MARYLAND NUTRIENT MANAGEMENT MANUAL

Incorporated by reference into **COMAR 15.20.07**

Supplement No. 7
(May 2012)

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ALL PAGES ARE INCLUSIVE

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Table 1. Plant Nutrient Recommendations Based on Soil Tests and Yield Goals for Corn Grain and Sorghum Grain Production

Crop	Nitrogen (N) pounds per acre[a,d]	N if no P&K recommended[a,d]	Recommended Nutrients Based on Soil Tests: Soil Phosphorus Index Low	Medium	Optimum	Excessive	Soil Potassium Index Low	Medium	Optimum	Excessive	Suggested methods of application
			P_2O_5 pounds per acre[b,e]				K_2O pounds per acre[c,f]				
Field Corn for Grain[a]											
Yield goal 140 b/A											
A. Conventional Tillage**	**140**	**140**	**65-135***	**30-65***	**20-30***	**0**	**110-180***	**60-110***	**20-60***	**0**	**Total**
	30	30	35-95	0-25	0	0	80-140	30-70	0-30	0	Broadcast
	30	0	30-40	30-40	20-30	0	30-40	30-40	20-30	0	Banded with planter
	80	110	0	0	0	0	0	0	0	0	Sidedress
B. No tillage**											
1. Alternating No-tillage/ Conventional Tillage	**140**	**140**	**65-135***	**30-65***	**20-30**	**0**	**110-180***	**60-110***	**20-60***	**0**	**Total**
	30	30	35-95	0-25	0	0	80-140	30-70	0-30	0	Broadcast
	30	0	30-40	30-40	20-30	0	30-40	30-40	20-30	0	Banded with planter
	80	110	0	0	0	0	0	0	0	0	Sidedress
2. Continuous No-tillage***	**140**	**140**	**75-180***	**30-70***	**20-30***	**0**	**110-180***	**50-110***	**20-50***	**0**	**Total**
	30	30	45-140	0-35	0	0	50-110	30-80	0-20	0	Broadcast
	30	0	30-40	30-40	20-30	0	30-40	20-30	20-30	0	Banded with planter
	80	110	0	0	0	0	0	0	0	0	Sidedress
Grain sorghum[d]											
Yield goal 100 bu/A	**75**	**75**	**65-135***	**30-65***	**20-30***	**0**	**80-150***	**30-80***	**20-30***	**0**	**Total**
	45	75	35-95	0-25	0	0	50-110	0-40	0	0	Broadcast
	30	30	30-40	30-40	20-30	0	30-40	30-40	20-30	0	Banded with planter

NOTES:

* Where ranges of nutrients are indicated for phosphorus and potassium, precise amount of plant nutrient required depends upon the numerical soil test index value for that nutrient.

** Recommendations assume that soil samples were taken from the conventional plow layer depth (0-8 inches) of all fields, including conventional, conservation, reduced and rotational tillage, as well as no-tillage management systems.

*** For continuous no-tillage, a separate soil sample should be collected from the 0-2 inch depth to monitor surface soil acidity (pH only).

A starter fertilizer is often beneficial in stimulating early plant growth, especially on cold wet soils. A complete starter fertilizer should supply 20 to 30 lbs/A of N, P_2O_5, and K_2O. If FIV-P is 150 or greater a P Site index calculation may prohibit addition of starter P_2O_5. If FIV-P is less than 100, then P_2O_5 may be applied to meet the total recommended. At sidedressing, subtract any starter N fertilizer already applied from the total recommended for the growing season.

[a] Field Corn For Grain

Apply 1.0 lb N / bushel of expected grain yield up to 250 bu/A. No additional nitrogen is recommended for yield goals above 250 bu/A. Nitrogen recommendations assume split applications (sidedress or fertigation).

A pre-sidedress soil nitrogen test (PSNT) may be useful in determining whether additional nitrogen is needed for corn crops on fields that have received manure or other organic nutrient sources in the past. See University of Maryland Extension Publication SFM-2 for details.

For conventional-tillage or no-tillage corn:

- Where N solution (UAN) is the N source, N rate assumes injection or subsurface band placement.
- If UAN is surface broadcast at planting, increase rate by 15-20%.
- If sidedress UAN is dribbled or streamed on the soil surface, increase rate by 5-10%.
- If sidedress N source is granulated urea, increase rate by 25%.

Notes for Table 1 continue on page 4.

Table 1. Notes, continued from page 3.

[b]For corn yield goals above 140 bu / A, adjust P_2O_5 as follows:
- If phosphorus soil test index is less than 51, increase P_2O_5 0.6 lb / A for each bushel of expected yield above 140 bushels.
- If phosphorus soil test index is between 51 and 100 lb / A, increase P_2O_5 0.3 lb / A for each bushel of expected yield above 140 bushels.
- If phosphorus soil test index is greater than 100, no adjustment is necessary.

[c]For corn yield goals above 140 bu / A, adjust K_2O as follows:
- If potassium soil test index is less than 51, increase K2O 0.8 lb / A for each bushel of expected yield above 140 bu / A.
- If potassium soil test index is between 51 and 100 lb / A, increase K2O 0.4 lb / A for each bushel of expected yield above 140 bu / A.
- If potassium soil test index is greater than 100, no adjustment is necessary.

[d]Grain Sorghum
For grain sorghum, apply 0.75 lb N / bushel of expected yield up to 125 bu / A. No additional nitrogen is recommended for yields above 125 bu / A.

