

EXAMPLE PLAN

NUTRIENT MANAGEMENT PLAN

Willow Farm

2020

Scenario

Willow Farm 2020

Farm Operator Joe and Hilda Willow own and operate a small farm where they grow vegetables and cut flowers for their community supported agriculture (CSA) business. Each fall the CSA hosts a banquet for its members and Joe and Hilda provide a pumpkin patch and corn maze as entertainment.

Annual rye (managed as an unfertilized cover crop) is planted in the pumpkin patch in the fall to serve as a base on which the pumpkins will grow. The pumpkins are no-tilled into the rye stubble.

A neighbor harvests the corn grain after the banquet and uses the grain on his farm.

Joe and Hilda also have a small beef cow/calf operation. They typically sell the calves at weaning. The cattle are kept on pasture most of the year.

Property Information The property is located at 123 Old Frederick Lane, Frederick, MD 21702
No streams are located in the vicinity of this property.

Account ID	Watershed	Acres Farmed & Pasture
1104123456	0113	45.2

Crops & Soils The farm consists of 2 pasture fields, 1 hay field, 2 vegetable gardens, a cut flower garden, 1 corn maze field, and 1 pumpkin patch. Separate vegetable are grown over equal areas in each garden. The dominant soil mapunit in all fields is **Birdsboro silt loam (BgA)**.

Field	Acres	Crop	Tillage	Yield Goal	Source of Yield Goal
pasture 1	14	orchard grass	no-till	4 tons/A	Web Soil Survey
pasture 2	20	orchard grass	no-till	4 tons/A	Web Soil Survey
hay	8	orchard grass	no-till	6 tons/A	operator's records
corn maze	2	corn	conventional tillage	150 bu/A	operator's records from corn grain yield check
pumpkin patch	1	pumpkins / rye	no-till	5 tons	operator's sales records

flower garden	900 sq. ft.	zinnia, celosia, sunflower, sweet pea, ageratum, statice	rototilled	100 bouquets	operator's sales records
vegetable garden 1	2700 sq. ft.	potatoes, beets, carrots, broccoli, winter squash	rototilled	500, 100, 200, 100, 300 pounds, respectively	operator's sales records
vegetable garden 2	4800 sq. ft.	beans, lettuce, onions, spinach, chard, tomatoes, peppers	rototilled	100, 50, 300, 50, 50, 300, 200 pounds respectively	operator's sales records

Animals

Animals	Number	Weight
Beef cows	14	1100
Calves	14	400

Confinement

The beef cattle are kept on pasture all year and have access to a run-in shed during the winter. They spend approximately 6 hours a day in the shed during the months of December, January, and February. No bedding is used.

The cows calve in March and the calves stay on pasture with the cows until they are sold in November.

Manure Management

The run-in shed is cleaned out in the spring and the manure is spread on the corn maze field. The manure is spread at a rate of approximately 6 tons/acre and is typically incorporated by light disking within 6 hours of application. A manure sample is collected each year in late winter or early spring.

Fertilizer Management

Commercial fertilizer is applied to all fields as recommended.

NUTRIENT MANAGEMENT PLAN

for

Joe and Hilda Willow

Willow Farm

123 Old Frederick Lane

Frederick, MD 21702

301-662-5555

BRIEF DESCRIPTION OF OPERATION: Joe and Hilda Willow own and operate a 45.2-acre farm in Frederick County. They raise 14 head beef cattle that calve in March. The calves are raised until weaning and then sold. In addition to cattle, Joe and Hilda also operate a CSA business through which they offer fresh vegetables and cut flowers. They also plant corn for a corn maze and a pumpkin patch that are used for entertainment during their annual CSA banquet each fall. The corn is harvested by a neighbor as grain after the annual banquet.

DATE OF PLAN: January 3, 2020

DURATION OF PLAN: March 1, 2020 – February 28, 2021

SOIL SAMPLING AND TESTING: The soil samples were collected in December 2018 by Joe Willow and analyzed by Waypoint Agricultural Laboratories, Inc. on December 28, 2018.

MANURE SAMPLING AND TESTING: The manure sample was collected in December 2019 by Joe Willow and analyzed by Waters Agricultural Laboratories, Inc.

MANURE MANAGEMENT: Cattle are on pasture 24-365. In the colder months, they congregate in a run-in shed at night. Manure is collected from the run-in shed in spring and spread on the corn field.

Regulations that became effective in December 2016 require the incorporation of manure under many cropping situations. The Willows incorporate manure with tillage equipment within a few hours of spreading. The Willows are aware that the Maryland Department of Agriculture reserves the right to require incorporation of organic nutrient sources on a case-by-case basis.

BASIS OF RECOMMENDATIONS: Recommendations for all fields are nitrogen and phosphorus based as required by the State of Maryland nutrient management regulations.

UM-PHOSPHORUS MANAGEMENT TOOL (UM-PMT): The farms/fields in the table below had soil test phosphorus (expressed as FIV-P) of 150 or above. PMT determinations were conducted for fields on which P-bearing materials will be applied and results of the PMT are listed as the P Loss Rating.

Farm or Tract	Field with FIV\geq150	PMT done?	P Loss Rating	Application Rate Used in Calculation; Explanation/Restriction
Home	Corn maze	Yes	LOW	Manure may be applied at a 6 ton/acre rate. This rate is below expected 1 year crop P removal.
	Pasture 1	No	N/A	

Transition Management 1 (TM1) of the UM-PMT is the regulatory P risk assessment for the upcoming growing season.

Since the UM-PMT will be the regulatory tool in 2022 results of both TM1 and results of the UM-PMT are included with this plan, as well as a table comparing the outcomes of both TM1 and the UM-PMT. It is possible that management of nutrient sources, both organic sources and fertilizer, will be impacted by the full adoption of UM-PMT.

AVERAGE SOIL PHOSPHORUS FERTILITY INDEX VALUE: The average soil FIV-P for this operation is based on the soil tests used for the development of the 2016 nutrient management plan. **The average soil P-FIV for this operation is 187.** Therefore, it is considered a Tier A Operation with an average soil P-FIV of 150 or greater but less than 300. Consult *Farming with Your Nutrient Management Plan* (page 9) for more information on the transition to the Phosphorus Management Tool. A copy of this publication is included with this plan.

NUTRIENT APPLICATION EQUIPMENT CALIBRATION: Application equipment must be calibrated to estimate actual application rates for all nutrient applications. Equipment must be recalibrated when equipment settings, ground speed, consistency or density of a product varies from the original calibration. Documentation of the calibrations must be recorded and made available during an implementation review conducted by MDA. This documentation must include any of the necessary calculations to attain the nutrient rate that was determined.

SOURCE OF YIELD GOAL INFORMATION: Mr. Willow keeps records of the number of bales harvested from his hay field. He uses yield information from the Web Soil Survey to assign yield goals for his pasture fields. Vegetable yields are estimated based on sales to CSA clients.

TIMING: Guidance on the timing of fertilizer applications is included on the recommendations sheet(s). Also note that nutrient application is prohibited when the soil is saturated, when the ground is covered with snow greater than one inch, or when the ground is hard-frozen greater than two inches. Additional information of a general nature is included in the “NUTRIENT APPLICATION REQUIREMENTS” and “GENERAL PRINCIPLES OF NUTRIENT MANAGEMENT” sections of this plan.

BEST MANAGEMENT PRACTICES: Mr. Willow has a Soil Conservation & Water Quality Plan and is implementing it as time and resources allow.

CUSTOM APPLICATION OF NUTRIENTS: If any nutrient sources are custom-applied, it is imperative that the farmer/operator inform the custom applicator(s) of the recommendations contained in this plan as well as any setbacks that are required. The farmer/operator is solely responsible for ensuring that the nutrient recommendations and setback requirements contained in this plan are followed by all hired contractors and employees.

RECORD KEEPING REQUIREMENTS: The Water Quality Improvement Act requires that producers keep records on fertilizer usage. Consult the model form and directions included in

the record keeping section of this plan for the type of information required.

Farm Identification Summary

Farm Name	Tax Account ID Numbers	Watershed Location Code	Total Acres Farmed (Cropland and Pastures)
Willow Farm	1104123456	0113	45.2

Manure Summary Table

Animal Type and Number	Total Manure Generation (tons/yr)*	Manure Avail. for Utilization (tons/yr)*	Manure Storage Capacity/Conditions	Timing of Application
Beef cows - 14	178	11	run-in shed	Spring
Calves - 14	40	0	n/a	n/a

