TITLE 35. OKLAHOMA DEPARTMENT OF AGRICULTURE, FOOD, AND FORESTRY

CHAPTER 17. WATER QUALITY

SUBCHAPTER 5. REGISTERED POULTRY FEEDING OPERATIONS

35:17-5-3. Registration, Nutrient Management Plan (NMP) required

(a) **Registration.**

(1) It shall be unlawful for any person to construct or operate a new poultry feeding operation without first registering with the State Board of Agriculture.

(2) Every poultry feeding operation shall be required to reregister annually by January 1 to operate.

(3) Any poultry feeding operation that has a valid license pursuant to the Oklahoma Concentrated Animal Feeding Operations Act shall not be required to register pursuant to the Oklahoma Registered Poultry Feeding Operations Act.

(4) The owner or operator of a poultry feeding operation not classified as a poultry feeding operation may register if the owner elects to come under the provisions of the Oklahoma Registered Poultry Feeding Operations Act and the rules of the State Board of Agriculture.

(b) **Nutrient Management Plan.**

(1) Every poultry feeding operation shall obtain or apply for an approved NMP addressing both nitrogen and phosphorus.

(2) All new operators of poultry feeding operations shall obtain or apply for a NMP prior to construction of the facility. The NMP shall be completed and implemented within one year of application.

(3) The NMP shall be prepared by USDA NRCS or an entity approved by the Oklahoma Department of Agriculture, Food, and Forestry.

(4) Plans shall be reviewed and updated at least every six (6) years from the date the NMP was obtained. Plans ~~may~~ shall also be reviewed and updated in the following circumstances:

(A) When ~~a change in~~ the Oklahoma Department of Agriculture, Food, and Forestry changes the waste utilization standards ~~occurs and upon notification by the Oklahoma Department of Agriculture, Food, and Forestry; and~~ or

(B) Upon ~~recommendation~~ notification of the Oklahoma Department of Agriculture, Food, and Forestry.

(5) ~~Plans~~ The NMP shall be updated prior to the expansion of a facility.

(6) Implementation of the NMP shall occur within ninety (90) days of receipt of the NMP unless otherwise determined by the Oklahoma Department of Agriculture, Food, and Forestry. In no event shall the poultry feeding operation land apply poultry waste in excess of the ~~current USDA NRCS 590 Standard, unless the Oklahoma Department of Agriculture, Food, and Forestry approves other~~ standards contained in Appendix A.

35:17-5-5. Nutrient Management Plan

(a) The NMP shall comply with all requirements contained in Appendix A and shall contain, at a minimum, the following:

(1) A description of poultry waste handling procedures and availability of equipment and type of equipment to be used.

(2) The calculations and assumptions used for determining land application rates.

(3) All nutrient analysis data, including soil and poultry waste testing.

(4) Legal description of lands to be used by an operation for land application.

(5) Soils map with description and type or series.

(6) Land application rates of poultry waste shall be based on the available nitrogen and phosphorus content of the poultry waste and soil test results.

(7) The procedures documented in the NMP shall ensure that the handling and utilization of poultry waste complies with the following requirements:

(A) Adequate poultry waste storage shall be provided. Poultry waste shall not be stored without adequate protection from rainfall and runoff. All new poultry feeding operations shall make provisions for storage of poultry waste prior to operating. Exceptions to storage requirements for poultry waste in emergency situations shall be granted on a case by case basis. Exceptions shall include but not be limited to allowing a contract poultry grower to take such actions as are necessary to meet requirements imposed on a grower by an integrator. However, in all situations growers shall be required to take all actions feasible to prevent pollution from stored poultry waste.

(B) Poultry waste shall not be applied to land when the ground is saturated or during rainfall events. Poultry waste shall not be applied to land when the ground is frozen or snow covered except in conformance with the NMP.

(C) Poultry waste shall only be applied to suitable land at appropriate times and rates as specified by the NMP. Runoff of poultry waste from the application site is prohibited.

(D) All practices necessary to minimize movement of poultry waste to watercourses shall be utilized and documented in the NMP.

(E) Edge of field, grassed strips shall separate water courses from runoff which may be carrying eroded soil and poultry waste.

(F) Poultry waste application shall be prohibited on land subject to excessive erosion.

(G) Land application rates of poultry waste shall provide controls for runoff as appropriate for site conditions.

