THE FUTURE OF NUTRIENT MANAGEMENT IN WISCONSIN

Susan M. Porter

The Department of Agriculture, Trade and Consumer Protection (DATCP) is responsible for promulgating nutrient management rules in Wisconsin per 92.05 (3) (k). Wis. Stats. These rules include development and dissemination of agricultural technical standards within the state to abate non-point source water pollution. Wisconsin is transitioning from the nitrogen-based nutrient management technical standard, to the revised phosphorus (P)-based USDA Natural Resources Conservation Service (NRCS) Technical Standard 590, Nutrient Management. The P-based 590 standard is required for Confined Animal Feeding Operations (CAFOs), federal Environmental Quality Incentive Program (EQIP), and the Dept. of Natural Resource’s (DNR) nutrient management performance standard. According to ATCP 50 Wis. Admin. Code, after 2005, when DATCP incorporates the P-based nutrient management standard into ATCP 50 (~2006), a farmer “shall” have a nutrient management plan for mechanically applied nutrients if at least 70% cost sharing is offered by local conservation agencies. A qualified planner shall approve the farmer’s nutrient management plan; have soil tests from a DATCP certified soil testing laboratory; comply with University of Wisconsin nutrient recommendations; and maintain tolerable soil loss levels for each field. DATCP estimates that 9 million acres of cropland will require P-based nutrient management plans at a cost of $28 per acre or $252,000,000 beginning in 2004. If Wisconsin implements nutrient management in 15 years, the annual cost will be $16,800,000 each year to meet the cost share requirement.

Nutrient Pollution and the Performance Standards

Wisconsin normally gets about 30-34 inches of rain annually. This water either returns to the atmosphere, runs-off, or infiltrates into groundwater. The drainage area is called a watershed. This runoff occurs when rainwater or snowmelt contacts soil, organic wastes, fertilizers, and other pollutants carrying them to surface and groundwater. DNR water quality staff estimate that about 40 percent of Wisconsin's rivers and streams and about 90% of our lakes are degraded or threatened by polluted runoff. Nitrate is the most common pollutant of Wisconsin's groundwater. Infants who drink water containing excessive nitrate can become seriously ill. In their young bodies, nitrate can change to nitrite, a chemical that reduces the blood's ability to absorb oxygen and bring it to body tissues, leading to "blue baby syndrome." In Wisconsin, about 10% of private drinking water wells exceed the enforcement standard health advisory level of 10 ppm nitrate (DATCP, 1999). About 1,400 miles of degraded streams and rivers (52%) appear on the Environmental Protection Agency’s list of impaired waters because of pollution.

In 1977, the Wisconsin legislature approved pollution control legislation that developed the Priority Watershed Program. In 1997, legislation expanded the state’s water laws to include statewide performance standards to reduce runoff. Today these performance standards and other water quality activities are carried-out through County Land and Water Resource Management (LWRM) plans. The agricultural performance standards are listed in NR 151.02 through 151.08 Wis. Admin. Code. Simply stated, the agricultural performance standards provide counties authority to require farmers to: Control erosion to meet tolerable soil loss (T) RUSLE 2; Construct manure storage facilities to standards; Divert clean water around feedlots close to streams; Not have overflowing manure storage facilities; Not have unconfined manure piles near surface water; Not have direct feedlot or manure storage runoff; Restrict livestock access to maintain adequate sod cover (vegetation) near water; and Apply nutrients to crop needs. County conservation departments can require farmers to implement

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these agricultural performance standards if 70% cost share is offered to producers that are not complying with the performance standards and have not received cost sharing to do so. All these performance standards, except for nutrient management became effective October 1, 2002, meaning that local government can require practices to be implemented.

Wisconsin’s nutrient management performance standard requires the producer’s nutrient management plan to manage soil nutrient levels to maintain or reduce nutrient delivery. These nutrient management plans must document that nutrient delivery to water will not alter the background water quality in Source Water Protection Areas, Impaired, Outstanding, and Exceptional Resources Water.³ The nutrient management performance becomes effective on January 1, 2005 in these special areas; and January 1, 2008 in other areas of Wisconsin. Wisconsin’s DNR will define these areas. DATCP intends to promulgate the USDA’s NRCS approved P-based 590 (July 2002) for the purpose of implementing the nutrient management performance standard. This P-based nutrient management standard assesses field-P risks for all sizes and farm types, this standard requires producers to choose from the P Index computer software model or use soil test P levels for each tract. A summary of the standard can be found at the end of this report.⁴