*See manure generation sheets

Certified Farmer Operator
Certification No. 5672

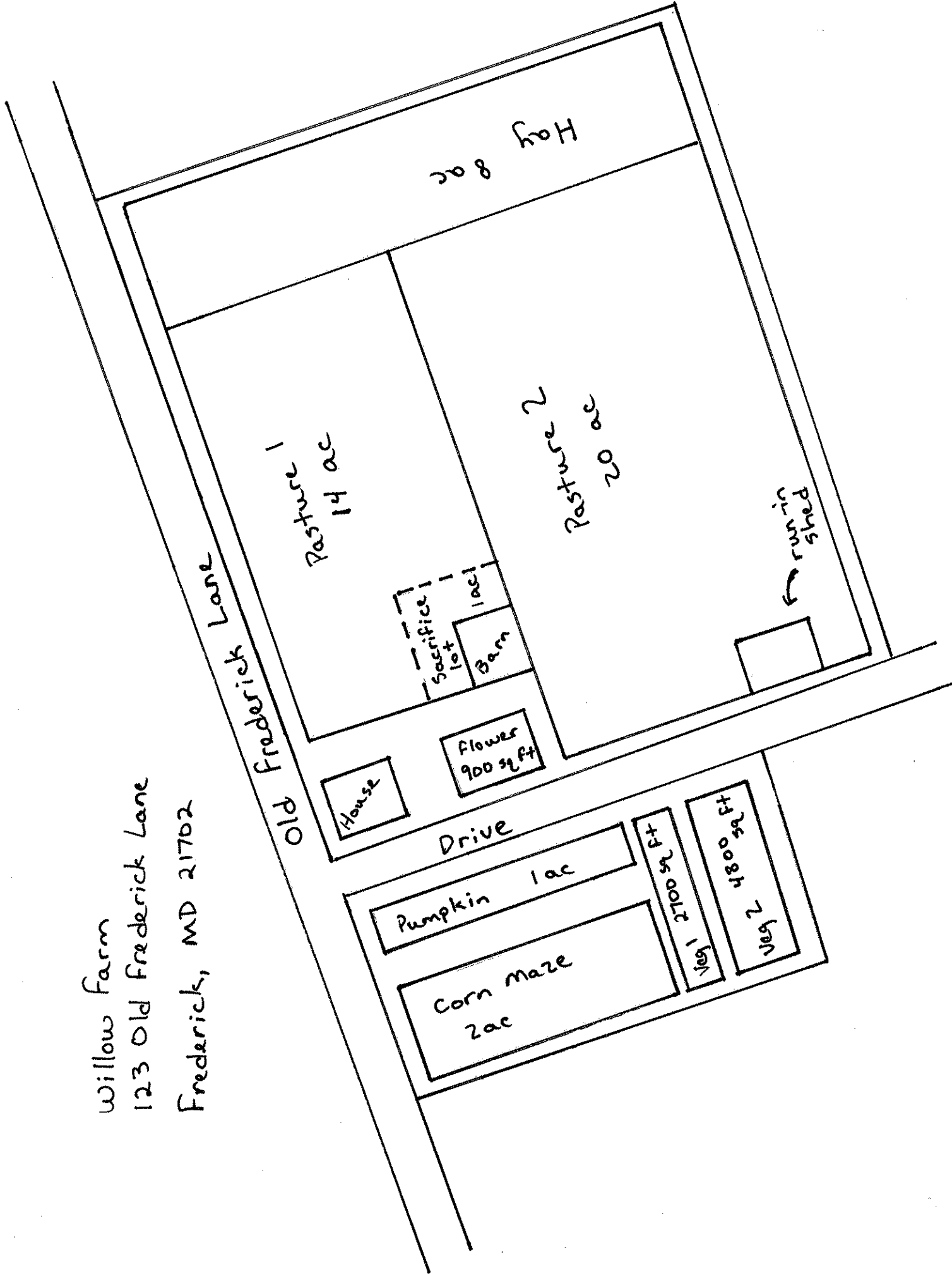
Plan Update Requirements

As stated in the cover sheet, this plan was developed for use from:
March 1, 2020 – February 28, 2021.

The following is a list of situations that will impact whether or not the attached Nutrient Management Plan will need updating **before** the end of the time period for which the plan was developed.

- 1) A change to the **planned crop or cropping rotation**, or introduction of a **new crop** not currently addressed in the existing nutrient management plan.
- 2) A change in **nutrient source or soil test results**.
- 3) A change in **acreage** managed of 10 percent or greater, or 30 acres, whichever is less.
- 4) A change in **animal units** of 10 percent or greater if resultant manure production will require significant management adjustments.

Willow Farm
123 Old Frederick Lane
Frederick, MD 21702



NUTRIENT APPLICATION SETBACKS FROM SURFACE WATER:

(5-19-15)

Setbacks for Nutrient Application are required in the development of nutrient management plans. Application and livestock setback regulations are contained under the Nutrient Application Requirements, Maryland Department of Agriculture 2012, COMAR 15.20.07.02, Maryland Nutrient Management Manual, 1-D1.

A minimum of a 10’ vegetative setback must be in place next to surface water. The chart below indicates if surface water is present that requires a setback on any farm/operation and identifies the fields that are required to have a nutrient application setback. **An application of crop nutrients using a broadcast method either with or without incorporation requires a 35’ setback. A directed spray application or the injection of crop nutrients only requires a 10’ setback.** Excepting perennial forage crops grown for hay and pasture, vegetation in the 10’ setback area may not include plants that would be considered part of the crop grown in the field (i.e. row crops). Pastures and hayfields are subject to a 10’ and/or a 35’ nutrient application setback depending on application methods. Nutrients may not be applied within the 10’ setback.

Livestock on pasture are required to meet the minimum 10’ setback by means of fencing unless a Best Management Practice (BMP) is approved by MDA or a Soil Conservation and Water Quality Plan is developed and implemented that prescribes an alternative to fencing animals 10’ from surface water. Alternative BMP’s may include stream crossings, watering facilities, pasture management, or other practices that are equally protective of water quality. Sacrifice lots for livestock require a 35’ setback from surface water.

If nutrients are custom-applied, it is the operator’s responsibility to inform the applicator of the setback distance based on the method of application.

Farm Name(s)	Is Surface Water Present on the farm that requires a setback (Yes or No)	Field(s) requiring a Nutrient Application Setback*	Nutrient Application Setback Required (Indicate with “Yes” in appropriate column(s).)		
			Livestock on Pasture ≥ 10 ft.	Directed Application** ≥ 10 ft.	Broadcast Application or Sacrifice Lots*** ≥ 35 ft.
Willow	No	None			

***If a field contains multiple sources of surface water (i.e. a pond and a stream), list each separately or identify on the map.**

****Directed Application** = Directed Spray Application (Vertical Fan or Drop Nozzle), Air Flow Application, Knifed/Injected application of Nutrients, Planter Applied nutrients

*****Broadcast Application or Sacrifice Lots** = Spinner Spreaders (Manure or Fertilizer), High Volume Horizontal Nozzles, Manure Spreaders (Box type with beaters, Splasher plates for liquid, Side Discharge V-Type)

SOIL TESTS

Report Number: 14-009-0877

Account Number: 12345



7621 Whitepine Road, Richmond, VA 23237
Main 804-743-9401 ° Fax 804-271-6446
www.waypointanalytical.com

Send To: Joe Willow
123 Old Frederick Ln
Frederick, MD 21702

"Every acre...Every year."™

Grower: Joe Willow
Willow Farm

SOIL ANALYSIS REPORT

Analytical Method(s): Mehlich 3 SMP Buffer pH Loss On Ignition Water pH

Date Received: 12/27/2018

Date Of Analysis: 12/28/2018

Date Of Report: 12/28/2018

Sample ID Field ID	Lab Number	OM	W/V	ENR	Phosphorus			Potassium	Magnesium	Calcium	Sodium	pH		Acidity	C.E.C
		% Rate	Soil Class	lbs/A	M3 ppm Rate	ppm Rate	ppm Rate	K ppm Rate	Mg ppm Rate	Ca ppm Rate	Na ppm Rate	Soil pH	Buffer Index	H meq/100g	meq/100g
Pasture 1	21830	3.6 M		114	185 H			130 M	132 H	1320 H		6.2	6.89	0.4	15.5
Pasture 2	21831	2.9 M		97	72 M			118 M	105 H	1280 H		6.1	6.75	0.5	14.5
Hay	21832	1.2 L		48	40 L			55 L	128 H	1295 H		6.2	6.85	0.4	14.8
Corn Maze	21833	1.5 L		48	155 H			87 M	103 H	950 H		6.0	6.72	0.4	14.5
Pumpkins	21834	2.7 M		48	58 M			170 H	140 H	880 H		5.7	6.0	1.1	15.0

Sample ID Field ID	Percent Base Saturation					Nitrate	Sulfur	Zinc	Manganese	Iron	Copper	Boron	Soluble Salts		
	K %	Mg %	Ca %	Na %	H %	NO ₃ N ppm Rate	S ppm Rate	Zn ppm Rate	Mn ppm Rate	Fe ppm Rate	Cu ppm Rate	B ppm Rate	SS ms/cm Rate		

Values on this report represent the plant available nutrients in the soil. Rating after each value: VL (Very Low), L (Low), M (Medium), H (High), VH (Very High). ENR - Estimated Nitrogen Release. C.E.C. - Cation Exchange Capacity.

Explanation of symbols: % (percent), ppm (parts per million), lbs/A (pounds per acre), ms/cm (milli-mhos per centimeter), meq/100g (milli-equivalent per 100 grams). Conversions: ppm x 2 = lbs/A, Soluble Salts ms/cm x 640 = ppm.

This report applies to sample(s) tested. Samples are retained a maximum of thirty days after testing.

Analysis prepared by: Waypoint Analytical Virginia, Inc.

by: *Paucic McGroary*

Paucic McGroary

Report Number: 14-009-0877

Account Number: 12345



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Sample ID Field ID	Lab Number	OM	W/V	ENR	Phosphorus			Potassium	Magnesium	Calcium	Sodium	pH		Acidity	C.E.C
		% Rate	Soil Class	lbs/A	M3 ppm Rate	ppm Rate	ppm Rate	K ppm Rate	Mg ppm Rate	Ca ppm Rate	Na ppm Rate	Soil pH	Buffer Index	H meq/100g	meq/100g
Flower	21835	2.5 M		100	48 M			191 VH	103 M	1400 H		6.1	6.75	0.4	15.0
Veg 1	21836	1.1 L		44	52 M			103 H	140 H	1400 H		6.2	6.85	0.4	15.2
Veg 2	21837	1.2 L		48	58 M			165 VH	110 M	1440 H		6.4	6.90	0.1	14.7

Sample ID Field ID	Percent Base Saturation					Nitrate	Sulfur	Zinc	Manganese	Iron	Copper	Boron	Soluble Salts		
	K %	Mg %	Ca %	Na %	H %	NO ₃ N ppm Rate	S ppm Rate	Zn ppm Rate	Mn ppm Rate	Fe ppm Rate	Cu ppm Rate	B ppm Rate	SS ms/cm Rate		

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Analysis prepared by: Waypoint Analytical Virginia, Inc.

by: *Paucic McGroary*

Paucic McGroary

Department of Environmental Science
 and Technology

Agricultural Nutrient Management Program

Soil Test Levels (FIVs), Soil Test Category and Yield Response

Soil Test Fertility Index Value (FIV)	Soil Test Category	Likelihood of Yield Response
0-25	low	yield response likely
26-50	medium	yield response possible
51-100	optimum	yield response unlikely
>100	excessive	yield response very unlikely

Your soil tests have been converted to the Maryland Fertility Index Value (FIV) scale.

Not all soil testing laboratories use the same extraction methods. There are also a number of ways in which the results can be reported (i.e., pounds per acre or ppm; P or P₂O₅). Converting soil test results from several laboratories to a common scale simplifies the process of making recommendations for agricultural crops grown in Maryland.

For more information about converting soil test results to the FIV scale and the basis for the conversions, please consult Soil Fertility Management 4 (SFM-4), *Converting Among Soil Test Analyses Frequently Used in Maryland*.

9/7/11

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**MANURE
INFORMATION**



Waters Agricultural Laboratories, Inc.