(H) Poultry waste shall only be applied ~~only~~ by a certified poultry waste applicator.

(b) The NMP shall also include a method for the disposal of carcasses. The NMP shall include provisions for disposal of carcasses associated with normal mortality and shall include provisions for emergency disposal when a major disease outbreak or other emergency results in deaths significantly higher than normal mortality rates. Accepted methods of carcass disposal include:

(1) Rendering

(A) Disposal of all carcasses shall occur within a reasonable period of time as approved by the State Department of Agriculture.

(B) Storage facilities shall be sealed or have lids and maintained so as to prevent pests and odors.

(2) Burial shall only be allowed as a method of carcass disposal if no reasonable alternative exists and specific measures and practices are identified which will be utilized to protect the ground and surface waters of the State.

(3) Composting by methods as approved in the NMP.

(4) Incineration shall only be used as a method of carcass disposal if the poultry feeding operation has a valid air quality permit from the Oklahoma Department of Environmental Quality, Air Quality Division, if required.

(c) Storage and land application of poultry waste shall not cause a discharge or runoff of significant pollutants to waters of the State or cause a water quality violation to waters of the State.

(d) The operator shall notify the State Department of Agriculture within twenty-four (24) hours of a discharge.

APPENDIX B
Nutrient Management Plan Requirements

DEFINITION
Managing the amount, source, placement, form, and timing of the application of poultry litter and nutrients and soil amendments for optimum plant growth and protecting the environment.

PURPOSES
- To budget and supply nutrients for plant production.
- To properly utilize manure or organic by-products as a beneficial plant nutrient source.
- To minimize agricultural nonpoint source pollution of surface and ground water resources.
- To maintain or improve the physical, chemical, and biological condition of soil.

CRITERIA
General Criteria Applicable to All Purposes
A nutrient budget for nitrogen (N), phosphorus (P), and potassium (K) shall be developed that considers all potential sources of nutrients (Exhibit 1, Tables 1 and 2).

Realistic yield goals shall be established using guidance outlined in Oklahoma State University Extension (OSU) Fact Sheet F-2225, OSU Soil Test Interpretations (https://extension.okstate.edu/fact-sheets/osu-soil-test-interpretations.html). A realistic yield goal is generally the average of three highest yields over the last five years. Rates of nutrient application established by OSU shall be the basis for nutrient recommendations. For new crops or varieties, industry yield recommendations may be used until documented yield information is available.

Plans for nutrient management shall specify the form, source, amount, timing, and method of application for each field to achieve realistic production goals and minimize the loss of nutrients to erosion, runoff, volatilization, and leaching.

Using effluent water for irrigating crops and grasses can increase salt concentrations in the soil creating a negative impact on plant growth. OSU Factsheet PSS-2245 (https://extension.okstate.edu/fact-sheets/using-lagoon-effluent-as-fertilizer.html) contains guidance for irrigating with effluent water.

SOIL AND TISSUE SAMPLING LABORATORY ANALYSIS (TESTING)
Nutrient planning shall be based on current soil test results developed in accordance with OSU guidance.

Soil samples shall be taken at least as often as the Registered Poultry Feeding Operations Act requires. Non-cultivated fields should be sampled during the dormant season. Fields used for cultivation should be sampled after harvest or before planting. Do not sample immediately after lime, fertilizer, or manure applications. Soil sampling shall occur prior to the first land application of the calendar year.

The OSU County Extension Service Office is available to assist with the soil testing process. Additional information concerning soil sampling can be found in the OSU Extension Fact Sheet F-2207, How to Get a Good Soil Sample (https://extension.okstate.edu/fact-sheets/how-to-get-a-good-soil-sample.html).

If a soil test laboratory other than OSU is used, the lab shall use the same phosphorus and potassium extractant (Mehlich-3) as used by the OSU lab and nutrient recommendations will be the same as those used by OSU. The soil testing laboratory shall be a member of the North American Proficiency Testing Program or Agricultural Laboratory Proficiency Program.

Soil testing shall include analysis for any nutrients for which specific information is needed to develop the nutrient management plan (e.g., pH, N, P, and K). Additional information concerning soil testing can be found in the OSU Extension Fact Sheet F-2225, OSU Soil Test Interpretations and Fact Sheet F-2901, Procedures Used by OSU Soil, Water, and Forage Analytical Laboratory.