For no-tillage grain sorghum:
Where N solution (UAN) is the N source, N rate assumes injection or subsurface band placement.
- If UAN is surface broadcast at planting, increase rate by 15-20%.
- If sidedress UAN is dribbled or streamed on the soil surface, increase rate by 5-10%.
- If sidedress N source is granulated urea, increase rate by 25%.

[e]For grain sorghum yield goals above 100 bu / A, adjust P_2O_5 as follows:
- If phosphorus soil test index is less than 51, increase P_2O_5 by 0.4 lb / A for every bushel of expected yield over 100 bu/A.
- If phosphorus soil test index is between 51 and 100, increase P_2O_5 by 0.2 lb / A for every bushel of expected yield over 100 bu/A.
- If phosphorus soil test index is greater than 100, no adjustment is necessary.

[f]For grain sorghum yield goals above 100 bu / A, adjust K_2O as follows:
- If potassium soil test index is less than 51, increase K_2O by 0.6 lb / A for every bushel of expected yield over 100 bu/A.
- If potassium soil test index is between 51 and 100, increase K_2O by 0.3 lb / A for every bushel of expected yield over 100 bu/A.
- If potassium soil test index is greater than 100, no adjustment is necessary.

Table 2. Plant Nutrient Recommendations Based on Soil Tests and Yield Goals for Corn Silage Production

Crop	Nitrogen (N) pounds per acre [a,b]	N if no P&K recommended [a,b]	Recommended Nutrients Based on Soil Tests: Soil Phosphorus Level — Low	Medium	Optimum	Excessive	Soil Potassium Level — Low	Medium	Optimum	Excessive	Suggested methods of application
			P_2O_5 pounds per acre[c]				K_2O pounds per acre[d]				
Corn Silage											
Yield goal 20 tons/A	**120**	**120**	**55-125***	**35-55***	**20-35***	**0**	**150-250***	**80-150***	**20-80***	**0**	**Total**
A. Conventional tillage **	30	30	30-85	0	0	0	120-210	60-120	0-50	0	Broadcast
	20	0	25-40	35-55	20-35	0	30-40	20-30	20-30	0	Banded with planter
	70	90	0	0	0	0	0	0	0	0	Sidedress
B. No-tillage**											
1. Alternating no-tillage with conventional Tillage	**120**	**120**	**55-125***	**35-55***	**20-35***	**0**	**150-250***	**80-150***	**20-80***	**0**	**Total**
	30	30	30-85	0	0	0	120-210	60-120	0-50	0	Broadcast
	20	0	25-40	35-55	20-35	0	30-40	20-30	20-30	0	Banded with planter
	70	90	0	0	0	0	0	0	0	0	Sidedress
2. Continuous no-tillage***	**120**	**120**	**95-165***	**35-95***	**20-35***	**0**	**150-250***	**80-150***	**20-80***	**0**	**Total**
	30	30	55-125	0-55	0	0	120-210	60-120	0-50	0	Broadcast
	20	0	40	35-40	20-35	0	30-40	20-30	20-30	0	Banded with planter
	70	90	0	0	0	0	0	0	0	0	Sidedress

NOTES:

* Where ranges of nutrients are indicated for phosphorus and potassium, precise amount of plant nutrient required depends upon the numerical soil test index value for that nutrient.

** Recommendations assume that soil samples were taken from the conventional plow layer depth (0-8 inches) of all fields, including conventional, conservation, reduced and rotational tillage, as well as no-tillage management systems.

*** For continuous no-tillage, a separate soil samples should be collected from the 0-2 inch depth to monitor surface soil acidity (pH only).

A starter fertilizer is often beneficial in stimulating early plant growth, especially on cold wet soils. A complete starter fertilizer should supply 20 to 30 lbs/A of N, P_2O_5, and K_2O. If FIV-P is 150 or greater a P Site index calculation may prohibit addition of starter P_2O_5. If FIV-P is less than 100, then P_2O_5 may be applied to meet the total recommended. At sidedressing, subtract any starter N fertilizer already applied from the total recommended for the growing season.

[a] Nitrogen recommendations assume split applications (sidedress or fertigation).

No-tillage corn silage:

Where N solution (UAN) is the N source, N rate assumes injection.

- If sidedress UAN is broadcast after planting using drop nozzles, increase rate by 15%.
- If sidedress UAN is dribbled after planting, increase rate by 5-10%.
- If sidedress N source is granulated urea, increase rate by 25%.

[b] **For corn silage yields above 20 tons / A, adjust N as follows:**

- Increase nitrogen rate by 7 lb / ton for each ton of expected yield between 20 and 40 tons / A.
- For expected corn silage yields greater than 40 tons / A, no additional nitrogen is recommended.

[c] **For corn silage yields above 20 tons / A, adjust P_2O_5 as follows:**

- If phosphorus soil test index is less than 51, increase P_2O_5 5 lbs / A for each additional ton of expected yield over 20 tons / A.
- If phosphorus soil test index is between 51 and 100, increase P_2O_5 2.5 lbs / A for each additional ton of expected yield over 20 tons / A.
- If phosphorus soil test index is greater than 100, no adjustment is necessary.

[d] **For corn silage yields above 20 tons / A, adjust K_2O as follows:**

- If potassium soil test index is less than 100, increase K_2O 7 lbs / A for each additional ton of expected yield over 20 tons / A.
- If potassium soil test index is greater than 100, no adjustment is necessary.