As the NRCS approved P-based 590 (July 2002), it became apparent that a computer program could improve education and implementation of this technical standard. Over the last year, DATCP, DNR, and NRCS have funded the UW research and development of the Soil Nutrient Application Program (SNAP Plus). SNAP Plus is a software tool to implement the July 2002 P-based Nutrient Management Standard 590. It brings together UW nutrient recommendations with RUSLE 2 calculations to provide an assessment of soil erosion rates using crop producers current rotations, tillage, and nutrient application practices. It then provides an estimate of the phosphorus loading risks or the “P Index” for each field over the course of the crop rotation. Research being conducted at the UW-Madison, UW-Platteville, and Discovery Farms is being used to calibrate and refine the P Index. SNAP Plus will be available in 2004 from http://wpindex.soils.wisc.edu/.

**Point Source Pollution Controls and Total Maximum Daily Loads (TMDL)**

For many years, Wisconsin law has required point sources of pollution to be regulated through DNR permits. These permits regulate sludge, sewage, industrial waste, and livestock operations greater than 1,000 animal units or confined animal feeding operations (CAFOs). The CAFOs are regulated by the DNR through authority delegated from the United States Environmental Protection Agency (EPA). These operations are assigned allowable effluent or pollution discharge limits. The EPA requires CAFOs to implement manure containment, P-based nutrient management, record keeping, erosion management, and options for lowering feed phosphorus levels. The manure containment system and the nutrient management P-based 590 standard from July 2002, is required by EPA as part of the criteria for establishing allowable effluent discharging for CAFOs. Federal EPA and Wisconsin DNR requirements for CAFOs, such as implementing the P-based 590 nutrient management standard, will be included in NR 243 Wis. Admin. Code. This code is being revised and will be taken to public hearing in 2004.

Waters that do not meet the Federal Clean Water Act’s designated use are classified as “impaired” and contained on the 303 d list submitted to the EPA. EPA requires states to identify waters that are not expected to achieve water quality standards after implementing required point source controls. To meet water quality standards in these impaired waters, states must establish allowable levels or total maximum daily loads (TMDLs) for non-point source pollutants such as sediment and phosphorus.
Livestock Modernization and Wisconsin’s nutrient balance

The State’s dairy industry contributes about $18 billion of the $40 billion that agriculture brings to Wisconsin’s economy every year. In July 2003, Wisconsin Secretary of Agriculture, Trade and Consumer Protection, Rod Nilsestuen, began to address land use conflicts that can arise and deter agriculture from modernizing. Secretary Nilsestuen appointed a committee to examine siting of livestock operations. In November, the committee that included farmers, environmentalists and local government representatives, presented their recommendations to the Secretary as a base for legislative debate. They agreed that preserving and strengthening animal agriculture is an important economic objective for the state and can be done in ways that protect the environment and respect local decision-making. Key elements of the recommendations include:

- The DATCP develops state standards with input from an expert panel that focus on air and water quality management practices and performance standards.
- A county or municipality that regulates siting and expansion of livestock operations will approve a livestock farmer's application if the application meets state standards and is consistent with county or municipal regulations.
- A State Review Board will be created to determine whether a county or municipality properly applied the state standards when it made its decision. It will also provide an appeal process.
- Deadlines will be established to ensure that local decision-making is fair and timely.

Milk production is expected to increase in Wisconsin during the next four years according to a survey conducted by the Wisconsin Agricultural Statistics Service (WASS) in 2002. This statewide survey of producers asked for their plans with the assumption that milk prices for the next five years will be at the same level as the past five years. Milk production in 2007 could top 26 billion pounds if producers' plans for keeping or expanding their herds are realized. This survey indicated that the number of milk cows and herd size are expected to increase from the 1.27 million cows in an average herd size of 73 in May 2002 to 1.4 million cows in an average herd size of 101 in May 2007. As Wisconsin agriculture modernizes and herd sizes increase, we must improve manure distribution to more acres. Using the livestock and crop estimates in Wisconsin from 2002 WASS6; and projecting an increase of 130,000 cows to 1.4 million cows by 2007; we can get some idea of a N and P balance for Wisconsin with 2007 livestock additions.