ADDITIONAL CRITERIA TO BUDGET AND SUPPLY NUTRIENTS FOR PLANT PRODUCTION

Plant nutrient removal rates can be found in Table 3. Nutrient removal rates for crops or forage combinations not listed in Table 3 may be calculated using the USDA Crop Nutrient Tool (https://plantsorig.sc.egov.usda.gov/npk/main).

Do not apply nutrients in the following situations:

- Animal manure shall not be land applied within 500 feet of the corner of an occupied residence not owned or operated by the feeding operation.
- Animal manure shall not be land applied within 300 feet of an existing public or private drinking water well.
- To areas within 100 feet of a perennial stream, pond, well, or sinkhole, unless an established buffer strip is present. The width of the buffer strip shall be used as a setback distance for application purposes. The buffer strip shall meet the requirements for design and maintenance established in the appropriate United States Department of Agriculture Natural Resources Conservation Service (NRCS) or OSU buffer standard and specification.
- To areas within 50 feet of an intermittent stream unless an established buffer strip is present. The width of the buffer strip shall be used as a setback distance for application purposes. The buffer strip must meet the requirements for design and maintenance established in the appropriate NRCS or OSU buffer standard and specification.
- To fields with > 15% slope.
- To soils less than 10 inches in depth to parent material.
- On soils that are frequently flooded.
- On soils that are frozen, snow covered, or water saturated (including periods of heavy rain when water ponding has occurred on the soil surface).
- On soils where the rock fragments in the surface layer are 3 to 10 inches in diameter and exceed 50% by volume.
- On soils where the rock fragments in the soil surface layer are > 10 inches in diameter and exceed 25% by volume.
- On soils where the rock fragments are > 10 inches in diameter which covers > 3% of the soil surface and the slope is > 8%. (Soil map unit name will include the description of Extremely Stoney, Extremely Bouldery, Extremely Rubbly, or Very Rubbly)
- On areas eroding at levels greater than the soil loss tolerance, “T”, from wind or water erosion or active gullies unless following a conservation plan that will reduce erosion below “T”. Use current NRCS soil loss prediction methods.
- On soils that are occasionally flooded. Manure may be applied between June 20 and September 20 on soils classified as occasionally flooded. Manure may also be applied to soils classified as occasionally flooded between February 1 and April 20 if the area is established to cool season grasses four inches in height at the

time of application. In no case will manure be applied when the soil is water saturated or when ponding has occurred on the soil surface after periods of heavy rain.

Organic Nutrient Application Rates

Timing and method of nutrient application shall correspond as closely as possible with plant nutrient uptake characteristics, cropping system limitations, weather and climatic conditions, availability of nutrients in manure, and field accessibility. Nutrients materials will be applied uniformly to the area. The application rate for liquid manure shall not create runoff and shall minimize ponding.

The application rate shall be based on the most limiting application based on Nitrogen (N) and Phosphorus (P). The following shall also be used when applying manure or organic by-products:

- N Application – The amount of N applied from manure shall not exceed the annual crop requirement for N. In some situations, additional N from inorganic/commercial sources may be required to supplement the organic sources. Manure may be applied to a legume crop at a rate equal to the estimated N removal in the harvested plant biomass.
- P Application – The maximum planned rates of P application shall be determined using a P assessment.

Field Risk Assessment

When applications of manure or other organic by-products are planned, a field-specific assessment of the potential for P and N transport from the site shall be completed as detailed below. (Tables 4 and 5)

Additional Criteria to Minimize Agricultural Non-Point Source Pollution of Surface and Ground Water Resources

Nutrient application rates are limited for certain water bodies in watersheds identified by the Oklahoma Department of Environmental Quality (ODEQ) as Nutrient Limited Watersheds and Nutrient Vulnerable Groundwaters in the Oklahoma Administrative Code (OAC) 252:30 of the Oklahoma Water Quality Standards. (Tables 5 and 6)

PLANS AND SPECIFICATIONS

Plans and specifications shall be in keeping with Appendix A and shall describe the requirements for implementing a practice to achieve its intended purpose, using nutrients to achieve production goals and to prevent or minimize water quality impairment.