Table 3. Plant Nutrient Recommendations Based on Soil Tests and Yield Goals for Small Grain Production

Crop	Nitrogen (N) pounds per acre[a]	Recommended Nutrients Based on Soil Tests: Soil Phosphorus Level P_2O_5 pounds per acre[b,d] Low	Medium	Optimum	Excessive	Soil Potassium Level K_2O pounds per acre[c,e] Low	Medium	Optimum	Excessive	Suggested methods of application
Wheat, Barley (fall) Yield goal100 bu/acre	**0-30***	**100-140*****	**80-100*****	**20-80*****	**0**	**100-140*****	**80-100*****	**20-80*****	**0**	**Broadcast at planting Topdress half at greenup** and half at Feeke's growth stage 5-6**
Wheat, Barley (spring)	**100**	0	0	0	0	0	0	0	0	
Wheat, Barley - Double Crop Soybeans (fall) Yield goal 100 bu/A	**0-30***	**70-165*****	**45-100*****	**20-85*****	**0**	**75-155*****	**35-105*****	**20-85*****	**0**	**Broadcast at planting Topdress half at greenup** and half at Feeke's growth stage 5-6**
Wheat, Barley - Double Crop Soybeans (spring)	**100**	**70-100*****	**40**	**0**	**0**	**70-100*****	**50**	**0**	**0**	
Rye, Winter Oats (fall) Rye yield goal 60 bu/A Oats yield goal 70 bu/A	**0-30**	**60-100*****	**40-60*****	**20-40*****	**0**	**60**	**100**	**40-60*****	**20-40**	**0 Broadcast and disk in or drill with seed**
Rye, Winter Oats (spring)	**70-80**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**Topdress at greenup**
Rye, Winter Oats - Double Crop Soybeans (fall) Yield goal 100 bu/A	**0-30***	**70-165*****	**45-100*****	**20-85*****	**0**	**75-155*****	**35-105*****	**20-85*****	**0**	**Broadcast or drill in fall**
Rye, Winter Oats - Double Crop Soybeans (spring)	**70-80**	**70-100*****	**40**	**0**	**0**	**70-100*****	**40**	**0**	**0**	**Topdress at greenup**
Spring Oats Yield goal 60-65 bu/A	**30-60**	**60-100*****	**40-60*****	**20-40*****	**0**	**60-100*****	**40-60*****	**20-40*****	**0**	**Broadcast and disk in or drill with seed**
Small Grain – Legume Interseeded	**20-40**	**75-125*****	**50-75*****	**20-50*****	**0**	**75-120*****	**45-75**	**20-45*****	**0**	**Total**
	0-20	**75-125*****	**50-75*****	**20-50*****	**0**	**75-120*****	**45-75*****	**20-45*****	**0**	**Broadcast or drill in fall**
	0-20	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**Topdress**

TABLE 3. NOTES

Where ranges of nutrients are indicated for phosphorous and potassium, the precise amount of plant nutrients required depends upon the numerical soil test index value for that nutrient

For small grains: Total nitrogen application rate is 1 lb N per bushel of expected yield.

* Fall nitrogen rate depends upon residual soil nitrate concentration. Nitrogen may not be applied in fall if soil nitrate test is greater than 10 ppm for wheat or greater than 15 ppm for barley. Soil nitrate tests shall be based on sampling to a depth of 8 inches. Organic nutrients, including manure, may be fall-applied in accordance with the Maryland Nutrient Management Manual, Section I-D-1, Section II.2.

** Topdress half at 1200 Growing Degree Units (GDU) base 32°F, but no earlier than Feburuary 15, and half at Feekes growth stage 5-6 (or 1350 GDD_{32})

*** Where ranges of nutrients are indicated for phosphorus and potassium, the precise amount of plant nutrient required depends upon the numerical soil test index value for that nutrient.

[a]**For all small grains production systems (conventional-tillage or no-tillage):**
- If topdress N solution (UAN) is surface broadcast, increase rate by 15-20%.
- If topdress UAN is dribbled or streamed on the soil surface, increase rate by 5-10%.
- If topdress N source is granulated urea, increase rate by 25%.

[b]**For wheat & barley yield goals above 100 bu/acre, adjust P_2O_5 as follows:**
- If phosphorus soil test index is less than 51, increase P_2O_5 by 1 lb/acre for each bushel of expected yield above 100 bu/acre.
- If phosphorus soil test index is between 51 and 100, increase P_2O_5 by 0.5 lb/acre for each bushel of expected yield above 100 bu/acre.
- If phosphorus soil test index is greater than 100, no adjustment is necessary.

[c]**For wheat & barley yield goals above 100 bu/acre, adjust K_2O as follows:**
- If potassium soil test index is less than 51, increase K_2O by 1 lb K_2O/acre for each bushel of expected yield above 100 bu/acre.
- If potassium soil test index is between 51and 100, increase K_2O by 0.5 lb K_2O/acre for each bushel of expected yield above 100 bu/acre.
- If potassium soil test index is greater than 100, no adjustment is necessary.