The Wisconsin DATCP reports that phosphorus fertilizer consumption in 2002 was 77 million pounds of P. Using WASS estimates, manure from cattle, hogs, poultry, and humans will supply 122 million pounds of P in Wisconsin during 2002. Cattle manure production is based on a low estimate of 120 pounds per day for dairy cows (3 pounds P$_2$O$_5$ per ton) and 75 pounds per day for all other cattle (5 pounds P$_2$O$_5$ per ton). If dairy herds increase as projected, 126 million pounds of P will be supplied by manure in 2007. Assuming fertilizer sales remain constant with 2002 levels, Wisconsin will be over applying P by 24 million pounds in 2007 based on 179 million pounds of P removed by Wisconsin crops7 using the following assumptions. (120 bu. corn removing 45 lbs. P$_2$O$_5$/ac, 1 tons corn silage removing 4 lbs. P$_2$O$_5$/ton, 40 bu soybeans/ac removing 35 lbs. P$_2$O$_5$, 50 bu. barley/ac. removing 20 lbs. P$_2$O$_5$, 50 bu. winter wheat/ac. removing 31 lbs. P$_2$O$_5$, 400 cwt. potato/ac. removing 50 lbs. P$_2$O$_5$, 2400 lbs. tobacco/ac. removing 20 lbs. P$_2$O$_5$, 3.5 ton snap beans/ac. removing 15 lbs. P$_2$O$_5$, 6 ton sweet corn/ac. removing 15 lbs. P$_2$O$_5$, 2 ton peas/ac removing 10 lbs. P$_2$O$_5$, 1 ton forage removing 13 lbs. P$_2$O$_5$, and 100 bu. oats/ac. removing 40 lbs. P$_2$O$_5$).

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<tr>
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<th>2002 Projected</th>
<th>2007 Projected</th>
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<tbody>
<tr>
<td>Million lbs. P Manure Produced</td>
<td>122</td>
<td>126</td>
</tr>
<tr>
<td>Million lbs. P Fertilizer Consumed</td>
<td>77</td>
<td>77</td>
</tr>
<tr>
<td>Million lbs. P Crop Removal</td>
<td>179</td>
<td>179</td>
</tr>
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Wisconsin DATCP reports that nitrogen fertilizer consumption in 2002 was 443 million pounds of N. Manure and legume N is supplied at 334 million pounds of N. Cattle manure production is based on a low estimate of 120 pounds per day for dairy cows and 75 pounds per day for all other cattle (both providing 4 pounds N per ton of manure). If herds increase as projected, manure and legumes will supply 344 million pounds of N in 2007. Assuming fertilizer sales remain constant, with 2002 levels, Wisconsin will be over applying N by 152 million pounds in 2007 based on 635 million pounds of N removed by all crops. This estimate includes legumes credits but does not consider all the N that legumes crops could remove.

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<thead>
<tr>
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<th>2002</th>
<th>2007 Projected</th>
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<tbody>
<tr>
<td>Million lbs. N Manure + Legumes Produced</td>
<td>334</td>
<td>344</td>
</tr>
<tr>
<td>Million lbs. N Fertilizer Consumed</td>
<td>443</td>
<td>443</td>
</tr>
<tr>
<td>Million lbs. N Crop Removal</td>
<td>635</td>
<td>635</td>
</tr>
<tr>
<td>Excess Million lbs. of N Supplied</td>
<td>142</td>
<td>152</td>
</tr>
<tr>
<td>Excess Tons of N Supplied</td>
<td>70,762</td>
<td>76,412</td>
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**Wisconsin’s fertilizer law and distributing manure nutrients**

To grow Wisconsin agriculture in a productive and environmentally sound manner, we must make better use of our nitrogen, phosphorus, and potassium resources by crediting nutrients, promoting more distribution of manure fertilizer, and reducing purchase commercial fertilizer applications. Wisconsin’s fertilizer law Ch. 94.64 Wis. Stats. defines fertilizer as anything containing one or more plant nutrient for plant growth or nutrients used to make fertilizer. Not included in this definition and exempt from the fertilizer license requirements and paying tonnage fees are wood ashes, liming material, non-product sewage sludge, and unmanipulated manure. This law defines manipulated manure as mechanically drying, pelletizing, or changing the manure by any other means. Promoting the use of manure as a Wisconsin produced fertilizer will be more cost effective if the manure is manipulated to contain less water and manure nutrients are concentrated. Distributors of this fertilizer must be licensed by DATCP and pay tonnage fees annually. In addition, distributors of bulk fertilizer must survey the farmer receiving bulk fertilizer to see if they have a current 590 nutrient management plan and record the name of the planner if a plan has been prepared. The number of acres and nutrient management plans are then reported to DATCP with fertilizer tonnage. The fertilizer tonnage fees cause problems for distributors of manure fertilizer. Comparing manure and commercial fertilizer for a 20 acre corn field with optimum soil test levels for P and K, and assuming tonnage fees of $1.48 per ton, the total tonnage fees amount to $2,131 for manure and $12 for commercial fertilizer.