Manure/Sludge Analysis and Application Report

*P.O. Box 382 * 257 Newton Highway * Camilla, Georgia 31731-0382 * phone: (229) 336-7216*

Ship To: Joe Willow 123 Old Frederick Road Frederick, MD 21702	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">Grower: Joe Willow</td> </tr> <tr> <td>SampleNumber: 92</td> <td>Date Submitted: 12/15/19</td> </tr> <tr> <td>Lab Number: 5922</td> <td>Report Date: 12/17/19</td> </tr> <tr> <td>Type: Beef</td> <td></td> </tr> </table>	Grower: Joe Willow		SampleNumber: 92	Date Submitted: 12/15/19	Lab Number: 5922	Report Date: 12/17/19	Type: Beef	
Grower: Joe Willow									
SampleNumber: 92	Date Submitted: 12/15/19								
Lab Number: 5922	Report Date: 12/17/19								
Type: Beef									

	%	Pounds per ton
Nitrogen – Total	0.83	16.6
Nitrogen – Ammonium	0.21	4.2
P ₂ O ₅ – Total	0.35	7.0
K ₂ O – Total	0.87	17.4
Moisture (%)	71.5	

Results Reported On: As received basis

Remarks: Suggest the use of PLANT and SOIL analysis to monitor the need for additional and or build up of some elements.

MANURE QUANTITY ESTIMATION (For Solid Manure)

You can only edit values highlighted in blue

Farm name: Willow Farm

Manure Production period:

Starting date: 4/1/2019 Ending date: 3/31/2020

A. Total days in manure production period: 366

Livestock Information

B. Livestock group	1	2	3
Beef cows			
C. Average weight (lbs.)	1100		
D. # of animals	14		
E. Animal units (AU) [(C x D)/1000]	15.4	0	0
F. Full days confined during manure production period	0		
G. Days partially confined during manure production period	90		
H. Hours per day confined	6		
I. Day equivalents partially confined (G * H)/24	23	0	0
J. Total day equivalents confined (F + I)	23	0	0
K. Total day equivalents unconfined on pasture (A - J)	344	366	366
L. Weight of manure/AU/day (lbs.) (see Table 1.)	63		

Bedding Estimation

M. Bedding type (straw, sawdust, etc.)	1	2	3
None			
N. Volume of bedding this production period (cu.ft.). (If weight of bedding is known, proceed to P and enter it directly.)			
O. Density of bedding (lbs. per cu.ft.) (see Table 2.)			
P. Weight of bedding (tons) [(N x O)/2000]	0.0	0.0	0.0

Uncollected Manure (Deposited on Pasture)

Q. Weight of manure on pasture (tons) [(E x L x K)/2000]	1	2	3
	167	0	0

Collected Solid Waste (Manure And Bedding)

R. Weight of collected manure (tons) [(E x L x J)/2000]	1	2	3
	11	0	0
S. Weight of collected manure & bedding (tons) (P + R)	11	0	0

Updated: 3-12-10

MANURE QUANTITY ESTIMATION (For Solid Manure)

You can only edit values highlighted in blue

Farm name: Willow Farm

Manure Production period:

Starting date: 3/1/2019 Ending date: 11/1/2019

A. Total days in manure production period: 246

Livestock Information

B. Livestock group	1	2	3
Calves			
C. Average weight (lbs.)	400		
D. # of animals	14		
E. Animal units (AU) [(C x D)/1000]	5.6	0	0
F. Full days confined during manure production period	0		
G. Days partially confined during manure production period	0		
H. Hours per day confined	0		
I. Day equivalents partially confined (G * H)/24	0	0	0
J. Total day equivalents confined (F + I)	0	0	0
K. Total day equivalents unconfined on pasture (A - J)	246	246	246
L. Weight of manure/AU/day (lbs.) (see Table 1.)	58		

Bedding Estimation

M. Bedding type (straw, sawdust, etc.)	1	2	3
None.			
N. Volume of bedding this production period (cu.ft.). (If weight of bedding is known, proceed to P and enter it directly.)			
O. Density of bedding (lbs. per cu.ft.) (see Table 2.)			
P. Weight of bedding (tons) [(N x O)/2000]	0.0	0.0	0.0

Uncollected Manure (Deposited on Pasture)

Q. Weight of manure on pasture (tons) [(E x L x K)/2000]	1	2	3
	40	0	0

Collected Solid Waste (Manure And Bedding)

R. Weight of collected manure (tons) [(E x L x J)/2000]	1	2	3
	0	0	0
S. Weight of collected manure & bedding (tons) (P + R)	0	0	0

Updated: 3-12-10

Manure Utilization Information

A	B	*C	D	E
Period of Application	Fields Available	Acres	Manure Application Rate	Manure Utilization Potential
Spring 2020	Corn maze	2	6 tons/A	12 tons
*Column C X Column D = Column E				

Manure Allocation Summary

A. Period of Application	Spring	
B. Period for Manure Generation	April 2019 – March 2020	
C. Manure Production Per Period	11 tons	
D. Manure Utilization Potential per Period	12 tons	
*E. Excess (+) or Deficit (-) (C – D)	-1 ton (deficit)	

*If excess, indicate name and address of export location in cover sheet.

P Risks Tool

UM Phosphorus Management Tool (PMT) Report

Farmer Name	Joe & Hilda Willow	Year - Tier - Phase	2020 - A - N/A
	4		
Account ID	1104123456		
County	Frederick		
Tract or Farm ID	Willow		
Field ID	Corn Maze		
MUSYM	BgA		
Area Crop	2.00 Acres 1		
Organics	Beef S		
R Factor			
Adj. K Factor LS Factor			
C P Factors			
RUSLE A	4.90		
Transport Risk Factors			
SED Value	10		
Soil Permeability Class	Moderate		
Field slope Concave? SR Factor	3.00 No 5.6		
Soil Drainage Class	well		
HSG Artificial Drainage? SD Factor	B No 0.0		
Management Factors			
Distance to Water (DF)	> 500 ft 0.2		
Buffer Width & Type (BF)	< 35' veg. 1.0		
Soil Test P Fertility Index Value	171		
Degree of P Saturation (DPS M3)	46.1 (est.)		
Fert. P appl. rates, lb/A FP * PSC	- - - 0		
Org. P appl. rates, lb/A OP * PSC	42 - - 21		
Runoff Fert. P appl. methods AMr(f)	- - - 0.00		
Runoff Org. P appl. methods AMr(o)	M2 - - 0.40		
Subsurface Fert. P appl. methods AMsub(f)	- - - 0.00		
Subsurface Org. P appl. methods AMsub(o)	M1 - - 0.32		
P particulate P runoff P subsurface	34 11 0		
P Loss Rating Score	45 (L)		

Comparison of Manure and/or Fertilizer Recommendations Based on Tier/Transition Management Phase and University of Maryland - Phosphorus Management Tool (UM-PMT)

Farm & field ID	Tier/Transition Management Phase	Manure Application Recommended (tons or gallons per acre)	Commercial Fertilizer Recommended (pounds phosphate or P ₂ O ₅ per acre)	UM-PMT category	Manure Application Recommended (tons or gallons per acre)	Commercial Fertilizer Recommended (pounds phosphate or P ₂ O ₅ per acre)
Willow Farm corn maze	TM1	6 tons/ac	None	Low	6 tons/ac (P applications over a 3 year period limited to expected P removal of planned crops in 3 year period)	None

The application of nutrient sources containing phosphorus could be more restrictive when the UM-PMT is fully implemented.

RECOMMENDATIONS

Fertilizer Recommendations

Farmer/Operator		Joe & Hilda Willow				Plan Year			2020					
Street Address		123 Old Frederick Lane				Tier - Phase			A - TM1					
City, State, Zip, County		Frederick MD 21702 Frederick				Date Plan Prepared			1-3-2020					
Tract No. / Farm Name	Field No.	Crops & Note Numbers	Area	Yield Goal	Plant Nutrients Needed N-P2O5-K2O	Nitrogen Credits			Fertilizer To Be Applied					Lime
						Leg.	Man.	Slu.	Method	N	P2O5	K2O	Mg	
Willow	Corn Maze 2020 [M]	1 Corn grain, conven. till. 7 28 1 2 3 27 60 92 93	2.00 Acres	150 Bu/A	150-0-61 #/A	0 #/A	20 #/A	0 #/A	Total	130 #/A	0 #/A	61 #/A		2.1 t/A
									broadcast	30 #/A	0 #/A	31 #/A		
									banded w/planter	30 #/A	0 #/A	30 #/A		
									sidedress	70 #/A	0 #/A	0 #/A		
Willow	Flower 2020 [*]	231 Cut Flowers (medium N feeders) 7 62	1 Ksf	100	2.0-1.0-0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	Total	2.0 #/Ksf	1.0 #/Ksf	0.0 #/Ksf		78 #/Ksf
									broadcast	2.0 #/Ksf	1.0 #/Ksf	0.0 #/Ksf		
Willow	Hay 2020 [*]	74 Orchardgrss; Maint. 7 4 6 53 60 70 71 88 89 92 93 184 185 186	8.00 Acres	6.0 T/A	300-27-90 #/A	0 #/A	0 #/A	0 #/A	Total	300 #/A	27 #/A	90 #/A		1.4 t/A
									tpdrs@ green-up	100 #/A	27 #/A	45 #/A		
									tpdrs post hvst#1	75 #/A	0 #/A	0 #/A		
									tpdrs late summer	75 #/A	0 #/A	45 #/A		
									tpdrs late fall	50 #/A	0 #/A	0 #/A		

[*] - indicates primary recommendation used for the PMT calculation.