[d]**For all small grain/double-crop soybean rotation with double-crop soybean yield goal above 40 bu/acre, adjust P_2O_5 as follows:**
- If phosphorus soil test index is less than 51, increase P_2O_5 by 1.5 lb/acre for every bushel of expected double-crop soybean yield over 40 bu/acre.
- If phosphorus soil test index is between 51 and 100, increase P_2O_5 by 0.75 lb/acre for every bushel of expected double-crop soybean yield over 40 bu/acre.
- If phosphorus soil test index is greater than 100, no adjustment is necessary.

[e]**For all small grain - double-crop soybean rotation with double-crop soybean yield goal above 40 bu/acre, adjust K_2O as follows:**
- If potassium soil test index is less than 51, add 3 lb/acre K_2O for every bushel of expected double-crop soybean yield over 40 bu/acre.
- If potassium soil test index is between 51 and 100, add 1.5 lb/A K_2O for every bushel of expected double-crop soybean yield over 40 bu/acre.
- If potassium soil test index is greater than 100, no adjustment is necessary.

Table 4. Plant Nutrient Recommendations Based on Soil Tests and Yield Goals for Soybean and Other Oilseed Production

Crop	Nitrogen (N) pounds per acre	Recommended Nutrients Based on Soil Tests: Soil Phosphorus Level — Low	Medium	Optimum	Excessive	Soil Potassium Level — Low	Medium	Optimum	Excessive	Suggested methods of application
		P_2O_5 pounds per acre[a,c]				K_2O pounds per acre[b,d]				
Soybean (full season) (40 bu / A yield goal)	**0****	**80-120***	**45-80***	**20-45***	**0**	**80-125***	**40-80***	**20-40***	**0**	**Broadcast or banded at planting**
Canola	**70-100***	**60-80***	**40-60***	**20-40***	**0**	**60-80***	**40-60***	**20-40***	**0**	**Total**
	20-40*	60-80*	40-60*	20-40*	0	60-80*	40-60*	20-40*	0	Broadcast
	50-60	0	0	0	0	0	0	0	0	Topdress
Sunflower[e] 0.5 ton seed / A yield goal)	**50**	**30**	**20**	**0**	**0**	**30**	**20**	**0**	**0**	**Broadcast at planting**

NOTES:

* Where ranges of nutrients are indicated for phosphorus and potassium, precise amount of plant nutrient required depends upon the numerical soil test index value for that nutrient.

** Nitrogen is not needed for soybean production; however, in order to meet crop needs for phosphorous, organic nutrients, including manure, may be applied at up to 50 lb N/acre. The rate may not exceed any phosphorous rate limits imposed by phosphorous site index calculation when FIV-P is 150 or greater.

Apply organic nutrients to small grain/double-crop soybean rotations at rates and timings to supply only the recommended nitrogen rate to the small grain crop.

[a] **For full-season soybean yield goals above 40 bu/A, adjust P_2O_5 as follows:**

- If phosphorus soil test index is less than 51, increase P_2O_5 by 1.5 lb/A for each additional bushel of expected yield over 40 bu/A.
- If phosphorus soil test index is between 51 and 100, increase P_2O_5 by 0.75 lb/A for each additional bushel of expected yield over 40 bu/A.
- If phosphorus soil test index is greater than 100, no adjustment is necessary.

[b] **For full-season soybean yield goals above 40 bu/A, adjust K_2O as follows:**

- If potassium soil test index is less than 51, increase K_2O by 3 lb/A for each bushel of expected yield over 40 bu/A.
- If potassium soil test index is between 51and 100, increase K_2O by 1.5 lb/A for each bushel of expected yield over 40 bu/A.
- If potassium soil test index is greater than 100, no adjustment is necessary.

[c] **For all small grain - double-crop soybean rotation with double-crop soybean yield goal above 40 bu/A, adjust P_2O_5 as follows:**

- If phosphorus soil test index is less than 51, increase P_2O_5 by 1.5 lb/A for every bushel of expected double-crop soybean yield over 40 bu/A.
- If phosphorus soil test index is between 51 and 100, increase P_2O_5 by 0.75 lb/A for every bushel of expected double-crop soybean yield over 40 bu/A.
- If phosphorus soil test index is greater than 100, no adjustment is necessary.

[d] **For all small grain - double-crop soybean rotation with double-crop soybean yield goal above 40 bu/A, adjust K_2O as follows:**

- If potassium soil test index is less than 51, add 3 lb/A K_2O for every bushel of expected double-crop soybean yield over 40 bu/A.
- If potassium soil test index is between 51 and 100, add 1.5 lb/A K_2O for every bushel of expected double-crop soybean yield over 40 bu/A.
- If potassium soil test index is greater than 100, no adjustment is necessary.

[e] **For sunflower seed yield goals between 0.5 and 1.5 tons/A, adjust as follows:**

- Add 25 lb N/A for each 0.25 tons/A of expected yield above 0.5 tons/A.
- Add 5 lb P_2O_5/A for each 0.25 tons/A of expected yield above 0.5 tons/A.
- Add 10 lb K_2O/A for each 0.25 tons/A of expected yield above 0.5 tons/A.
- For expected yields greater than 1.5 tons/A, no additional nutrients are necessary.

NUTRIENT APPLICATION REQUIREMENTS

Source: Maryland Department of Agriculture 2012
Regulatory Citation: COMAR 15.20.07.02

I. GENERAL GUIDELINES

A. This document addresses (1) **Setbacks for Nutrient Application**, (2) **Application Timing** for **all nutrients, organic and chemical**, and (3) **Temporary Field Stockpiling (staging) of Organic Materials**. Application of nutrients may vary depending on the crop, season, nutrient source, and weather conditions. A person applying nutrients shall use best management practices, including following these "Nutrient Application Requirements," to maximize plant utilization efficiency as described in Section I-B of the *Maryland Nutrient Management Manual*, and minimize the potential for nutrient movement to sensitive areas and losses to surrounding water bodies, including surface and groundwater.