The following components shall be included in the nutrient management plan as applicable:

- Aerial photograph or map and a soil map of the site,
- Plant production sequence or crop rotation,
- Results of soil, plant, water, manure, and/or organic by-product sample analyses,
- Realistic yield goals for the crops in the rotation based on OSU guidance,
- Recommended nutrient rates, timing, form, and method of application and incorporation,
- Guidance for implementation, operation, maintenance, recordkeeping, and
- Completed nutrient budget for N, P, and K for the rotation or crop sequence.

If increases in soil phosphorus levels are expected, plans shall document:

- The soil phosphorus levels at which it may be desirable to convert to phosphorus based implementation,
- The relationship between soil phosphorus levels and potential for phosphorus transport from the field,
- The potential for soil phosphorus drawdown from the production and harvesting of crops, and
- The management activities or techniques used to reduce the potential for phosphorus loss.

When applicable, plans shall include other practices or management activities as determined by specific regulation, program requirements, or producer goals.

TABLE 1: Nitrogen Requirements

The nitrogen requirement is calculated by subtracting the soil test nitrogen value from the nitrogen required for a selected crop and yield goal.

Established Bermudagrass		Cool Season Grasses (Fescue, Orchard		Established Old World Bluestem		Established Weeping Lovegrass	
N Required lbs/ac	Yield Goal tons/ac	N Required lbs/ac	Yield Goal tons/ac	N Required lbs/ac	Yield Goal tons/ac	N Required lbs/ac	Yield Goal tons/ac
50	1	**60**	1	**35**	1	**35**	1
100	2	**120**	2	**70**	2	**70**	2
150	3	**180**	3	**110**	3	**110**	3
200	4	**240**	4	**150**	4	**160**	4
260	5	**300**	5	**200**	5	**220**	5
320	6						
400	7						

Virgin Native Hay Meadow		Small Grains for Grazing		Canola		Forage Sorghum or Corn Silage		
N Required lbs/ac	Yield Goal lbs/ac	N Required lbs/ac	Yield Goal tons/ac	N Required lbs/ac	Yield Goal lbs/ac	N Required lbs/ac	Yield Goal	
							Silage tons/ac	Hay tons/ac
0	1.0	**30**	0.5	**50**	1000	**45**	5	2.5
50	1.5	**60**	1.0	**75**	1500	**90**	10	5.0
100	1.6	**90**	1.5	**100**	2000	**135**	15	7.5
		120	2.0	**125**	2500	**185**	20	10.0
		150	2.5	**150**	3000	**240**	25	12.5
		180	3.0	**175**	3500	**300**	30	15.0

	Wheat	Barley	Oat	Corn		Grain Sorghum		Cotton	
N Required lbs/ac	Yield Goal bu/ac			N Required lbs/ac	Yield Goal lbs/ac	N Required lbs/ac	Yield Goal bu/ac	N Required lbs/ac	Yield Goal bales/ac
30	15	20	25	**40**	40	**30**	2000	**30**	0.50
40	20	25	35	**50**	50	**40**	2500	**45**	0.75
60	30	35	55	**60**	60	**50**	3000	**60**	1.00
80	40	50	70	**85**	85	**70**	4000	**75**	1.25
100	50	60	90	**110**	100	**85**	4500	**90**	1.50
125	60	75	105	**130**	120	**100**	5000	**105**	1.75
155	70	90	125	**190**	160	**160**	7000	**120**	2.00
185	80	100	140	**215**	180	**195**	8000	**135**	2.25
240	100	125	175	**240**	200	**230**	9000	**150**	2.50
				300	250			**165**	3.00

				360	300				**180**	3.50

Alfalfa	Peanuts	Soybeans	Mungbeans, Cowpeas, Guar
10 to 20 lbs/ac for establishment. None needed for maintenance	**10 to 20 lbs/ac with P and K**	**10 to 20 lbs/ac with P and K**	**10 to 20 lbs/ac with P and K**

Nitrogen Requirements

Nitrogen Recommendations for Establishing Grass

Soil Test N[1/]	Native Grass / Bluestem Establishments	All Other Grass Establishments
	N Required lbs/ac	
0	0	40
1	0	39
2	0	38
3	0	37
4	0	36
5	0	35
6	0	34
7	0	33
8	0	32
9	0	31
10	0	30
11	0	29
12	0	28
13	0	27
14	0	26
15	0	25
16	0	24
17	0	23
18	0	22
19	0	21
20	0	20
21+	0	0

[1/] Nitrogen soil test values are only valid if test is within the last 60 days; therefore, assume nitrogen soil test of zero (0) when old tests are used.

