NUTRIENT MANAGEMENT PLAN

Soil Testing Plan
Soils will be tested a minimum of every 4 years to a depth of 7” in the fall after crop removal and prior to manure application. One sample shall be taken for each 2.5 acres. Samples shall be analyzed for pH, Phosphorus, and Potassium, at a minimum. *(Source - IL Agronomy Handbook, NRCS Standard 590)*

Manure Testing Plan
Manure samples shall be taken annually during manure application from each storage facility and manure type (liquid or solid), and analyzed for Total N, Ammonium Nitrogen, Organic N, P_2O_5, and K_2O.

Illinois Phosphorus Risk Assessment
(Illinois NRCS – Nutrient Management Standard, Code 590)

Phosphorus (P) loading to surface water can accelerate eutrophication. The availability of other nutrients and light penetration into the water column will also influence the response of waterbodies to phosphorus. Land managers who desire to minimize transport of phosphorus need a practical assessment procedure to assist them in making decisions concerning the applications of phosphorus-containing materials.

Factors such as: the amount of erosion and runoff; the form, amount, and distribution of Phosphorus in the soil: and fertilizer and manure application rate, timing, and placement determine P loss from agricultural fields and the resulting P loading to water resources. Most phosphorus compounds found in soils have low water solubility. Consequently, P loss from agricultural land was once thought to be primarily associated with soil erosion. In many cases, sediment-bound P is still the dominant form in which P losses from agricultural fields occur. Over the past decade, research has shown that phosphorus can be lost in runoff in dissolved forms. High dissolved P concentration in runoff is more frequently observed where soil P levels are high particularly near the soil surface. High soil P levels, however, do not automatically equate to high dissolved P in runoff. As stated earlier, numerous factors interact to create the potential for P losses from agricultural fields. Many of the basic processes that govern P transport are known. It is difficult, however, to know at any given site which factor(s) influence P loss rates proportionally more than others. Insufficient data exist in Illinois to definitively guide landowners as to which factors in a specific field contribute the most to P losses. There are indications, however, that where solution P losses from crop fields are dominant, high soil P concentration at the surface are likely the most dominant factor.

The purpose of this guide is to (1) help land managers identify factors in agricultural fields known to contribute to “P” runoff loss and, (2) identify practices that can reduce phosphorus loss from agricultural fields. The factors most commonly associated with both dissolved and sediment-bound P loss are presented. For each factor, guidance is provided to help land managers estimate the relative potential for P transport to surface water. It is important to realize that the procedure is not a predictive tool for P loading. It is merely a tool for assessing the relative potential for phosphorus transport.

Use of P Risk Assessment:
When possible, land managers should adopt management practices that minimize phosphorus loss risk factors. If phosphorus containing materials need to be applied to fields that have medium or high risk potentials, recommended management practices should be used to reduce the risk of phosphorus transport.

Examples of Practices to Reduce Phosphorus Risk Potential

Soil Erosion Control

- Use residue management and/or structural practices to reduce sheet and rill erosion
- Install filter strips, riparian forest buffers, contour buffer strips, field borders, or wetlands

Minimize Connectivity to Water Bodies

- Install water and sediment control basins to reduce quantity of sediment transported offsite
- Install conservation buffers adjacent to water resources to create nutrient application setbacks

Reduce Runoff Potential

- Terrace fields to reduce slope length
- Contour strip cropping, contour buffer strips, cover crops, crop rotations that include meadow and/or small grains, and crop residue management

Lower Soil Test Phosphorus

- Sample soils on high testing fields to determine vertical distribution of the phosphorus
- If phosphorus is concentrated in the top two inches of soil, invert the soil (e.g. moldboard plow) where soil erosion will not be a problem
- Avoid stratification by placing phosphorus materials beneath the top two inches of the soil surface

Practice Nutrient Management

- Apply no more than maintenance levels of phosphorus when soil test P reaches the levels described in the Illinois Agronomy Handbook, Chapter 11.
- When soil test P levels reach 300 lb/acre, only maintenance P levels may be applied to land.

Site Characteristic Definitions

1. **SOIL EROSION –** Sheet and rill erosion as measured by the most current version of the Revised Universal Soil Loss Equation (RUSLE).
   (Low = < T, Medium = >T, ≤ 2T, High = > 2 T)

2. **CONNECTIVITY TO WATER –** Defines the potential for P to be transferred from the site to a perennial stream or water body. The more closely connected the runoff is from the field via concentrated flow (from a defined grassed waterway or surface drain) to a perennial stream or water body the higher the potential for P transport.
   (Low = > 1,000', Medium = < 1,000', ≥ 200', High = < 200')

3. **RUNOFF CLASS –** Represents the effects of the Hydrologic Soil Group (A, B, C, D) on runoff. This factor represents the site's runoff vulnerability.
   (A = Low, B = Medium, C,D = High)