Corn crop nutrient need is **160 lbs. N – 60 lbs. P₂O₅ – 45 lbs. K₂O**.

<table>
<thead>
<tr>
<th>Manure application</th>
<th>Fertilizer application</th>
</tr>
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<tbody>
<tr>
<td>16,000 gal/ac</td>
<td>53 gal/ac of 28% &amp; 250 lbs. 9-23-30</td>
</tr>
<tr>
<td>176-80-320 per ac</td>
<td>(157+22)-57-75 per ac</td>
</tr>
<tr>
<td>11-5-20 per 1,000 gallons</td>
<td>Fertilizer value/ ton $341</td>
</tr>
<tr>
<td>Fertilizer value/ ton $1.34</td>
<td>$1.48 Tonnage fees on 20 acres = $12</td>
</tr>
<tr>
<td>$1.48 Tonnage fees on 20 acres = $2,131</td>
<td>Application cost $210 @ $10/ac</td>
</tr>
<tr>
<td>Application cost $1,600 @ $5/1,000 gal. $80/ac</td>
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</tbody>
</table>

The fertilizer rule, ATCP 40, Wis. Admin. Code is undergoing revisions with public hearings planned for 2004 or 2005. The code can specify requirements for a guaranteed analysis for the oxide and elemental forms of P and K while prescribing tolerances for the nutrient guarantees. The rule can also specify requirements for sampling, testing, and analyzing fertilizer. The new
ATCP 40 Wis. Admin. Code can and should be more flexible in promoting manure fertilizer sources for Wisconsin agriculture.

**Paying for Compliance**

After 2005 when the nutrient management performance standard becomes effective, and the P-based 590 standard is incorporated into ATCP 50, a farmer “shall” have a nutrient management plan for mechanically applied nutrients if at least 70% cost sharing is offered by federal, state, or local governmental agencies. To cover 70% of the farmer’s annual cost, the farmer may accept an alternative flat rate payment of $7 per acre per year for four years (or $28 per acre to develop and implement the nutrient management plan). Nutrient management plans must be approved by qualified nutrient management planners. The planner and the farmer are required to follow the nutrient management performance standard; follow the 590 standard & UW soil test recommendations from a DATCP certified lab with soil test updates every 4 years; crop fields to (T) tolerable soil loss levels using RUSLE 2 soil loss equation; and grass concentrated water flow areas.

The Natural Resources Conservation Service (NRCS) offers EQIP cost share contracts to farmers with livestock or cropping operations of all sizes. In 2003, this program provided about $11,000,000 to producers in Wisconsin and this funding is projected to triple by 2006. Federal EQIP funding requires compliance with the P-based nutrient management standard when a producer accepts government cost-share dollars for nutrient management, the installation of manure storage, or barnyard runoff control structures. In most counties, EQIP pays the farmer a nutrient management incentive payment of $21 per acre over a 4 year contract. So, nutrient management contracts beginning in 2003 will end in 2007 after the performance standard is in effect in some areas.

A Technical Service Provider (TSP) can be paid for preparing the annual nutrient management plan. Payment rates in 2003 for this nutrient management planning service range from $4-$7 per acre per year. In order to receive TSP payments, agronomists interested in becoming a TechReg Certified TSP in nutrient management must become certified from the [http://techreg.usda.gov](http://techreg.usda.gov) website. With both the EQIP incentive payment and the TSP payment, a farmer could receive about $40-$50 per acre over 4 years in most counties. This payment covers more than the required 70% of the cost of a nutrient management plan. If a county or local government provides 70% of the cost of a nutrient management plan, and the performance standard is in effect (after 2005 or 2008), NR 151 Wis. Admin. Code states that a county or local government may require the farmer to continue complying with this practice at the farmer’s expense even if land ownership changes.