Fertilizer Recommendations

Farmer/Operator		Joe & Hilda Willow				Plan Year			2020					
Street Address		123 Old Frederick Lane				Tier - Phase			A - TM1					
City, State, Zip, County		Frederick MD 21702 Frederick				Date Plan Prepared			1-3-2020					
Tract No. / Farm Name	Field No.	Crops & Note Numbers	Area	Yield Goal	Plant Nutrients Needed N-P2O5-K2O	Nitrogen Credits			Fertilizer To Be Applied					Lime
						Leg.	Man.	Slu.	Method	N	P2O5	K2O	Mg	
Willow	Pasture 1 2020 [*]	74 Orchardgrss; Maint. 7 4 6 53 60 70 71 88 89 92 93 184 185 186	14.00 Acres	4.0 T/A	200-0-31 #/A	0 #/A	0 #/A	0 #/A	Total	200 #/A	0 #/A	31 #/A		1.4 t/A
									tpdrs@ green-up	50 #/A	0 #/A	31 #/A		
									tpdrs post hvst#1	50 #/A	0 #/A	0 #/A		
									tpdrs late summer	50 #/A	0 #/A	0 #/A		
									tpdrs late fall	50 #/A	0 #/A	0 #/A		
Willow	Pasture 2 2020 [*]	74 Orchardgrss; Maint. 7 4 6 53 60 70 71 88 89 92 93 184 185 186	20.00 Acres	4.0 T/A	200-20-36 #/A	0 #/A	0 #/A	0 #/A	Total	200 #/A	20 #/A	36 #/A		1.5 t/A
									tpdrs@ green-up	50 #/A	20 #/A	36 #/A		
									tpdrs post hvst#1	50 #/A	0 #/A	0 #/A		
									tpdrs late summer	50 #/A	0 #/A	0 #/A		
									tpdrs late fall	50 #/A	0 #/A	0 #/A		
Willow	Pumpkin 2020 [*]	169 Pumpkin 7 11 101 103 121 122 161 202	1.00 Acres	5.0 T/A	100-43-0 #/A	0 #/A	0 #/A	0 #/A	Total	100 #/A	43 #/A	0 #/A		3.1 t/A
									brdcast & disk in	25 #/A	43 #/A	0 #/A		
									sdrs @ 1st runners	75 #/A	0 #/A	0 #/A		

[*] - indicates primary recommendation used for the PMT calculation.

Fertilizer Recommendations

Farmer/Operator		Joe & Hilda Willow				Plan Year			2020					
Street Address		123 Old Frederick Lane				Tier - Phase			A - TM1					
City, State, Zip, County		Frederick MD 21702 Frederick				Date Plan Prepared			1-3-2020					
Tract No. / Farm Name	Field No.	Crops & Note Numbers	Area	Yield Goal	Plant Nutrients Needed N-P2O5-K2O	Nitrogen Credits			Fertilizer To Be Applied					Lime
						Leg.	Man.	Slu.	Method	N	P2O5	K2O	Mg	
Willow	Pumpkin 2020	51 Cover crop for water quality	1.00 Acres	0.0 T/A	0-0-0 #/A	0 #/A	0 #/A	0 #/A	Total	0 #/A	0 #/A	0 #/A		3.1 t/A
Willow	Veg 1 2019	126 Beets 7 90 101 103 121 122 161	3 Ksf	80 Cwt/A	2.3-1.1-0.99 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	Total	2.3 #/Ksf	1.1 #/Ksf	1.0 #/Ksf		64 #/Ksf
									brdcast & disk in	1.1 #/Ksf	1.1 #/Ksf	1.0 #/Ksf		
									sdrs4-6wksPostplant	1.1 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		
Willow	Veg 1 2019	131 Carrots 7 101 103 121 122 161 170	3 Ksf	160 Cwt/A	1.8-1.1-0.99 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	Total	1.8 #/Ksf	1.1 #/Ksf	1.0 #/Ksf		64 #/Ksf
									brdcast & disk in	1.1 #/Ksf	1.1 #/Ksf	1.0 #/Ksf		
									sdrs if needed	0.7 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		

[*] - indicates primary recommendation used for the PMT calculation.

Fertilizer Recommendations

Farmer/Operator		Joe & Hilda Willow				Plan Year			2020					
Street Address		123 Old Frederick Lane				Tier - Phase			A - TM1					
City, State, Zip, County		Frederick MD 21702 Frederick				Date Plan Prepared			1-3-2020					
Tract No. / Farm Name	Field No.	Crops & Note Numbers	Area	Yield Goal	Plant Nutrients Needed N-P2O5-K2O	Nitrogen Credits			Fertilizer To Be Applied					Lime
						Leg.	Man.	Slu.	Method	N	P2O5	K2O	Mg	
Willow	Veg 1 2019	127 Broccoli 7 11 101 103 121 122 161 166	3 Ksf	80 Cwt/A	4.6-1.1-0.99 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	Total	4.6 #/Ksf	1.1 #/Ksf	1.0 #/Ksf		64 #/Ksf
									brdcst & disk in	2.3 #/Ksf	1.1 #/Ksf	1.0 #/Ksf		
									sdrs2-3wksPostplant	1.1 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		
									sdrs4-6wksPostplant	1.1 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		
Willow	Veg 1 2019 [*]	166 Potatoes-white,L&SiL,300 cwt/A 20 101 103 121 122 161 200	3 Ksf	400 Cwt/A	3.4-2.0-1.8 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	Total	3.4 #/Ksf	2.0 #/Ksf	1.8 #/Ksf		0 #/Ksf
									brdcst & disk in	1.1 #/Ksf	0.9 #/Ksf	0.0 #/Ksf		
									band w/planter	2.3 #/Ksf	1.1 #/Ksf	1.8 #/Ksf		
Willow	Veg 1 2019	182 Squash; winter 7 11 101 103 121 122 161 202	3 Ksf	240 Cwt/A	2.3-1.1-1.8 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	Total	2.3 #/Ksf	1.1 #/Ksf	1.8 #/Ksf		64 #/Ksf
									brdcst & disk in	0.6 #/Ksf	1.1 #/Ksf	1.8 #/Ksf		
									sdrs @ 1st runners	1.7 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		

[*] - indicates primary recommendation used for the PMT calculation.

Fertilizer Recommendations

Farmer/Operator		Joe & Hilda Willow				Plan Year			2020					
Street Address		123 Old Frederick Lane				Tier - Phase			A - TM1					
City, State, Zip, County		Frederick MD 21702 Frederick				Date Plan Prepared			1-3-2020					
Tract No. / Farm Name	Field No.	Crops & Note Numbers	Area	Yield Goal	Plant Nutrients Needed N-P2O5-K2O	Nitrogen Credits			Fertilizer To Be Applied					Lime
						Leg.	Man.	Slu.	Method	N	P2O5	K2O	Mg	
Willow	Veg 2 2019	152 Lettuce; Leaf 101 103 121 122 161 177	5 Ksf	30 Cwt/A	2.9-1.8-0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	Total	2.9 #/Ksf	1.8 #/Ksf	0.0 #/Ksf		0 #/Ksf
									brdcst & disk in	1.7 #/Ksf	1.8 #/Ksf	0.0 #/Ksf		
									sdrs3-5wksPostplant	1.1 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		
Willow	Veg 2 2019	143 Swiss Chard 101 103 121 122 161	5 Ksf	30 Cwt/A	2.3-0.99-0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	Total	2.3 #/Ksf	1.0 #/Ksf	0.0 #/Ksf		0 #/Ksf
									brdcst & disk in	1.1 #/Ksf	1.0 #/Ksf	0.0 #/Ksf		
									sdrs4-6wksPostplant	1.1 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		
Willow	Veg 2 2019	158 Onions; Bulbs 11 101 103 121 122 161 192	5 Ksf	190 Cwt/A	2.3-0.99-0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	Total	2.3 #/Ksf	1.0 #/Ksf	0.0 #/Ksf		0 #/Ksf
									brdcst & disk in	1.1 #/Ksf	1.0 #/Ksf	0.0 #/Ksf		
									sdrs4-5wksPostplant	1.1 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		

[*] - indicates primary recommendation used for the PMT calculation.

Fertilizer Recommendations

Farmer/Operator		Joe & Hilda Willow				Plan Year			2020					
Street Address		123 Old Frederick Lane				Tier - Phase			A - TM1					
City, State, Zip, County		Frederick MD 21702 Frederick				Date Plan Prepared			1-3-2020					
Tract No. / Farm Name	Field No.	Crops & Note Numbers	Area	Yield Goal	Plant Nutrients Needed N-P2O5-K2O	Nitrogen Credits			Fertilizer To Be Applied					Lime
						Leg.	Man.	Slu.	Method	N	P2O5	K2O	Mg	
Willow	Veg 2 2019	164 Peppers 20 101 103 121 122 161 198	5 Ksf	125 Cwt/A	4.1-1.8-0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	Total	4.1 #/Ksf	1.8 #/Ksf	0.0 #/Ksf		0 #/Ksf
									brdcst & disk in	2.3 #/Ksf	1.8 #/Ksf	0.0 #/Ksf		
									sdrs post fruitset	1.1 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		
									sdrs later if need	0.7 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		
Willow	Veg 2 2019	189 Tomatoes; fresh market; L & SiL 20 101 103 121 122 161 216	5 Ksf	9.0 T/A	1.8-1.8-0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	Total	1.8 #/Ksf	1.8 #/Ksf	0.0 #/Ksf		0 #/Ksf
									brdcst & plow down	1.1 #/Ksf	1.8 #/Ksf	0.0 #/Ksf		
									sdrs@frt.set if need	0.7 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		
Willow	Veg 2 2019	179 Spinach; Spring or Fall, 2 cuttings 20 101 103 121 122 161 206	5 Ksf	30 Cwt/A	3.6-1.8-0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	0.0 #/Ksf	Total	3.6 #/Ksf	1.8 #/Ksf	0.0 #/Ksf		0 #/Ksf
									brdcst & disk in	1.7 #/Ksf	1.8 #/Ksf	0.0 #/Ksf		
									sidedress	0.9 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		
									tpdrs after cutting	0.9 #/Ksf	0.0 #/Ksf	0.0 #/Ksf		

[*] - indicates primary recommendation used for the PMT calculation.