Note: For recommendations on maintenance of grass stands for long-term deferment programs (e.g., CRP) follow the guidance in Tables 1, 2, 3 of this Appendix A.

TABLE 2: Phosphorus Requirements

P Soil Test Index	Established Bermudagrass		Established Cool Season Grasses		Established Old World Bluestem		Established Weeping Lovegrass	
	P_2O_5 lbs/ac	Percent Sufficiency	P_2O_5 lbs/ac	Percent Sufficiency	P_2O_5 lbs/ac	Percent Sufficiency	P_2O_5 lbs/ac	Percent Sufficiency
0	75	50	80	30	60	50	60	50
10	60	65	60	50	40	70	50	70
20	40	80	40	70	30	85	40	85
40	20	95	20	95	20	95	20	95
65+	0	100	0	100	0	100	0	100

P Soil Test Index	Virgin Native Hay Meadows		Small Grains for Grazing		Legumes in Pasture		Canola	
	P_2O_5 lbs/ac	Percent Sufficiency	P_2O_5 lbs/ac	Percent Sufficiency	P_2O_5 lbs/ac	Percent Sufficiency	P_2O_5 lbs/ac	Percent Sufficiency
0	40	50	80	25	75	50	80	25
10	20	80	60	45	60	65	60	45
20	0	95	40	80	40	80	40	80
40	0	100	20	90	20	95	20	90
65+	0	100	0	100	0	100	0	100

P Soil Test Index	Small Grains		Grain Sorghum		Corn		Cotton	
	P_2O_5 lbs/ac	Percent Sufficiency	P_2O_5 lbs/ac	Percent Sufficiency	P_2O_5 lbs/ac	Percent Sufficiency	P_2O_5 lbs/ac	Percent Sufficiency
0	80	25	60	40	80	30	75	55
10	60	45	50	60	60	60	60	70
20	40	80	40	80	40	80	45	85
40	20	90	20	95	20	95	30	95
65+	0	100	0	100	0	100	0	100

P Soil Test Index	Alfalfa		Peanuts		Soybeans		Mungbean, Cowpeas, Guar	
	P_2O_5 lbs/ac	Percent Sufficiency	P_2O_5 lbs/ac	Percent Sufficiency	P_2O_5 lbs/ac	Percent Sufficiency	P_2O_5 lbs/ac	Percent Sufficiency
0	200	20	80	40	70	40	70	40
10	150	50	60	60	50	60	50	60
20	100	70	40	80	30	80	30	80
40	60	90	20	95	20	95	20	95

65+	0	100	0	100	0	100	0	100

Phosphorus Requirements

Phosphorus Recommendations for Establishing Grass

P Soil Test Index	Bermudagrass Establishments	Fescue and Cool Season Grass Establishments	Bluestem and Lovegrass Establishments	Native Grass Establishments
	P_2O_5 lbs/ac			
0	40	40	40	40
1	40	40	40	38
2	40	40	40	36
3	40	40	40	34
4	40	40	40	32
5	40	40	40	30
6	40	40	40	28
7	40	40	40	26
8	40	40	40	24
9	40	40	40	22
10	40	40	40	20
11-20	40	40	30	0
21-40	30	30	20	0
41-48	20	20	0	0
49+	0	0	0	0

Note: For recommendations on maintenance of grass stands for long-term deferment programs (e.g., CRP) follow the guidance in Tables 1, 2, 3 of this Appendix A.

P Soil Test Index	Forage Sorghum or Corn Silage	
	P_2O_5 lbs/ac	Percent Sufficiency
0	100	30
10	75	60
20	45	80
40	25	95
65+	0	100

TABLE 3: Crop Nutrient Removal *

% of Dry Material Harvested					
Forage as Hay Crop		% Moisture (default)	%N	%P	%K
Bermuda		9.05	1.37	0.19	1.55
Tall Fescue		12.50	1.71	0.30	1.96
Native Hay		9.50	1.52	0.22	1.45
Alfalfa		9.65	2.79	0.26	2.12
Ryegrass		12.74	1.49	0.20	1.42
Wheatgrass		10.85	1.34	0.07	
Clovers		11.99	2.63	0.27	2.35
Eastern Gamagrass		10.85	1.51	0.10	3.06