B. This document does not supersede Maryland Department of the Environment Animal Feeding Operations regulations in COMAR 26.08.01 and 26.08.03.09, or the Maryland Department of the Environment Sewage Sludge Management regulations in COMAR 26.04.06 regarding the requirements for sewage sludge storage, buffer zones, and the incorporation of sewage sludge into the soil by the end of each working day.

C. All materials that provide primary crop nutrients shall be included in, and managed by, a Nutrient Management Plan. These materials include chemical fertilizer, organic materials such as animal manure, sewage sludge, food processing wastes/residuals, spray irrigation from wastewater treatment plants, other waste streams containing nutrients, and soil conditioners/amendments.

D. These Nutrient Application Requirements shall be followed by certified consultants in the development of nutrient management plans, and by operators and applicators during plan implementation in order to comply with COMAR 15.20.08.05G, H and I

II. SETBACKS FOR NUTRIENT APPLICATION

A. "Nutrient Application Setback" means a vegetated area of a prescribed width where nutrient-containing material may not be applied, as measured from the edge of surface water, including perennial and intermittent streams. An intermittent stream means a stream or the reach of a stream that is below the local water table for at least some part of the year, and obtains its flow from both surface runoff and ground water discharge. Surface water does not include:

1. Ephemeral streams (defined as streams which flow only in direct response to precipitation in the immediate watershed and which have a channel bottom that is always above the local water table);
2. Irrigation and treatment ditches, as defined under "waters" in COMAR 15.20.08.03(B)(39), and
3. Field ditches, which, for purposes of this exception, are defined as channelized waterways that, as provided in the USDA-NRCS National Cooperative Soil Survey, are not within:
    a. A floodplain soil mapping unit;
    b. A hydric soil unit and mapped as a narrow, elongated feature in a fluvial/floodplain position; or
    c. A soil mapping unit that has a "B" slope class or steeper.

B. Effective January 1, 2014, a person who uses nutrients shall implement the following nutrient application setback requirements:
1. An application of crop nutrients using a broadcast method (*e.g.*, spinners, splashers) either with or without incorporation requires a 35-foot setback.
2. A directed spray application or the injection of crop nutrients requires a 10-foot setback.
3. Excepting perennial forage crops grown for hay or pasture, vegetation in the 10-foot setback area may not include plants that would be considered part of the crop grown in the field.
4. Pastures and hayfields are subject to a 10-foot nutrient application setback.
5. Nutrients may not be applied mechanically within the setback. Except as provided in subsection II.B.6, livestock shall be excluded from the setback to prevent direct deposition of nutrients within the setback.
6. As an alternative to fencing livestock from the setback area, a person shall work with the soil conservation district to develop and implement a Soil Conservation and Water Quality Plan. The plan shall include Best Management Practices (BMPs) such as stream crossings, alternative watering facilities, pasture management or other MDA-approved BMPs that are considered to be equally protective of water quality and stream health.
7. As an alternative to a nutrient application setback, MDA may approve other BMPs that it finds equally protective of water quality and stream health. Alternative BMPs may be approved based on established USDA, NRCS practice standards or research and demonstration by the University of Maryland, College of Agriculture and Natural Resources or other land grant university establishing the effectiveness of these practices.
8. Sacrifice lots (less than 75% grass or grass legume mix) shall maintain a 35-foot setback.

C. Operators are responsible for sediment and erosion control of stream crossing areas. Operators shall move livestock from one side of the stream to the other side only through stream crossings designed to prevent erosion and sediment loss. Operators shall gate crossing areas wider than 12 feet. Operators may allow livestock controlled access to streams for watering in accordance with USDA-NRCS Field Office Technical Guide standards and specifications.

III. APPLICATION TIMING

A. The consultant, applicator, operator, and the certified farm operator shall comply with the following management requirements when recommending or applying nutrients throughout the year. These requirements separately address the use of (1) chemical fertilizers and (2) organic fertilizers. An organic fertilizer is derived from either a plant or animal product, and contains carbon, and one or more elements other than hydrogen and oxygen that are essential for plant growth. The consultant, applicator, operator, and certified farm operator shall follow the nutrient application recommendations for crops as specified in the *Maryland Nutrient Management Manual* Section I-B. Nutrients shall be applied as close to plant nutrient uptake period as possible.

B. Spring and Summer (March 1 through September 9)

1. A person may make a nutrient application during the spring-summer time period for an existing crop or a crop to be planted either during this time period or in the fall provided that, for each such crop, the rates and applications are made in accordance with recommendations found in Section I-B of the *Maryland Nutrient Management Manual.*
2. Except as provided in subsection III.B.3, organic nutrient sources shall be injected or incorporated as soon as possible, but no later than 48 hours after application.
3. If any of the following conditions exist, the material is not required to be injected or incorporated:
    a. Livestock manures deposited directly by animals;
    b. Permanent pastures;
    c. Land used for hay production;
    d. Fields containing highly erodible land as defined by USDA-NRCS in its Field Office Technical Guide;
    e. Fields in which a current soil conservation and water quality plan or a current USDA/NRCS program requirement prohibits or otherwise restricts soil disturbance; or
    f. Land where nutrients are applied to a growing crop through a spray irrigation system.