Notes

Farmer/Operator	Joe & Hilda Willow	Plan Year	2020
Street Address	123 Old Frederick Lane	Tier - Phase	A - TM1
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1. To satisfy TOTAL recommendation for many crops, it may be necessary to adjust SUGGESTED TIMING AND METHODS of application, (i.e. broadcast, topdress, sidedress, row, etc.) to be compatible with available equipment and materials.
2. These recommendations assume that the highest level of nitrogen (N) management will be utilized and that N losses due to leaching, volatilization and denitrification are minimized by utilizing to best management practices.
3. For conventional tillage, ag-lime recommendations are based upon the amount of oxides required for the surface 8" of soil. Lime should be thoroughly mixed with the soil by plowing and disking. If recommended amount of oxides exceeds 1.5 tons of lime per acre (assuming 50% total oxides), ½ should be plowed down and the remainder applied after plowing and disked in thoroughly.
4. If topdressing ag-lime without tillage, reduce the total amount of oxides recommended by 50 percent. When topdressing ag-lime, and soil mixing is not possible, do not apply more than 1500 lbs per acre of oxides in any one application. The balance can be applied the next year. It would be best to do a soil test before making the second application.
6. Split-application of nitrogen is required for optimal production and nitrogen use efficiency of established pasture and hay land and for the protection of ground water resources.
7. Magnesium will be recommended when the soil test indicates a low or very low level. Use dolomitic lime as a liming material when magnesium is recommended AND when lime is needed to correct soil acidity. The magnesium (Mg) recommendation is expressed as elemental Mg when lime is not required.
10. A number of vegetable crops have a starter phosphorus recommendation (expressed as phosphate or P2O5) of 20 pounds per acre. This includes beans, peas, eggplant, and okra. If soil test FIV-P is 150 or greater, phosphorus risk assessments (Phosphorus Site Index [PSI] and/or Phosphorus Management Tool [PMT]) must first be conducted to determine if starter phosphorus is allowed.
11. A number of vegetable crops have a starter phosphorus recommendation (expressed as phosphate or P2O5) of 25 pounds per acre. This includes sweet potatoes, many members of the Brassica genus - broccoli, collards, cabbage, Chinese cabbage, kale, kohlrabi, Brussels sprouts, cauliflower), onions, cucurbits (cucumbers, melons, squash, pumpkins and watermelons). If soil test FIV-P is 150 or greater, phosphorus risk assessments (Phosphorus Site Index [PSI] and/or Phosphorus Management Tool [PMT]) must first be conducted to determine if starter phosphorus is allowed.

Notes

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20. A number of vegetable crops have a starter phosphorus recommendation (expressed as phosphate or P2O5) of 50 pounds per acre. This includes asparagus, peppers, white potatoes, spinach and tomatoes. If soil test FIV-P is 150 or greater, phosphorus risk assessments (Phosphorus Site Index [PSI] and/or Phosphorus Management Tool [PMT]) must first be conducted to determine if starter phosphorus is allowed.
27. If soil test FIV-P is 150 or greater, a phosphorus risk assessment (Phosphorus Site Index [PSI] or Phosphorus Management Tool [PMT]) must first be conducted to determine if a starter containing phosphorus is allowed. A starter may be beneficial in stimulating early plant growth, especially on cold, wet soils. A good starter fertilizer should supply 20-30 lbs/A of N, P2O5, and K2O.
28. Proper timing of nutrient applications is important. Apply nutrient sources as close to planting or nutrient demand as possible so that nutrients are absorbed by plants quickly and not allowed to runoff into surface water or leach into ground water.
53. (See related 70, 71, 88 & 89) For the maintenance of fescue (not accumulated for late fall/winter grazing), orchardgrass or reed canarygrass (4 tons per acre yield goal), the TOTAL nitrogen recommendation ranges from 150-200 lbs per acre. Topdress 35-50 lbs per acre at greenup. In addition, topdress 40-50 lbs per acre after the first harvest, 35-50 lbs in late summer, and 40-50 lbs per acre in late fall.
60. If the nitrogen requirement is met by surface broadcasting UAN either prior to or at planting, use of proven urease and nitrification inhibitors is recommended to minimize nitrogen loss via volatilization and/or denitrification pathways.
62. For cut flowers [medium (N) feeders], the N recommendation ranges from 1.5-2 lbs N per 1000 square feet.
70. For the maintenance of fescue (not accumulated for late fall/winter grazing), orchardgrass or reed canary grass (5 tons per acre yield goal), the TOTAL nitrogen recommendation ranges from 200-250 lbs per acre. Topdress 60-80 lbs per acre at greenup. In addition, topdress 50-60 lbs per acre after the first harvest, 50-60 lbs per acre in late summer, and 40-50 lbs per acre in late fall.
71. For the maintenance of fescue (not accumulated for late fall/winter grazing), orchardgrass or canary grass (6 tons per acre yield goal, and up), the TOTAL nitrogen recommendation ranges from 250-300 lbs per acre. Topdress 80-100 lbs per acre at greenup. In addition, topdress 65-75 lbs per acre after the first harvest, 65-75 lbs per acre in late summer, and 40-50 lbs per acre in late fall.

Notes

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88. For the maintenance of fescue (not accumulated for late fall/winter grazing), orchardgrass or reed canarygrass (up to 2 tons per acre yield goal), the TOTAL nitrogen recommendation ranges from 75-100 lbs per acre. Topdress 35-50 lbs per acre after the first harvest. In addition, topdress 40-50 lbs per acre in late fall.
89. For the maintenance of fescue (not accumulated for late fall/winter grazing), orchardgrass or reed canarygrass (3 tons per acre yield goal), the TOTAL nitrogen recommendation ranges from 100-150 lbs per acre. Topdress 30-50 lbs per acre after the first harvest. In addition, topdress 30-50 lbs per acre in late summer and 30-40 lbs in late fall.
90. For swiss chard and beets, the total nitrogen recommendation is 75-100 lbs/acre. Broadcast and disk in 50 lbs/acre before planting, and sidedress 25-50 lbs/acre 4-6 weeks after planting.
92. If UAN is dribbled or streamed on the soil surface, use a proven urease inhibitor to help minimize nitrogen loss via volatilization.
93. If nitrogen source is granular urea, use a proven urease inhibitor to help minimize loss via volatilization.
101. Direct application of raw manure is not recommended for vegetable or herb crops other than sweet corn. If raw manure application is intended for a field that will be planted with vegetable or herb crops other than sweet corn, it should be applied and incorporated just prior to establishing a cover crop the previous fall, at rates that will not exceed the cover crop utilization of nutrients that fall.
103. Well-composted manure may be applied directly to all vegetable crops, if it is incorporated prior to planting the crop.
121. Calcium (Ca) may be deficient in some soils that have not been properly limed, where excessive potash fertilizer has been used, and/or where crops are subjected to drought stress.
122. Magnesium (Mg) may become deficient in some soils used for vegetable production. Dolomitic or high-magnesium limestones should be used when liming soils that are low in magnesium. Magnesium should be applied as a fertilizer source (e.g. epsom salts, sulfate of potash-magnesia, kieserite, brucite, etc.) on low-magnesium soils where lime is not needed. Magnesium may be applied as a foliar spray to supply magnesium to the crop in emergency situations.

Notes

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- 161. Using good tillage practices, winter cover crops, and periodically resting the land with the use of summer cover crops between vegetable plantings, are essential to prevent the deterioration of soil structure that is vital for maintaining high levels of production.

- 164. For snap beans, the total nitrogen recommendation is 40-80 lbs/acre. Broadcast and disk in 20-40 lbs/acre before planting, and band 20-40 lbs/acre with the planter.

- 166. For broccoli, the total nitrogen recommendation is 150-200 lbs/acre. Broadcast and disk in 50-100 lbs/acre before planting, sidedress 50 lbs/acre 2-3 weeks after planting, and sidedress 50 lbs/acre 4-6 weeks after planting.

- 170. For carrots, the total nitrogen recommendation is 50-80 lbs/acre. Broadcast and disk in 50 lbs/acre before planting, and sidedress 25-30 lbs/acre if needed.

- 177. For leaf lettuces including endive, ecarole, arugula, radicchio, and others, as well as basil and oregano, the total nitrogen recommendation is 100-125 lbs/acre. Broadcast and disk in 50-75 lbs/acre before planting and sidedress 25-50 lbs/acre 3-5 weeks after planting.

- 184. For each yield goal, the combined nitrogen (N) from the split applications must not exceed the maximum total N recommendation.

- 185. The late summer topdress application for fescue, orchardgrass, reed canarygrass, bromegrass, timothy, and perennial ryegrass, should be applied between mid-August and early September, depending on sufficient rainfall to move the nitrogen into the soil.

- 186. Late fall nitrogen application (mid- to late October in the mountains of western Maryland and late October to mid-November elsewhere in Maryland, (approximately the killing frost date) stimulates root growth and leads to a more vigorous stand. This application must be a commercial nitrogen source where all N is readily available. Manure or other organic sources of nitrogen are not recommended for the late fall application. If late fall application is not made, add 40-50 lb.N/acre to the greenup application.

- 192. For onion bulbs, the total nitrogen recommendation is 75-100 lbs/acre. Broadcast and disk in 50-75 lbs/acre before planting, and sidedress 25-50 lbs/acre 4-5 weeks after planting.

- 198. For peppers, the total nitrogen recommendation is 100-180 lbs/acre. Broadcast and disk in 50 lbs/acre before planting, sidedress 50 lbs/acre after first fruit set, and sidedress 25-80 lbs/acre later in the season if needed.

Notes

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<p>200. For white potatoes on loams & silt loams, the total nitrogen recommendation is 125-150 lbs/acre. Broadcast and disk in 50 lbs/acre before planting, and band place 75-100 lbs/acre with the planter.</p> <p>202. For winter squash, pumpkins and pumpkin squash, the total nitrogen recommendation is 50-100 lbs/acre. Broadcast and disk in 25-50 lbs/acre before planting, and sidedress 25-50 lbs/acre when vines start to run.</p> <p>206. For spinach (spring or fall), the total nitrogen recommendation is 100-155 lbs/acre. Broadcast and disk in 50-75 lbs/acre before planting, sidedress or topdress 25-40 lbs/acre, and topdress an additional 25-40 lbs/acre after cutting (This recommendation assumes that 2 cutting will be obtained. For 3 cuttings of spinach, topdress an additional 25-40 lbs Nitrogen/acre after the second cutting for total recommendation of 100-195 lbs Nitrogen/acre).</p> <p>216. For tomatoes (fresh market), on loams & silt loams, and Garden Huckleberry, the total nitrogen recommendation is 50-80 lbs/acre. Broadcast and plow down 50 lbs/acre, sidedress 25-30 lbs/acre when first fruits are set if needed.</p>			

MDA'S

NUTRIENT APPLICATION

REQUIREMENTS

NUTRIENT APPLICATION REQUIREMENTS

Source: Maryland Department of Agriculture 2016
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 15.20.08.05H and .05I

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.
 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. Nutrient application is prohibited when the soil is saturated, when the ground is covered with snow greater than one inch, or when the ground is hard-frozen greater than two inches.
 3. Organic nutrient sources shall be injected or incorporated as soon as possible, but no later than 48 hours after application, except those farm operations that choose to manage their farms to obtain the benefits of no-till farming will not be required to incorporate.
 - a. MDA reserves the right to require incorporation of organic nutrient sources on a case by case basis.