	% of Dry Material Harvested					
Crop	Unit	Weight/Unit	% Moisture (default)	%N	%P	%K
Barley	grain	48 lbs/bu	11.72	2.11	0.42	0.54
	straw	72 lbs/bu	11.25	0.69	0.10	1.79
Corn	grain	56 lbs/bu	13.52	1.64	0.31	0.34
	stove	56 lbs/bu	13.30	0.98	0.10	1.50
Oats	grain	32 lbs/bu	10.67	2.09	0.38	0.46
	straw	64 lbs/bu	9.68	0.71	0.09	2.39
Rye	grain	56 lbs/bu	11.88	2.14	0.38	0.52
	straw	84 lbs/bu	9.07	0.50	0.09	0.97
Sorghum	grain	56 lbs/bu	11.18	1.87	0.33	0.39
	stove	56 lbs/bu	8.13	0.67	0.13	0.73
Soybeans	beans	97 lbs/bu	10.12	6.57	0.67	1.54
	straw	75 lbs/bu	11.07	0.83	0.06	0.57
Wheat	grain	60 lbs/bu	11.68	2.30	0.43	0.49
	straw	92.48 lbs/bu	9.22	0.64	0.06	1.17
Cotton	lint & seed	500 lbs/bale	7.80	3.30	0.41	0.49
	burs & stalks	3 lbs/lb of lint	7.70	0.99		

*** These crop nutrient removal figures come from the NRCS Agricultural Waste Management Field Handbook, Chapter 6, Role of Plants in Waste Management (Table 6-6). The handbook lists additional crops not listed above. These numbers represent average figures taken from multiple sources and are nutrients removed in the harvested portion of the crop. These figures can be used as guidance for waste management planning purposes. Actual waste application will be based on soil test.**

Example calculation to estimate nutrients removed

Bermuda: Yield 3 tons/ac forage = 6000 lbs/ac hay

(6000 lbs- (6000 lbs X 0.0905 (% moisture))) X 0.0019 (%P/lb) = 10.37 lbs/ac phosphorus in hay

(6000 lbs – (6000 lbs X 0.0905 (% moisture))) X 0.0137 (%N/lb) = 75.01 lbs/ac nitrogen in hay

(6000 lbs – (6000 lbs X 0.0905 (% moisture))) X 0.0155 (%K/lb) = 84.57.0 lbs/ac potassium in hay

Wheat: Yield 40 bu/ac = 60 lbs/bu x 40 bu = 2400 lbs of grain

40 bu/ac x 92.48 lbs/bu straw = 3,699.2 lbs/ac straw produced

1 ton/ac straw baled and removed from field = 1 ton/ac x 2000 lbs = 2000 lbs of straw/ac Grain:

(2400 lbs/ac - (2400 lbs/ac X 0.1168 (% moisture))) x 0.0230 (%N/lb) = 48.75lbs/ac Nitrogen in grain

(2400 lbs/ac – (2400 lbs/ac X 0.1168 (% moisture))) x 0.0043 (%P/lb) = 9.11 lbs/ac Phosphorus in grain

(2400 lbs/ac – (2400 lbs/ac X 0.1168 (% moisture))) x 0.0049 (%K/lb) = 10.39 lbs/ac Potassium in grain

Straw: (2000 lbs/ac – (2000 lbs/ac X 0.0922 (% moisture))) x 0.0064 (%N lb) = 11.62 lbs/ac Nitrogen in straw

(2000 lbs/ac – (2000 lbs/ac X 0.0922 (% moisture))) x 0.0006 (%P lb) = 1.09 lbs/ac Phosphorus in straw

(2000 lbs/ac – (2000 lbs/ac X 0.0922 (% moisture))) x 0.0057 (%K/lb) = 10.35 lbs/ac Potassium in straw

Total Nutrient Removed = 60.37 lbs/ac N removed, 10.2 lbs/ac P removed, 20.74 lbs/ac K removed

Table 4: Annual Manure Application Rates for Non-Nutrient Limited Watersheds and Non-Nutrient Vulnerable Groundwaters