C. Fall Application

1. Term Defined.

In this regulation, the term "fall application" means:

a. For the years 2012 through 2015, nutrients applied from September 10 through November 15; and

b. After July 1, 2016, nutrients applied:

    (i) For Maryland in counties east of the Chesapeake Bay and the Susquehanna River, from September 10 through November 1; and

(ii) For Maryland in counties west of the Chesapeake Bay and the Susquehanna River, from September 10 through November 15.

2. Chemical Fertilizers

A person may make a fall application of a chemical fertilizer for an existing crop or a crop to be planted during this time period provided that, for each such crop, the rates and applications are made in accordance with recommendations found in Section I-B of the *Maryland Nutrient Management Manual.*

3. Organic Fertilizers

a. General Rules for Fall Application of Organic Sources

(i) Excepting poultry litter, a person may make a fall application of an organic nutrient source for an existing crop or a crop to be planted either during this time period or the following spring (before June 1) provided that, for each such crop, the rates and applications are made in accordance with paragraph III.C.3.(b) of this subsection and the recommendations found in Section I-B of the *Maryland Nutrient Management Manual.*

(ii) A person may make a fall application of poultry litter for an existing crop or a crop to be planted during this time period provided that, for each such crop, the rates and applications are made in accordance with paragraph III.C.3.(b) of this subsection and the recommendations found in Section I-B of the *Maryland Nutrient Management Manual.*

b. General Conditions Relating to the Fall Application of Organic Nutrient Sources

(i) Except as provided in subparagraph III.C.3.b.(ii), if a person makes a fall application of an organic nutrient source, the person shall incorporate or inject the material. If the material is not injected, it shall be incorporated as soon as possible, but no later than 48 hours after application.

(ii) If any of the following conditions exist, the material is not required to be injected or incorporated:

(aa) Livestock manures deposited directly by animals:

(bb) Permanent pastures;

(cc) Land used for hay production;

(dd) Fields containing highly erodible land as defined by USDA-NRCS in its Field Office Technical Guide;

(ee) Fields in which a current soil conservation and water quality plan or a current USDA/NRCS program requirement prohibits or otherwise restricts soil disturbance; or

(ff) Land where nutrients are applied to a growing crop through a spray irrigation system.

(iii) A person may make a fall-application on pasture land, hay-land or other acreage under vegetative cover.

(iv) A person making a fall-application of an organic nutrient source to fallow cropland shall plant a cover crop as soon as possible after application. The cover crop planting shall occur:

(aa) No later than November 15; and

(bb) After July 1, 2016, in counties east of the Chesapeake Bay and Susquehanna River, no later than November 5.

(v) The rate of nutrient application shall be determined based on recommendations outlined in Section 1-B of the *Maryland Nutrient Management Manual* using either nitrogen or phosphorus–based criteria.

(vi) If the application is phosphorus-based, the phosphorus application rate:

(aa) For a fall-seeded crop, shall be based on the phosphorus recommendations for that crop;

(bb) For crops to be planted the following spring (no later than June 1), may not exceed the one year crop removal rate of phosphorus for the spring-planted crop;

(cc) Shall follow the provisions of the Phosphorus Site Index, as they may otherwise apply; and

(dd) Shall result in an application rate of plant available nitrogen not exceeding 50 lbs. per acre.

(vii) If the application is nitrogen-based, the rate of application for a fall-seeded crop shall be based on recommendations for plant available nitrogen as outlined in Section I-B of the *Maryland Nutrient Management Manual*. If the application is related to a crop that is to be planted the following spring (before June 1), the application of nitrogen may not exceed:

(aa) 50% of the plant available nitrogen recommended for the crop; and

(bb) 50 lbs. of plant available nitrogen per acre.

4. Emergency Situations

Applications required in emergency situations such as imminent overflow of a storage facility shall be managed in consultation with the Maryland Department of Agriculture. Operators in such situations shall contact the MDA regional nutrient management representative for guidance.

D. Winter Application

1. Term Defined.

In this regulation, the term "winter application" means:

a. For the years 2012 through 2015, nutrients applied from November 16 through February 28 of the following year; and

b. After July 1, 2016, nutrients applied:

(i) For Maryland counties east of the Chesapeake Bay and the Susquehanna River, from November 2 through February 28 of the following year; and

(ii) For Maryland counties west of the Chesapeake Bay and the Susquehanna River, from November 16 through February 28 of the following year.

2. Chemical Fertilizer

As a general rule, a person may not make a winter application of a chemical fertilizer to cropland. However, for small grains and perennial forage crops, a person may apply nitrogen at green-up when tillering begins as recommended in the *Maryland Nutrient Management Manual* section I-B. In addition, a person may apply certain nutrients for greenhouse production and for other vegetable and small fruit crops listed in the *Maryland Nutrient Management Manual* Section I-B. The restriction on the application of chemical fertilizers during winter also does not apply to potash or liming materials.