4. **SOIL "P" TEST (Bray P1 or Mehlich 3) –** Soil test procedure using the Bray P1 extraction, or other extraction test calibrated to bray P1, that provides an index of plant available P expressed in lbs. P/Acre (PPM x 2 = lbs./Acre where soil samples are obtained to the 6 2/3" depth)
   (Low = < 35 lbs/acre, Medium = 35-70 lbs/acre, High = > 70 lbs/acre)

5. **P INPUTS –** Represents the combined effect of application method and application rate on the potential for phosphorus to be transported in runoff in both dissolved and sediment-bound phases. Phosphorus application rate is expressed in terms of the University of Illinois maintenance phosphorus recommendations applicable to crops/yields grown on the site being evaluated. Phosphorus may be in the form of commercial fertilizer or organic materials such as manure, animal waste lagoon supernatant, wastewater from municipal or agricultural sources or nonagricultural biosolids such as sewage sludge or landscape waste. When using the "P Inputs Matrix", it is assumed that soil incorporation is performed prior to runoff events. Instances where incorporation is typically not performed prior to runoff events will be considered as non-incorporated surface applications.
   (See P Input Matrix Below)

P INPUT MATRIX

	Application Rate		
Application Method	**≤ UI Recommendations**	**> UI – 150% UI**	**> 150% UI**
Incorporation or injection > 3" below surface	Low	Low	Low
Shallowly incorporated surface applications < 3"	Low	Medium	High
Non-incorporated surface applications	Medium	High	High

<u>Phosphorus Risk Assessment for Individual Fields</u>

The table below identifies specific risk factors that may be present in a given field. No attempt has been made to "average" the factors and assign a composite rating for the field. It is recognized that risk factors do not act independently to influence phosphorus loss from agricultural fields and P loading into water resources. Simple averaging however, assumes that all risk factors have the same amount of influence. Attempts to objectively weight some factors more or less than others would be desirable, but difficult without supporting data. The phosphorus assessment procedure is not a process based or empirical model. The procedure was developed as a conservation planning tool. The tool is designed to provide guidance to select and plan conservation measures that will lower the potential for phosphorus loss from agricultural fields and P loading into water resources.

Explanation of General Risk Assessment Ratings

Low – Low potential for P movement from the field. No adverse impacts to surrounding areas (i.e. surface waters) are anticipated if current farming practices are continued.

Medium – Medium potential for P movement from the field.

High - High potential for P movement from the field. Adverse impacts to surface waters from excess P loading may occur.

Very High - Very high potential for P movement from the field. Adverse impacts to surface waters are likely. No manure shall be applied until conservation practices are put into place to reduce the potential for P movement.

Explanation of Using P Risk Assessment for Manure Applications

***Soil Erosion* –** No manure will be applied to any field unless it rates "Low"

***Connectivity to Surface Water* –** 200' setbacks around all surface water will bring all fields under the "Medium" rating

***P soil test* –** Fields in this plan have "Medium/Optimum" ratings for P soil tests. Planned manure applications will maintain P, and avoid excessive buildup.

IL Phosphorous Risk Assessment
Dare Farms

Field Name	Spread Acres	Connectivity to Surface Water	Runoff Potential	P1 Soil Test	P input Matrix
Triple D - 1	89.5	Medium or Low	Medium	Medium	Low, incorporate or inject >3" below the surface
Triple D - 2	37.6	Medium or Low	Medium	Medium	Low, incorporate or inject >3" below the surface
Triple D - 3N	39.0	Medium or Low	Medium	Low	Low, incorporate or inject >3" below the surface
NW Field	77.8	Medium or Low	Medium	Low	Low, incorporate or inject >3" below the surface
North Rob's	33.4	Medium or Low	Medium	Low	Low, incorporate or inject >3" below the surface
Harold's 80	83.0	Medium or Low	Medium	Medium	Low, incorporate or inject >3" below the surface
11th Avenue	149.0	High	Medium	Low	Low, incorporate or inject >3" below the surface
Phil's	75.0	Medium or Low	Medium	Medium	Low, incorporate or inject >3" below the surface
Phil's Bottom	26.0	Medium or Low	Medium	Medium	Low, incorporate or inject >3" below the surface
Double D	115.0	Medium or Low	Medium	Medium	Low, incorporate or inject >3" below the surface
Silo Field	38.0	Medium or Low	Medium	High	Low, incorporate or inject >3" below the surface
East Buildings	38.0	Medium or Low	Medium	High	Low, incorporate or inject >3" below the surface
South House	69.2	Medium or Low	Medium	High	Low, incorporate or inject >3" below the surface
N Harold's	19.6	Medium or Low	Medium	Low	Low, incorporate or inject >3" below the surface
Freeman's	104.0	High	Medium	Medium	Low, incorporate or inject >3" below the surface
Hach	96.3	High	Medium	Medium	Low, incorporate or inject >3" below the surface
Keep	50.0	Medium or Low	Medium	Medium	Low, incorporate or inject >3" below the surface