Rating	Soil Test P Index	0 – 8% Slope	8 to 15% Slope	0 to 15% Slope
		Soil > 20" Deep	Soil > 20" Deep	Soil 10" to 20" Deep
*Low	0 – 65	Full Rate	Full Rate Split Application	Half Rate
*Moderate	66 – 250	Full Rate	Half Rate	Half Rate
*High	251 – 400	Half Rate	Half Rate	Half Rate
*Very High	> 400	Plant Removal[1]	Plant Removal[1]	Plant Removal[1]
*Severe	*	No Application	No Application	No Application

Rating	Soil Test P Index	Rocks >10" in diameter which cover >3% of the soils surface and <8% slope
*Low	0 – 65	Half Rate
*Moderate	66 – 250	Half Rate
*High	251 – 400	Half Rate
*Very High	> 400	Plant Removal[1]
*Severe	*	No Application

[1] **Note – It may not be feasible to calibrate equipment and make manure applications at the Plant Removal rate.**

Table 5: Annual Manure Application Rates for Nutrient Limited Watersheds

Rating	Soil Test P Index	0 – 8% Slope	8 to 15% Slope	0 to 15% Slope
		Soil > 20" Deep	Soil > 20" Deep	Soil 10" to 20" Deep
*Low	0 – 65	Full Rate	Full Rate Split Application	Half Rate
*Moderate	66 – 120	Full Rate	Half Rate	Half Rate
*High	121 – 300	Half Rate	Half Rate	Half Rate
*Severe	> 300	No Application	No Application	No Application

Rating	Soil Test P Index	Rocks >10" in diameter which cover >3% of the soils surface and <8% slope
*Low	0 – 65	Half Rate
*Moderate	66 – 120	Half Rate
*High	121 – 300	Half Rate
*Severe	> 300	No Application

*** See Severe Rating - No Application listed below. Check for specific site characteristics which may deem the field inadequate for manure application from the list below.**

Annual manure application rates are listed below.

Manure Application Rates

Full Rate – Not to exceed the Nitrogen requirement of the crop and the following P_2O_5 rates:

1. 200 lbs P_2O_5 per acre when surface applied.
2. 300 lbs P_2O_5 per acre when application is by sprinkler irrigation and managed to prevent runoff from the field.
3. 400 lbs P_2O_5 per acre if injected or incorporated below the soil surface.

Half Rate – Not to exceed the Nitrogen requirement of the crop and the following P_2O_5 rates:

1. 100 lbs P_2O_5 per acre when surface applied.
2. 150 lbs P_2O_5 per acre when application is by sprinkler irrigation and managed to prevent runoff from the field.
3. 200 lbs P_2O_5 per acre if injected or incorporated below the soil surface.

Split Application –

1. Nitrogen- Not to exceed the Nitrogen requirement of the crop, applied during the growing season
2. Phosphorus- Application will be no more than ½ the allowed P_2O_5 rate per application at least 30 days apart.

Severe Rating - No Manure Application.

Table 6: Mitigation for Nutrient Vulnerable Groundwaters

Leaching Index (LI)	Groundwater Vulnerability Rating	Mitigating Activities	RATING
0 - 5	High	One (1) activity	**LOW**
	Very High	One (1) activity	
5 - 10	High	Two (2) activities	**MODERATE**
	Very High	Two (2) activities	
10+	High	Three (3) activities	**HIGH**
	Very High	Four (4) activities	

MITIGATING ACTIVITIES:

- Delay nitrogen application until plants are actively growing (4" minimum height)
- Apply split applications of 50% of the total nitrogen needs
- Seasonal nitrogen requirements for actively growing plants shall be split to provide no more than 40 lbs of actual nitrogen every 4 – 6 weeks. Warm season plants – apply ≤ 40 lbs/acre Nitrogen during early spring (green up), after first cutting or grazing (late May – early June), or late summer. Cool season plants- apply ≤40 lbs/ac in the fall at planting. Add the remaining recommended amount in early spring (Feb – March).
- Nitrogen will not be applied during expected heavy rainfall months (April, May, and June) on warm season plants.
- Lower realistic yield expectation by 25%
- Use enhanced efficiency fertilizer products (sulfur coated urea products, polymer coated fertilizers, uncoated slow release fertilizers).
- Utilize nitrogen release strip and GreenSeeker sensors to make mid-season nitrogen applications
- Use precision agricultural technologies to precisely apply variable rates of nitrogen fertilizer.
- Utilize annual soil testing.
- Banding nitrogen applications.
- Use legume crops and cover crops to provide nitrogen through biological fixation and nutrient recycling.