3. Organic Fertilizer

a. A person may make a winter application of an organic nutrient source to cropland only if:
   (i) The operation has inadequate storage (*i.e.*, the storage capacity will be exceeded before the March 1 winter application restriction);
   (ii) The nutrient source is non-stackable; and
   (iii) There is no other reasonable option to manage it.

b. Any such application shall be made in accordance with Section I-B of the *Maryland Nutrient Management Manual.*

c. The prohibition against making a winter application of an organic source does not apply to:
   (i) The application of potash, liming materials, or manure deposited directly by livestock; or
   (ii) A person, following organic guidelines, applying an organic nutrient for greenhouse production and for certain vegetable crops, small fruit crops, small grain crops, and cool season grass sod production listed in the *Maryland Nutrient Management Manual* Section I-B.

d. Operators and generators of organic nutrient sources shall make plans for adequate storage t

0.o eliminate the need for a winter application before deadlines described in III. E.

e. The following restrictions apply to any such winter application:
   (i) Nutrient application is prohibited during the winter if the organic nutrient source is stackable (equal to or less than 60 percent moisture content, such as poultry litter) or adequate storage is available.
   (ii) Nutrient application is prohibited when the soil is saturated, when the ground is covered with snow, or when the ground is hard-frozen.
   (iii) Nutrient application is prohibited to land with a slope greater than 7 percent.
   (iv) Rates of application shall be minimized and available acreage used to the greatest extent practical. In no case shall the application rate per acre exceed the one-year phosphorus removal rate for the next harvested crop.
   (v) Winter applications shall be by injection only and made into existing vegetative cover,

small grain crops, or established hay fields and pastures. Injection into existing cover may be effected, for example, using vertical tillage equipment such as a Turbo-Till® or with a knifed injection system which minimizes soil disturbance and maximizes vegetative cover. Vegetative cover shall be maintained as such until March 1.

(vi) Applications required in emergency situations such as imminent overflow of a storage facility shall be managed in consultation with the Maryland Department of Agriculture. Operators in such situations shall contact the MDA regional nutrient management representative for guidance.

E. Prohibition against Winter Application

1. Except as provided in subsections III.E.2 and III.E.3, after July 1, 2016, a person may not make a winter application of a nutrient source to agricultural land.

2. a. The prohibition against making a winter application after July 1, 2016 does not apply to a nutrient source that originates from:

   (i) A dairy or livestock operation with less than 50 animal units; or

   (ii) A municipal wastewater treatment plan with a design flow capacity of less than 0.5 million gallons per day.

   b. This exception to the general prohibition referenced in subsection III.E.1 expires after the winter application that ends on February 28, 2020.

3. The prohibition against making a winter application does not apply to potash, liming materials, or manure deposited directly by livestock. A person may make a winter application of certain nutrients for greenhouse production and for certain vegetable crops, small fruit crops, small grain crops, and cool season grass sod production listed in the *Maryland Nutrient Management Manual* Section I-B.

IV. TEMPORARY FIELD STOCKPILING (STAGING) FOR STACKABLE ORGANIC NUTRIENT SOURCES (equal to or less than 60% moisture content)

A. General Provisions

1. When other immediate use options and alternatives are not available, temporary field stockpiling (staging) of organic nutrient sources is allowed. Temporary field stockpiling (staging) provides greater environmental protection than a fall or winter application of nutrients or applying nutrients too far ahead of normal planting time and crop uptake.
2. To minimize the duration of temporary field stockpiling (staging), operators shall coordinate with integrators to schedule cleanouts as close to spring planting as possible, thereby providing a source of nutrients that is in phase with crop nutrient needs.
3. Existing storage shall be fully used prior to stockpiling material in the field.
4. Any material staged in a temporary field stockpile shall be land applied in the first spring season following the placement of the stockpile.

B. The temporary field stockpiling (staging) shall be located:
   1. If a vegetated buffer is not in place, at least 100 feet from any surface water as defined in COMAR 15.20.08.03(B)(39) and any irrigation or treatment ditches; and if a vegetated buffer is in place, at least 35 feet from any such water;
   2. At least 100 feet from wells, springs, and wetlands; however, if the well is located down gradient from the temporary field stockpiling (staging) area, at least 300 feet from the well;
   3. At least 200 feet from any residence outside the operator's property;
   4. Outside flood prone areas and areas subject to ponding;
   5. If located on more than a 3 percent grade slope and no diversion installed, no farther than 150 feet from the top of the slope.

C. Poultry litter and other materials shall be stacked at least 6 feet high and peaked to prevent precipitation from soaking into the pile.

D. Materials shall be field stockpiled (staged) temporarily in a manner that prevents nutrient runoff.

E. Temporary field stockpiling (staging) locations for subsequent piles should stay at the same location, rather than be moved from place to place.

F. All nutrients shall be removed from the temporary field (staged) stockpile and the ground area thoroughly scraped or cleaned when the application of the nutrients takes place.

G. Temporary field stockpile (staged) areas shall be restored to its original condition and, if necessary, reseeded with grass or an agronomic crop to facilitate nutrient uptake.

Guidelines for Application of Soil Conditioners, Soil Amendments, Waste Materials or Effluent on Agricultural Land (Summary of Existing Guidelines)

The Maryland Department of Agriculture ("MDA") administers programs concerning the registration, labeling and application of commercial fertilizers, organic nutrients, organic wastes, soil conditioners and soil amendments. The Maryland Department of Environment ("MDE") has developed standards and issues discharge permits for, and oversees the safe permissible uses of, solid and liquid byproducts, including those with heavy metals, trace elements, and other pre-application treatment requirements, for various land treatment and water reuse systems.