C. Fall Application (September 10 through December 15)

1. 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.

2. 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 2(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 2(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) A person may make a fall-application on pasture land, hay-land or other acreage under vegetative cover.

(ii) Organic nutrient sources shall be injected or incorporated as soon as possible, but no later than 48 hours after application, except those farm operations that choose to manage their farms to obtain the benefits of no-till farming will not be required to incorporate.

(a) MDA reserves the right to require incorporation of organic nutrient sources on a case by case basis

(iii) 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 no later than November 15; and

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

(v) 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.

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

(vii) Nutrient application is prohibited when the soil is saturated, when the ground is covered with snow greater than one inch, or when the ground is hard-frozen greater than two inches.

3. Emergency Situations

Applications required in emergency situations due to an 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 (December 16 through February 28 of the following year)

1. 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.

2. 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. Operators and generators of organic nutrient sources shall make plans for adequate storage to eliminate the need for a winter application before deadlines described in III. E.

d. 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 greater than one inch or when the ground is hard-frozen greater than two inches.

(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 or 50# of plant available nitrogen per acre for the next harvested crop. Any winter applied nutrients will be deducted from the recommendations of the next harvested crop.

(v) Winter applications shall be made on existing vegetative cover, small grain crops, or established hay fields and pastures and maintained as such until March 1st .

(vi) A setback of at least 100 feet from all surface waters shall be maintained, unless best management practices providing water quality protection equivalent to such a setback are in place. (Surface water is defined as any permanent or intermittent, continuous, physical conduit for transporting water. Shovel ditches and water leads are not included as surface waters for purposes of this policy.

(vii) Applications required in emergency situations due to an imminent overflow of a storage facility from on farm generated organic fertilizer 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. Operators will be required to enter into an agreement of intent with the Soil Conservation District or private entity that is a certified Technical Service Provider approved by NRCS.

E. Prohibition against Winter Application

1. Except as provided in subsections E.2 and, E.3 and E.4, 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 plant with a design flow capacity of less than 0.5 million gallons per day.

b. This exception to the general prohibition referenced in subsection 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.

4. Applications required in emergency situations due to an imminent overflow of a storage facility from on farm generated organic fertilizer shall be managed AS PROVIDED IN III D.2 [and] in consultation with the Maryland Department of Agriculture. Operators in such situations shall contact the MDA regional nutrient management representative for guidance. Operators will be required to enter into an agreement of intent with the Soil Conservation District or private entity that is a certified Technical Service Provider approved by NRCS.

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.

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.

RECORDKEEPING

APPLICATION VARIANCES

INSPECTION



MARYLAND NUTRIENT MANAGEMENT PROGRAM

Agricultural Operation Record Keeping Requirements

(January 2003)

The Maryland Nutrient Management Program (MNMP) has developed a new record keeping system, which enables operators to evaluate crop management and nutrient management decisions, and helps consultants make more accurate nutrient recommendations. Included in the new system is a *Field-By-Field Nutrient Application Record* form, a *Grain Yield Calculation* sheet and a *Forage Yield Calculation* sheet.

According to the Water Quality Improvement Act (WQIA) of 1998, the application of nutrients on a farm operation must be documented, and certain records must be maintained by the operator for either 3 or 5 years (See Table 1). It may, at times, be necessary to make these records available to a Maryland Department of Agriculture (MDA) Nutrient Management Specialist when he/she evaluates the implementation of a nutrient management plan.

Table 1.

<p>For 3 years, the following records/plan information must be kept:</p> <ul style="list-style-type: none">➤ Nutrient management plan prepared by certified consultant➤ Receipts for nutrients purchased➤ Manure analysis laboratory report and management information (if applicable)➤ Soil analysis laboratory report➤ Documentation of field-by-field nutrient quantity, rates, timing, type and analysis➤ Documentation justifying past revisions or adjustments to the nutrient management plan <p>For 5 years, the following records must be kept:</p> <ul style="list-style-type: none">➤ Crop yields and support of crop yield data each year for 5 years <p>For nurseries or out -of-ground producers, the following records must be kept:</p> <ul style="list-style-type: none">➤ Description of production cycles and nutrients applied, description of substrate, analysis of organic materials used as a source of nutrients in the substrate, and any monitoring information on run-off testing➤ Documented nutrient use for crops without yield goals

In addition to documenting nutrient applications, it is important to document any adjustments to the nutrient management plan. These adjustments include:

- Change in land base
- Change in crops
- Change in nutrient source
- Change in the number of animals
- Change due to manure analysis

Some adjustments are beyond the operator's control, however they still must be documented. These kinds of adjustments include:

- Natural disasters
- Animal mortality or disease
- Economic factors (market changes)
- Weather

Field-by-Field Nutrient Application Record Form

On the new *Field-by-Field Nutrient Application Record* form, operators can easily document the application of nutrients on their farm operations, and account for each farm that they manage on an annual basis. Operators can also keep track of one or more fields that are planted with the same crop and managed similarly.

This form contains two separate areas for recording nutrient applications based on either the same field with different crops in a cropping year or different fields with different crops or management considerations. Each nutrient application can be documented by date, or if the applications are similar, multiple applications can be recorded with several dates on one row.

Other information recorded on this form include the application type (such as chemical fertilizer, animal manure or bio-solids), analysis, rate, total amount applied, method of application and acres applied. Lime application can also be recorded on this form although it is not required by the regulations. Operators can also record any notes specific to the application activity as needed.

Copies of the *Field-by-Field Nutrient Application Record* form can be made by the operator or obtained by contacting the MNMP. Questions regarding this form, record keeping in general or the MNMP can be directed to the county's Extension Agent in Agricultural Science or MDA's Nutrient Management Program at 410-841-5959.

Grain and Forage Yield Calculation Sheets

Two other forms that have been developed by the MNMP are the *Grain Yield Calculation Sheet* and *Forage Yield Calculation Sheet*. These two forms are designed to help operators estimate their crop yields.

Yield information is based on each farm by crop per year. Multiple fields having similar soil characteristics and management for growing a particular crop can be combined to obtain a representative yield. The harvest of a crop can be documented on one or more dates and be based on a similar unit of weight for hay and percent moisture for grain. Once all of the crop harvest information is final, calculations are provided to determine yield estimates.

Grain factors are provided based on information from the University of Maryland Extension and the Penn State Agronomy Guide. On the bottom of each sheet there is a reminder to operators to include determined yields into their nutrient management plan record keeping requirements.

Field-By-Field Nutrient Application Record Form

Definitions

Farm Name: Name of the farm receiving nutrients, lime or pesticides.

Operator: Name of the person who manages the agricultural operation.

Year: The year in which nutrients have been applied.

Field or Field Strips: An area sharing common characteristics, including soil type, nutrient content and plant type or crop produced, such that the nutrients can be recommended and managed in a uniform and consistent manner.

Crop: Primary and/or cover crop grown.

Acres: Total acres representative of the crop grown.

Actual Yield: Crop yield achieved at the time of crop harvest.

Application Date: The date that the nutrient application was made. Any information recorded on the form will be relative to this date.

Nutrient Type: The type of nutrient application such as commercial fertilizer (ammonium nitrate, etc.), animal manure (dairy, beef, etc.), biosolids (lime stabilized, anaerobically digested, etc.), or lime made on the application date. Use additional rows for multiple types of applications on the same date.

Analysis N-P-K: The chemical composition of the applied material as reported by a credited laboratory, or the product label measuring the percentage of nitrogen, phosphorus and potassium.

Application Rate (per acre): Rate of nutrient application measured in wet tons or gallons.

Total Amount Applied: The total quantity of nutrients applied; measured in wet tons or gallons per acre.

Application Method: The method in which the nutrient application is made, such as surface application, surface with incorporation and injection.

Acres Applied: The total number of acres that received the nutrient application.

Notes: Any specific information or occurrences useful for future management of a particular field including notation of variation from NMP recommendations.

FIELD BY FIELD NUTRIENT APPLICATION RECORD

January-03

FARM NAME: _____

OPERATOR: _____

YEAR: _____

FIELD ID/CROPPING INFORMATION:

Field or Field Strips:		Crop:	Acres:	Actual Yield:		
Application Types:		Fertilizer, Animal Manure, Biosolids, Lime				
<i>Application Date</i>	<i>Nutrient Type</i>	<i>Analysis N-P-K</i>	<i>Application Rate Per Acre</i>	<i>Total Amount Applied</i>	<i>Application Method</i>	<i>Acres Applied</i>
Notes:						

Field or Field Strips:		Crop:	Acres:	Actual Yield:		
Application Types:		Fertilizer, Animal Manure, Biosolids, Lime				
<i>Application Date</i>	<i>Nutrient Type</i>	<i>Analysis N-P-K</i>	<i>Application Rate Per Acre</i>	<i>Total Amount Applied</i>	<i>Application Method</i>	<i>Acres Applied</i>
Notes:						

All records on this sheet, except for lime information, is required for Nutrient Management Regulations

GRAIN YIELD CALCULATION SHEET

(April 2001)

Farm: _____

Year: _____

Field/Mgmt Unit: _____

Crop: _____

Date(s)	Ticket #(s)	% Actual Moisture	Grain Harvested (lbs)	Acres Harvested

% Average Moisture	Total Grain Harvested (lbs)	Total Acres Harvested

GRAIN FACTORS

Crop	Grain Factor (lbs/bu)	% Standard Storage Moisture
Shelled Corn	56	15.5
Ear Corn	*70	15.5
Soybeans	60	13
Wheat	60	12.5
Barley	48	12.5
Rye	56	12.5
Oats	32	12.5

*Factor is derived from the 1999-2000 Penn State Agronomy Guide
 All other factors are derived from the University of Maryland Cooperative Extension (1997)

GRAIN YIELD CALCULATION

$$\frac{\text{(Total Grain Harvested / Grain Factor)} \times (100 - \% \text{ Average Moisture})}{(100 - \% \text{ Standard Storage Moisture})} = \text{Total bu/field}$$

$$\frac{\text{Total bu/field}}{\text{Total Acres Harvested}} = \text{Grain Yield (bu/acre)}$$

Total bu/field

Grain Yield (bu/acre)

IMPORTANT:

- *Attach all weight tickets and/or receipts to this sheet*
- *Yield information on this report page needs to be retained for 5 years*
- *Multiple fields should be recorded together as one management unit if similar crop management practices/harvesting were done*
- *Information on calculating yields for corn silage can be obtained from your county Cooperative Extension office*

FORAGE YIELD CALCULATION SHEET

(April 2001)

Farm: _____

Year: _____

Field/Mgmt Unit: _____

Crop: _____

Date(s)	Bale Description	Number of Bales	Average Bale Weight (lbs)	Acres Harvested

Total Number of Bales	Total Average Bale Weight (lbs)	Total Acres Harvested

FORAGE YIELD CALCULATION

Total Number of Bales X Total Average Bale Weight = Total lbs Harvested

$\frac{\text{Total lbs Harvested}}{\text{Total Acres Harvested}} = \text{lbs/acre}$

$\frac{\text{lbs/acre}}{2000 \text{ (lbs/ton)}} = \text{Forage Yield (tons/acre)}$

Total lbs Harvested

lbs/acre

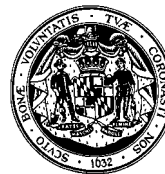
Forage Yield (tons/acre)

IMPORTANT:

- Yield information on this calculation sheet must be retained for 5 years
- Remember to record all cuttings made on any given field or management unit
- Harvesting moisture is assumed to be 12-18% (University of Maryland Cooperative Extension estimate)
- Information on calculating yields based on the volume of a storage facility (silo, bunker, agr. Bag) can be obtained from your county Cooperative Extension office
- Multiple fields should be recorded together as one management unit if similar crop management practices/harvesting were done

Maryland Nutrient Management Program
**Variance for Commercial Fertilizer
Nutrient Application**

(August 2004)



Occasionally operators may need to group a number of fields within a close level (short range) of soil fertility and prepare a fertilizer blend for each group rather than field specific nutrient recommendation rates developed by the software programs. This guidance document will be used by MDA Nutrient Management Program Specialists during an implementation evaluation to evaluate the degree of variance between planned recommendation rates and actual applied rates for operators using commercial fertilizer sources.

Variance in Nutrient Application Rates for Commercial Fertilizer

Nitrogen:

Total application of commercial nitrogen should not exceed the recommended rate by more than #10/acre. Any rate over the recommended rate or the 10#/acre must be justified and is subject to be in non-compliance.

Phosphorus and Potassium

Recommended rates of commercial phosphorus and potassium can be applied at one rate when the plan recommends various rates for different fields. When using a blended fertilizer material containing phosphorus and potassium, the combined rates **cannot exceed** the phosphorus requirements. The following guidance should be used when evaluating the grouping of recommended nutrient rates.

Phosphorus

Maryland soil test FIV's will be used as a guide for what recommended rates can be grouped at one rate. Any soil test FIV's for phosphorus with the same rating (example: low, medium, optimum) can be managed at one rate. The rate should not exceed the highest recommended rate given in your nutrient management plan for that crop in that soil test range. The rate **cannot** exceed the upper limit of the nutrient recommended for that crop and yield goal within that soil test range, given in the Maryland Nutrient Management Manual, Section I-B1 and I-B2. (See two examples below)

Example 1: An operator has 3 corn fields with a yield goal of 140 bushel/acre. The three fields all have different rates of phosphorus recommendations from NuMan. Field 1 recommends #30/acre, field 2 recommends #50/acre, and field 3 recommends #0/acre. Any of these three fields with the same soil test FIV rating can be grouped together and applied at one rate, not to exceed the upper limit recommended within the plan for these crops in the given soil test FIV range. Fields 1 & 2 have a recommendation of #30 and #50/acre and have a soil test FIV rating of medium. Therefore fields 1 and 2 can be applied at the same rate, of up to #50 (the highest recommended rate). Field 3's recommendation is #0/acre, with an excessive soil test FIV rating, and cannot be grouped with fields 1 & 2. Field 3 would be allowed a starter fertilizer of up to #30/acre (provided the P-FIV is less than 150 or a P-Site evaluation has been done) however, the operator **cannot** exceed this rate.

The consultant or person grouping the fields should stay within the lower range when grouping recommendations for one rate when a high range is provided in the manual.

Example 2: An operator again has 3 corn fields with a yield goal of 140 bushel/acre. The three fields all have different rates of phosphorus recommendations from NuMan. Field 1 recommends #120/acre, field 2 recommends #130/acre, and field 3 recommends #70/acre. According to the Maryland Nutrient Management Manual, Section I-B1, these three fields all have the same soil test FIV rating of Low and could be grouped together. However, MDA suggests that the fields be grouped together within the particular range as close to the recommendation as possible. In this case, field 3 should be treated separate from fields 1 and 2 since the FIV range of field 3 is almost half the recommendation of fields 1 and 2. Fields 1 and 2 can be grouped together not to exceed #130/acre.

Potassium Requirement #1

The same guidance of grouping fields together is used for potassium. Any fields with the same soil test FIV ratings for potassium can be managed at one rate. The rate should not exceed the highest recommended rate given in your nutrient management plan for that crop in that soil test range.

Potassium Requirement #2

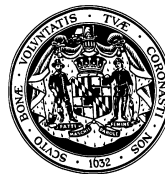
If the operator has recommended rates of potassium that are lower than what can be achieved because of equipment limitations or product availability, they may apply **up to** the recommended rates of that crop and the crop to follow (will require a 2 year crop plan). However, the operator **must** account for the over application with the following crop.

Example: The operator has a recommendation for #30/acre of potassium for their soybean crop, however, they are unable to achieve this rate based on equipment limitations. They plan to follow this crop with wheat/beans which has a recommendation for #60/acre potassium. Therefore the operator may apply **up to** #90/acre potassium at anytime during that 2 year/2 crop rotation. This is only if the operator has equipment limitation issues. If there are no equipment limitations, the operator will need to follow Requirement No. 1.

All applications of nutrients and any reasoning for exceeding the recommended plan rates must be documented. Any applications that exceed the above guidance are subject to be in non-compliance unless prior approval has been granted by the Department.

Maryland Nutrient Management Program Variance for Animal Manure Nutrient Application

(August 2004)



Many operators throughout the state apply some form of animal manures to their fields to help meet crop nutrient requirements. Realizing the tremendous variability within organic nutrient sources such as the type of material, nutrient content, composition, along with various other factors such as equipment limitations, application methods and operator judgment, the following guidance was developed. This guidance document will be used by MDA Nutrient Management Program Specialists to evaluate past animal manure nutrient applications during a plan implementation review of a farm.

Variance in Nutrient Application Rates for Animal Manures

Nitrogen-based Plan: 10#/acre maximum allowance for nitrogen application *(per field)*

Operators who have over applied their animal manure based on the organic N recommended rate for any field, and **have not** met their total crop N requirement through the application of animal manure, will need to make the necessary adjustments in their commercial N recommended rate prior to applying commercial N. The total N application (organic and commercial) should not exceed the total recommended N rate for any field in the plan by more than 10#/acre. Any nutrient application over the recommended rate or the 10#/acre allowance must be justified and is subject to be in non-compliance.

Example:

A dairy producer's plan recommends 140 lbs/acre of Nitrogen for a particular field which will be planted in corn. The plan recommends 5,000 gal/acre of liquid dairy manure along with 40 lbs/acre of commercial N to meet the 140 lbs/acre N recommendation for that field. Due to an error in application, the operator actually applied 6,000 gal/acre. Because of this error, the operator will now need to adjust their commercial N application accordingly. Assuming the liquid dairy manure provided 20 lbs of PAN per 1000 gallons, the operator would need to reduce their commercial N application rate to 20 lbs/acre instead of the original 40 lbs/acre.

Nitrogen and Phosphorus-based plan: 10% maximum variance for N and P application *(per field)*

Operators who intend to meet the total crop N requirement in a field through the application of animal manures, or those operations that are applying to fields restricted to a P- based planning rate (FIV 150 or over and P-Site Index completed), should not exceed the total recommended rate by more than 10 percent. Any rate over the recommended rate, or the 10 percent variance, must be justified and is subject to be in non-compliance.

Example:

A poultry producer's plan recommends 140 lbs/acre of Nitrogen for a particular field which will be planted in corn. The plan recommends 3 tons of poultry litter/acre to meet the 140 lbs/acre N recommendation for a field, or is under a P-based plan restriction of 3 tons of litter/acre. The operator will need to keep their total organic nutrient application rate within 10% of the recommended rate. In this scenario, they would be allowed up to 3.3 tons/acre. This variance is given for equipment variability and possible operator error.

All applications of nutrients must follow the guidelines and standards documented in the *Maryland Nutrient Management Manual* Section I - Nutrient Recommendations, D - Timing of Nutrient Application. Any reasoning for exceeding the recommended plan application rates must be documented. Any applications of nutrients that exceed the above guidance are subject to be in non-compliance unless prior approval has been granted by the Department.

Note: This guidance document does not serve as a tool for those operations using biosolids as a nutrient source. The application of biosolids as a crop nutrient source is regulated under the Maryland Department of the Environment sewage sludge regulations. However, MDA does have planning guidance for the application of biosolids in the *Maryland Nutrient Management Manual* Fact Sheet Series # 6 entitled Nutrient Management Planning Guidance for Biosolid Use.



Maryland Department of Agriculture

Office of Resource Conservation

Larry Hogan, Governor
Boyd Rutherford, Lt. Governor
Joseph Bartenfelder, Secretary
Mary Ellen Setting, Deputy Secretary

Nutrient Management Program

The Wayne A. Cawley, Jr. Building
50 Harry S. Truman Parkway
Annapolis, Maryland 21401
www.mda.maryland.gov

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410.841.5959 Baltimore/Washington
410.841.5950 Fax
800.492.5590 Toll Free

Plan Implementation Review Process for Operators

(September 2007, updated September 2015)

This document explains the process of a nutrient management plan implementation review and provides the operator with information about preparing for a review.

Selection Method

Nutrient management specialists either randomly select an operation for a review, arrange a review in response to a complaint, schedule a follow-up to a previous review, and/or to discuss questions /concerns with submitted AIRs or other non-compliance issues.

Notification

Nutrient management specialists notify the selected operator by letter or telephone to schedule a plan implementation review. The letter may propose a given date and time to visit at the operation site. MDA may provide the operator the option to confirm or reschedule the meeting date and/or location for the operator's convenience.