Recommended Management Practices to Reduce P Losses

1. Perform soil test regularly (minimum of every four years) and follow University of Illinois' recommendations for application rates.
2. Do not maintain excessively high phosphorus soil test levels, especially in areas prone to phosphorus transport.
3. Use variable rate applications to increase the precision of phosphorus applications and to maintain rates needed for optimal crop production.
4. In areas where phosphorus losses occur primarily from surface runoff, incorporate or inject phosphorus beneath the soil surface.
5. Control soil erosion to "T" or less.
6. Utilize agronomic practices that optimize crop production to maximize phosphorus utilization.
7. Use filter strips or riparian forest buffers to reduce offsite transport of particulate phosphorus.
8. Avoid applying nutrients when soils are frozen or covered with ice or snow.
9. Fall applications of phosphorus that are not incorporated into the soil should not be applied on slopes greater than 5% unless runoff control measures such as heavy residue cover, contour mulch tillage, contour strip cropping, or terraces have been applied.
10. Minimize surface runoff of water by reducing compaction, maintaining high crop residue levels, installing runoff control structures such as terraces, etc.
11. Avoid stratification on soils that are susceptible to runoff and erosion.

Nitrogen Risk Assessment

(Illinois NRCS-Nutrient Management Standard, Code 590)

	Soil Texture[2]		
Application Timing & Temp[1]	**Coarse**	**Medium**	**Fine**
Fall with inhibitor > 60°F	High	High	High
Fall with inhibitor < 60°F	High	Medium	Medium
Fall w/out inhibitor > 60°F	High	High	High
Fall w/out inhibitor < 60°F	High	Medium	Medium
Spring w/out inhibitor	Medium	Medium	Medium-Low
Spring with inhibitor	Medium-Low	Low	Low
Spring split-applied or sidedress	Medium-Low	Low	Low

[1] Temperatures refer to soil temperature measured at a depth of 4 inches. For this assessment, inhibitors refer to nitrification inhibitors

[2] Soil Texture: Coarse: sand, loamy sand, sandy loam
Medium: silt, silt loam, loam
Fine: silty clay loam, silty clay, clay, clay loam, sandy clay, loam, sandy clay

Fields are categorized according to the predominant soil type of the field.

Coarse:

Medium: *All fields in this plan are predominantly silt loams*

Fine:

Nitrogen Risk Assessment for Individual Fields

All fields in this plan have the same risk potential for N leaching under the following levels of management.

- High potential if applied in the fall with an inhibitor when soil temperature at a depth of 4" is greater than 60°F.
- Medium potential if applied in the fall with an inhibitor when soil temperature at a depth of 4" is less than 60°F.
- High potential if applied in the fall without an inhibitor when soil temperature at a depth of 4" is greater than 50°F.
- Medium potential if applied in the fall without an inhibitor when soil temperature at a depth of 4" is less than 50°F.
- Medium (medium soils) or medium-low (fine soils) potential if applied in the spring without an inhibitor.
- Low potential if applied in the spring with an inhibitor.
- Low potential if applied in the spring split applied or sidedressed.

Recommended Management Practices to Reduce N Losses

1. Set realistic yield goals and follow University of Illinois' nitrogen recommendations
2. Take credit for nitrogen from all sources: previous legume crop, incidental nitrogen contained in diammonium phosphate (DAP) and other fertilizers, manure applications, etc.
3. Use Nitrogen Risk Assessment tool to determine application timing for fields with various soil textures.
4. Apply the majority of nitrogen shortly before or after planting if spring applications are feasible.
5. When fall applying, use a nitrification inhibitor and wait until soil has cooled to 60°F, or wait until the soil has cooled down to 50°F. For southern IL, this is usually the 2nd week of October, and for central and northern IL, this is the third week of October.
6. Use adequate levels of phosphorus, potassium, and other nutrients to ensure optimum yields and nitrogen use efficiency.
7. Evaluate the nutrient recommendations post-harvest including: comparing actual yields to expected yields, evaluating the factors affecting yields and nitrogen use, considering the use of plant tissue analyses and an end-of-the-season corn stalk nitrate test to evaluate plant nitrogen sufficiency, and refining nitrogen rates for future years.
8. Review each nutrient management plan annually to determine if changes are needed.
9. Calibrate application equipment annually to within tolerable limits.
10. Use filter strips and riparian forest buffers to intercept nutrients transported surface runoff to the stream. (NOTE: These practices will have minimal effect in areas with extensive subsurface drainage.)
11. Avoid applying nitrogen around environmentally sensitive areas such as sinkholes, wells, gullies, ditches, surface inlets, or rapidly permeable areas.
12. Use cover crops, such as rye, to capture residual nitrogen after harvest and prevent nitrogen from being lost between harvest and planting of the next crop.
13. Utilize water table management to reduce artificial drainage when it is not needed for crop growth or field operations.
14. Utilize water table management to reduce artificial drainage when it is not needed for crop growth or field operations.
15. Outlet tiles into constructed wetlands to remove a portion of the nitrogen before tile effluent discharges into lakes or streams.