The purpose of this summary is to provide guidance to certified consultants, agricultural operators, applicators, and agency staff when planning to use soil conditioners, soil amendments, and waste material or effluent on agricultural land. This document explains the requirements for the planned application of these materials, including the requisite laboratory analysis of, and record keeping and reporting requirements for any soil amendment, conditioner or any waste materials not already regulated under State law. Because MDA's State Chemist Section regulates the labeling and distribution of fertilizers and liming materials, this document also provides a brief overview of existing laws and regulations governing this program.

STATE CHEMIST PRODUCT REGISTRATION AND LABELING REQUIREMENTS

Before sale or distribution, all commercially available nutrient products, such as fertilizer, intended for land application must be registered with the MDA State Chemist Section and labeled according to Maryland Commercial Fertilizer Law. Agriculture Article, §§6-201 *et seq.*

Fertilizers sold in bags, other containers, or in bulk must be properly labeled with weight, nutrient content, and any other identifying information.

Soil conditioner materials sold in bags, other containers, or in bulk must be properly labeled with weight and content, and any other identifying information.

All soil conditioners or amendments must be registered with MDA's State Chemist Section.

On a case by case basis, the State Chemist Section may require laboratory tests and other information for evaluation or review to determine the efficacy and safety of the material. Contact the State Chemist Section for more information.

MARYLAND DEPARTMENT OF ENVIRONMENT REQUIREMENTS

Generators, distributors, and applicators shall follow MDE standards and requirements as specified in discharge permits, to ensure the safe permissible uses of solid or liquid byproducts. Distributors and applicators shall keep records of the laboratory analysis and application of the byproducts, and make timely reporting requirements.

NUTRIENT MANAGEMENT REQUIREMENTS

Provider, Distributor, Consultant, and Applicator Responsibilities

A generator or applicator of the byproducts shall provide all labeling information for soil amendments/conditioners and other materials applied to agricultural land, including laboratory test results for plant nutrients (total N, NH_4-N phosphorus and potassium) and organic matter to the farm operator or operator's certified consultant. The materials shall meet the State minimum pre-application treatment requirements. Consultants shall include all nutrient sources and soil conditioners with their respective mineralization rates in the operation's nutrient management plan. Application rates and restrictions must follow the nutrient management plan recommendations. Consultant recommendations shall be consistent with *Maryland Nutrient Management Manual.*

Labeling information for soil amendments/conditioners and other materials applied to agricultural land, including laboratory test results for plant nutrients (total N, NH_4-N phosphorus and potassium) and organic matter, must be provided to the operator as part of the nutrient management plan. All plan information including labeling shall be kept in both the consultant's and operator's records and made available to State agency staff for inspection.

Persons applying the material must be credentialed by MDA as a:

- Certified Nutrient Management Consultant or supervise an employee who does the application;
- Certified Farmer/Operator on one's own land only or supervise an employee's work; or
- Nutrient Applicator Voucher holder (on one's own land only).

Application rates must be in accordance with the nutrient management plan. Applicators shall keep records on applied materials including label information, test results, field application dates, material application rate (in tons per acre, or gallons per acre rates) and application rates of actual nitrogen, phosphate and potash applied (in pounds per acre). A copy of information about the applied materials and other such records, including consultant information (e.g., name, certificate & license number), must be provided to operator.

Farmer/Operator Responsibilities

The agricultural operator is responsible for having a current nutrient management plan that accounts for all nutrient sources, soil conditioners, and any other substances applied to the land. Operators shall:

- Update and adjust the current plan if this material was not included in it.
- Oversee and assure that all materials applied are based on nutrient management plan recommendations.
- Obtain all records from the applicator and keep them with other plan records required by regulations. The records should include:
  - Supplier or source name and address;
  - Material name, origin and composition;
  - Labeling information and laboratory analysis for plant nutrients (total N, NH_4-N phosphorus and potassium - *even if no nutrient claims are made)*, organic matter, and pH;
  - Field specific application rates and the amount of material applied for crops specified in the plan for each field;
  - Material application rate (in tons per acre, or gallons per acre);
  - Application rates of actual nitrogen, phosphate and potash (in pounds per acre);
  - Application method and spreader calibration calculations; and,
  - Name, address and nutrient management certification number and license number of applicator.

Operators may contact MDA Nutrient Management Program for assistance with unlisted materials and requirements for application of soil conditioners/amendments.

Farmer/Operator Rights

Bulk fertilizers supplied to a farmer or operator must be accompanied by a statement that includes the appropriate net content declaration, the brand and grade, the guaranteed analysis, and the name and address of the manufacturer or registrant. This information will help the farmer or operator determine whether the material is acceptable for application on the farm in consultation with a certified nutrient management consultant.

Fertilizer sold in bags or other containers must be properly labeled with nutrient values and any other identifying information. These labels are on file and available for review at MDA's State Chemist Section.

Compliance with Maryland's nutrient management regulations regarding use of soil conditioners or amendments is ultimately the responsibility of the farmer or operator.

For more information or to report a possible violation of these regulations contact:

Maryland Department of Agriculture
Nutrient Management Program
50 Harry S Truman Pkwy Room 207
Annapolis, MD 21401
Phone 410-841-5959
Fax 410-841-5950; or

State Chemist Section
50 Harry S Truman Pkwy Room 511
Annapolis, MD 21401
Phone 410-841-2721
Fax 410-841-2740