Operator Requirements

A specialist from the MDA nutrient management program will conduct the review. The operator must make available for review the current **and** two prior years' nutrient management plans and any records associated with these plans. The specialist will randomly select one or more year's worth of plans and associated records, and compare them against nutrient application records and fertilizer receipts. The specialist will examine several fields or management units representative of the operation. P-Site Index calculations and implementation of any resulting best management practices will be verified. Following the review, the specialist will give the operator a copy of the plan implementation evaluation report which will include any necessary follow-up action.

Use these checklists to prepare for your Nutrient Management Plan Implementation Review.

Necessary Records (retain for 3 years):

From All Nutrient Management Plans for the Operation

- Updated operation information used for required reporting to MDA
- Operation map or aerial photo
- Soil analysis results (original lab test results)
- Manure analysis and management information (if applicable, original lab test results)
- Summary nutrient recommendations (by field and specific to the crop)
- Phosphorus Site Index calculations (if applicable)
- Required Best Management Practices (for P-Site Index only)

From Actual Implementation Records

- Nutrient Type(s)** Type of nutrients applied such as fertilizer, animal manure, biosolid, etc.
- Analysis/Nutrient content** N-P-K analysis of nutrients applied
- Rates & Quantity** Pounds, gallons, or tons applied per acre and total amount applied per total crop acres per timing period
- Application Timing & Method** Date(s) applied and method such as banded, sidedress, topdress, etc.
- Manure Management Information:** Manure type, date of removal from production and/or storage facility, location stored, where applied, name and location of receiver if moved off-site, and quantity estimate
- Actual Yield:** Specific field or management unit yield information **for the last 5 years**
- Applicator voucher or certificate number:** Individual(s) applying or supervising application of nutrients on the operation
- Receipts for nutrients purchased:** Receipts for all nutrients purchased and applied (all organic and inorganic sources)

Management Changes and Plan Modifications during Implementation

Management changes or unforeseen circumstance in an agricultural operation may require the operator to modify or update a plan before its expiration. Any revisions to the plan by a certified consultant or certified operator must be justified, documented and included in the records.

Questions?

Contact your local MDA regional office.

REGIONAL OFFICES

Region 1: GARRETT, ALLEGANY, and WASHINGTON COUNTIES

Keith Potter, Nutrient Management Specialist

Tel: 301-777-1747 (x 116)

12407 Naves Cross Road, N.E., Cumberland, MD 21502

keith.potter@maryland.gov

Fax: 301-777-7632

Region 2a: FREDERICK

Moana Himes, Nutrient Management Specialist

Tel: 301-694-9290 (x136)

92 Thomas Johnson Drive, Suite 110, Frederick, MD 21702

moana.himes@maryland.gov

Fax: 301-694-5744

Region 2b: HOWARD and MONTGOMERY COUNTIES

Jessica James, Nutrient Management Specialist

Tel: 301-694-9290 (x137)

92 Thomas Johnson Drive, Suite 110, Frederick, MD 21702

jessica.james@maryland.gov

Fax: 301-694-5744

Region 3a: ANNE ARUNDEL, CARROLL, and PRINCE GEORGE'S COUNTIES

Adam Lyon, Nutrient Management Specialist

Tel: 410-841-5949

50 Harry S. Truman Parkway, Suite 201, Annapolis, MD 21401

adam.lyon@maryland.gov

Fax: 410-841-5950

Region 3b: CHARLES, CALVERT, and ST. MARY'S COUNTIES

Weylin Anderson, Nutrient Management Specialist

Tel: 301-475-8402 (x 122)

26737 Radio Station Way, Suite B, Leonardtown, MD 20650

weylin.anderson@maryland.gov

Fax: 301-475-8391

Region 4: BALTIMORE, HARFORD, and CECIL COUNTIES

Darren Alles, Nutrient Management Specialist

Tel: 410-838-6181 (x118)

2205 Commerce Road, Suite C, Forest Hill, MD 21050

darren.alles@maryland.gov

Fax: Not available at this time

Region 5a: KENT, QUEEN ANNE'S, and TALBOT COUNTIES

Howard Callahan, Nutrient Management Specialist

Tel: 410-822-8126

28577 Mary's Court, Suite 4, Easton, MD 21601

howard.callahan@maryland.gov

Fax: 410-822-8353

Region 5b: CAROLINE, and DORCHESTER COUNTIES

Dan Schwaninger, Nutrient Management Specialist

Tel: 410-822-8120

28577 Mary's Court, Suite 4, Easton, MD 21601

dan.schwaninger@maryland.gov

Fax: 410-822-8353

Region 6: WICOMICO, SOMERSET, and WORCESTER COUNTIES

Steven Dorsey, Nutrient Management Specialist

Tel: 410-677-0802 (x 4)

27722 Nanticoke Road, Unit #2, Salisbury, MD 21801

steve.dorsey@maryland.gov

Fax: 410-543-6660

**GENERAL PRINCIPLES
OF
NUTRIENT
MANAGEMENT**



General Principles of Nutrient Management

Both farm profitability and water quality can be improved through efficient nutrient use. Manure and biosolids should be considered valuable fertilizer materials and managed in the same manner as commercial fertilizers. Soil testing is very important for the development of nutrient application rates.

Please refer to the appropriate issue of the *Nutrient Manager* (the newsletter of the *University of Maryland Extension Agricultural Nutrient Management Program*) for more information on soil testing, nitrogen, phosphorus, potassium, sulfur, and pH and liming.

I. Nutrient Recommendations

A) Nitrogen:

- 1) Nitrogen recommendations for many crops are based on yield goals for those crops. It is important to establish realistic yield goals for each field based upon historical yield data (the average yield for the best 3 out of the last 5 years, 6 of 10, etc.).
- 2) Recommended application rates for nitrogen should not be exceeded.
- 3) The use of the Pre-Sidedress Nitrogen Test (PSNT) is recommended in the early summer after forage legumes or manure and biosolids applications to corn in order to determine if additional nitrogen is needed.
- 4) Residual values for nitrogen available from legumes in rotation or previous applications of manure or sludge are deducted from gross nitrogen recommendations.
- 5) Growing a winter cover crop is a very effective practice for reducing nitrate losses from cropland during a time of the year when leaching potential is high.

B) Phosphorus and other nutrients:

- 1) Recommendations for phosphorus, potassium and micronutrients are based on soil test values, yield goals and crop rotation. When soil test levels are high, additional nutrients, other than an in-row starter fertilizer, are not recommended for most crops.
- 2) Soil pH influences nutrient availability, particularly phosphorus. Soil pH should be adjusted to the level recommended for the crop to be grown.

II. Recommendations for application of all nutrient sources

A) Proper timing of nutrient applications is important. Apply nutrient sources as close to planting or nutrient demand as possible so that nutrients are taken up by plants quickly and not allowed to runoff into surface water or leach into ground water.

B) Avoid application of nutrient sources to frozen ground and during periods of high potential for leaching and runoff. Application in late fall or winter of any nitrogen source for a spring-planted crop should be avoided whenever possible.

C) Avoid application of nutrient sources to sensitive areas, wetlands, sinkholes, and steep slopes.

D) Calibrate nutrient application equipment accurately to insure that recommended rates are applied. Accurate and uniform applications of nutrients are necessary to maximize the nutrient potential of the fertilizer materials.

III. Recommendations for Manure Applications

A) *Testing:*

1) Manures vary tremendously in nutrient content depending upon animal species, rations, and storage conditions. The nutrient content of manure can be determined through laboratory testing.

2) Whenever possible manure should be sampled at least 6 weeks before planned application to allow time for analysis and plan development.

3) A consistent baseline for nutrient content may be established and based on analyses taken at least twice a year until a uniform value is confirmed, and then every second year thereafter to verify its consistency. If significant changes occur, including feed, management, animals, or storage, new samples should be collected for nutrient analysis.

B) *Application of manure:*

1) Nutrient applications should be made at times of the year that will minimize N and P losses to water and N volatilization loss to the atmosphere. Crop utilization of nutrients in manure and biosolids is maximized if these materials are applied in synchrony with periods of crop uptake. Storage of manure may be necessary to facilitate appropriate timing of nutrient applications.

2) **Nitrogen-based applications of manure will cause phosphorus soil test levels to increase over time.**

3) Winter application of manure is complicated. See the section on *MDA's Nutrient Application Guidelines*, which has information from Part I-D of the **Maryland Nutrient Management Manual** for details.

4) Application recommendations for daily haul operations include consideration of slope, crop and vegetative cover.

C) *Storage capacity:*

1) Optimal utilization of nutrients in manure and other nutrient sources is difficult without the ability to store manure for part of the year. Improving storage capacity available will minimize the potential for nutrient loss or runoff and will improve the possibility of proper timing of manure applications.

2) Contact your ***Soil Conservation District*** for advice on design and cost share programs for storage structures if you do not have manure storage capacity or if you need additional storage capacity.

IV. Erosion and Runoff Control

A) *Best Management Practices* should be used to minimize soil erosion and runoff, which can carry nutrients to surface waters. Advice on soil erosion control can be obtained from your ***Soil Conservation District***.

B) *Best Management Practices* around the barnyard area may need to be updated based on current regulations to reduce likelihood of nutrient loss from the area. Consult with your ***Soil Conservation District*** for details.

C) *Phosphorus Site Index*

The addition of any P-bearing material (fertilizer or manure) to fields whose P soil test levels are greater than or equal to FIV 150 will require evaluation of the risk of P movement.

The *Phosphorus Site Index* is a tool that is used to evaluate potential risk for phosphorus movement from agricultural land to surface waters. The *Phosphorus Site Index* includes determination of the limiting nutrient (nitrogen or phosphorus) and may also require additional restrictions of P fertilizer usage.

For a *Phosphorus Site Index* evaluation of your fields or for more information on the *Phosphorus Site Index* contact your Nutrient Management Advisor.

V. Record Keeping

The **Water Quality Improvement Act of 1998** legislation requires producers to keep the following records for at least 3 years (except for #2, crop yields).

- 1) Nutrient management plans
- 2) Record of crops planted and actual yield (5 years of records needed in order to determine average)
- 3) Record of the timing, location and crop acreage of all nutrient applications
- 4) Analysis of the nutrient content of any fertilizer applied
- 5) Receipts related to the purchase of nutrients
- 6) Animal waste generation measurements and estimations
- 7) Documentation to justify any changes from the nutrient management plan as written