	=	___ gals
Hogs	___	x	___	x	365	=	___ gals
Other	___	x	___	x	365	=	___ gals

Dairy Cows Milked	Wastewater (Gal/Cow/Day)
0 - 50	5 - 8
50 - 150	4 - 6
150+	2 – 4

*** Typical Wastewater — excludes flushing systems**

Note: Most modern swine operations with lagoons use recirculated flush water for some of the production areas, therefore, when calculating process wastewater, you should consider only the clean water that is added during each flush.

C. Feedlot Runoff

$$\frac{A \times ROF \times AnnPrec}{12} \times 7.48 = \text{Feedlot Runoff}$$

Where: A = lot area in square feet
ROF = runoff factor
ROF for paved lot = .60
ROF for unpaved lot = .25
AnnPrec = annual average precipitation from Table 8-7
7.48 converts cubic feet to gallons

$$\frac{(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)}{12} \times 7.48 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \text{gallons}$$

D. Net Precipitation Excess Over Pit or Lagoon (Precipitation less Evaporation)

Lagoons: NPE = Rainfall - (Lake Evaporation x .9)*
NPE = ________ - (________ x _________)
NPE = ________

Pits: NPE = Rainfall - (Lake Evaporation X .3)*
NPE = ________ - (_________ x _________)
NPE = ________

*See Table 8-7

$$\frac{SA \times NPE}{12} \times 7.48 = \textbf{Total NPE (gallons)}$$

where: SA = surface area of pit or lagoon at the top,
NPE = net precipitation excess as calculated above,
7.48 converts cubic feet to gallons

$$\frac{(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)}{12} \times 7.48 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \text{gallons}$$

Total Annual Liquid Animal Waste Volume Produced =
(A. Manure + B. Process Wastewater + C. Feedlot Runoff + D. Net Precipitation Excess) ______________ **gallons**

Table 8-7
Virginia Annual Normal Precipitation and Lake Evaporation

County	Annual Precip.	Lake Evaporation
Accomack	42	38
Albemarle	44	36
Alleghany	37	32
Amelia	42	40
Amherst	45	36
Appomatox	40	38
Augusta	38	33
Bath	41	32
Bedford	43	37
Bland	39	32
Botetourt	42	34
Brunswick	42	41
Buchanan	42	31
Buckingham	41	38
Campbell	38	38
Caroline	42	38
Carroll	41	35
Charles City	42	40
Charlotte	43	40
Chesapeake	48	40
Chesterfield	42	40
Clarke	37	34
Craig	38	32
Culpeper	40	36
Cumberland	41	39
Dickenson	42	32
Dinwiddie	42	40
Essex	44	39
Fairfax	42	37
Fauquier	40	36
Floyd	44	35
Fluvanna	39	38
Franklin	43	38
Frederick	37	33
Giles	35	32
Gloucester	43	40
Goochland	40	39
Grayson	43	33
Greene	41	36
Greensville	43	41
Halifax	42	40
Hanover	42	39
Henrico	43	40
Henry	44	39
Highland	39	32
Isle of Wight	44	40
James City	42	40
King & Queen	44	39
King George	40	38
King William	44	39
Lancaster	42	39
Lee	50	33
Loudoun	40	37
Louisa	42	38
Lunenburg	42	40
Madison	41	36
Mathews	43	40
Mecklenburg	42	41
Middlesex	42	39
Montgomery	37	34
Nelson	46	36
New Kent	44	40
Northampton	41	39
Northumberland	42	38
Nottoway	42	40
Orange	40	37
Page	39	34
Patrick	44	38
Pittsylvania	41	39
Powhatan	40	40
Prince Edward	41	40
Prince George	42	40
Prince William	36	37
Pulaski	35	33
Rappahannock	40	35
Richmond	43	38
Roanoke	40	34
Rockbridge	38	34
Rockingham	34	33
Russell	45	31
Scott	45	32
Shenandoah	34	33
Smyth	43	32
Southampton	45	41
Spotsylvania	40	38
Stafford	38	37
Suffolk	47	40
Surry	44	40
Sussex	44	40
Tazewell	42	31
Virginia Beach	46	40
Warren	35	34
Washington	45	32
Westmoreland	41	38
Wise	46	32
Wythe	37	32
York	44	40

Table 8-8
Maximum Wastewater Irrigation Application Rates for Different Soil Types

Soil Characteristics	0%-5% Slope Inches per hour	
	Cover	Bare
Clay; very poorly drained	0.30	0.15
Silty Surface; poorly drained clay or claypan subsoil	0.40	0.25
Medium textured surface soil; moderate to imperfectly drained profile	0.50	0.30
Silt loam; loam, and very fine sandy loam; well to moderately well drained	0.60	0.40
Loamy sand, sandy loam or peat; well drained	0.90	0.60

Reduce hydraulic application rates on sloping ground:

Slope	Application Rate Reduction
0% - 5%	0%
6% - 8%	20%
9% -12%	40%
13% -20%	60%
Over 20%	75%

Caution: Check application rates to insure that desired nutrient levels are not exceeded. Use the most restrictive criteria.

Do not irrigate wastewater to sites where soil moisture will exceed field capacity immediately following irrigation. Field capacity is defined as the amount of water held in the soil after the excess gravitational water has drained away and after free drainage has practically ceased.

Allow sufficient drying time between subsequent irrigations so that field capacity is not exceeded due to the irrigation events.

Source: Pennsylvania Department of Environmental Resources, 1990. "***Assessment of Field Manure Nutrient Management.***"

Section IX. Biosolids Management

Table 9-1
Estimated Nitrogen Mineralization Rates for Biosolids[1]

Biosolids Type	Application Year			
	Application Year	1 Year After Application	2 Years After Application	3 Years After Application
Lime Stabilized	0.30	0.10	0.10	0.05
Aerobic Digestion	0.30	0.10	0.10	0.05
Anaerobic Digestion	0.30	0.10	0.10	0.05
Composted[2]	0.10	0.05	0.03	0.00

1. To determine nitrogen available from previous Biosolids applications, multiply the percent organic nitrogen by the appropriate mineralization factor.

2. Total organic nitrogen content of 2% or less and no significant ammonia nitrogen.

Table 9-2
Biosolids Ammonium Nitrogen Availability Coefficients[1]

Method of Application	Biosolids pH < 10	Biosolids pH > 10
Injection	1.00	1.00
Incorporated within 24 hours	0.85	0.75
Incorporated within 1-7 days	0.70	0.50
Incorporated after 7 days or no incorporation	0.50	0.25

1. To determine the plant-available Biosolids ammonium nitrogen in the soil, multiply the Biosolids ammonium nitrogen concentration or total weight applied by the appropriate availability coefficient.

Primary Nutrient Availability for Biosolids

Biosolids Phosphorus

Available P_2O_5 = Biosolids Analysis P_2O_5

If soils are testing M+ or above in phosphorus and the Biosolids will supply enough phosphorus for the crop according to the formula Available P_2O_5 = Total P_2O_5, no fertilizer phosphorus should be used due to unlikely crop response and water quality concerns.

For soils testing Medium or below, starter applications of fertilizer phosphorus should be made even if the Biosolids contain sufficient phosphorus, since it is contained in slow release organic forms. For soils testing low, higher levels of phosphorus starter fertilizer are recommended.

Biosolids Potassium

Available K_2O = Biosolids analysis K_2O