**Implementing Agricultural Performance Standards**

Land and water resource management plans are setting the county’s course for implementing their water quality priorities that will include the implementation of the performance standards. Annual reports for each of the 330 watersheds in Wisconsin are likely to include the number of acres or sites evaluated and how many acres are in compliance for each performance standard. In 2003, DNR surveyed county land conservation departments on their agricultural performance standard implementation strategy and 62 counties responded. About 25 counties (40%) expect compliance activities to include evaluating compliance periodically by monitoring management practices installed with state cost-share money and implementing operator certification system to stay in touch with landowners. Compliance activities will also include enforcing county ordinances, reviewing field phosphorus levels with nutrient and pest management (NPM) plans, responding to complaints, and ensuring that new owners are made aware of NR 151 compliance information that may pertain to the property they acquire. Ultimately counties will need an efficient method for
monitoring compliance of RUSLE 2 soil loss, phosphorus index levels, and soil test P levels by field.

Compliance and privacy issues are an important part of implementing the agricultural performance standards. A big change came with the 2002 amendment to the Privacy Act of 1974, 5 U.S.C. § 552a. The Privacy Act limits information sharing to data without personal or programmatic identifiers. Much of the implementation money for the nutrient management performance standard will be federal. As a result, tracking where these funds have been provided may be protected by the privacy act. Federal, state, and county agencies need to find ways to determine where fields have been paid to comply with the water quality performance standards so available funds can be used efficiently. Not coordinating agency activities could double the cost of compliance, the second time using state funds and tracking compliance.

In summary, Wisconsin agriculture needs to make better use of our nutrient resources. We need to promote manure as a fertilizer and modernize agriculture in an environmentally sound manner. As we all work with Wisconsin producers we need to make them aware of the performance standard requirements and available funding for nutrient management through the continual NRCS EQIP sign-up.

Reference
3 NR 151.07 Wis. Admin. Code Runoff Management, September 2002
6 Wisconsin Agricultural Statistics Service, 2003 Issue Wisconsin Agricultural Statistics

**NUTRIENT MANAGEMENT STANDARD 590 – SUMMARY**

**CRITERIA FOR ALL SITES**

1. General Cases
   A. Annual field- or nutrient management unit-specific plan consistent with UWEX soil fertility recommendations (A2809)
   B. Routine soil testing shall be conducted at least once every four years, Sample soils according to UWEX recommendations (A2100), - Analysis by an approved lab (listed in Technical Note)
2. Nutrient Application Prohibitions
   A. Nutrients shall not be spread on:
      1) Concentrated flow channels, buffers, non-farmed wetlands
      2) Non-cropland and/or non-pastured land
         - Exception: Establishment and maintenance nutrient requirements are allowed
   B. Frozen or snow-covered soil nutrient application prohibitions:
      1) Within 1,000 ft. of a lake, pond, flowage or within 300 ft. of a river or stream
      2) Within 200 ft. upslope of wells, sinkholes, fractured bedrock, gravel pits
      3) Slopes greater than 9%
         - Exception: Up to 12% is allowed if contour strip cropped with sod or contour farmed with corn residue remaining and concentrated flow areas in perennial vegetative cover
         - Exception: Areas that do not contribute runoff to surface water or groundwater conduits may be exempt based on an in-field evaluation
      4) Fields that are at least 1/3 within the documented drainage areas of concentrated flow channels that deliver runoff to surface or groundwater conduits
      5) No commercial fertilizer applications - Exception: Grass pastures and winter grains not contained in above prohibition areas

3. Nutrient Application Restrictions
   A. Manure and organic byproducts shall not be applied to the following areas unless injected or incorporated within 72 hours: 200 feet upslope of wells and other groundwater conduits
   B. When nutrient incorporation is not possible (i.e. frozen or snow-covered soils) and where application is not prohibited (see above), implement the following:
      1) Do not apply nutrients at rates exceeding the P removal of the current year’s crop
      2) Limit liquid manure applications to 7,000 gallons/acre
      3) Establish perennial vegetative cover in all concentrated flow channels
   C. Manures, organic byproducts, and fertilizers shall not run off during application

4. Nutrient Crediting Requirements
   A. Legume-N and manure nutrients shall be credited according to UWEX recommendations
   B. Organic byproducts (sludge, septage, industrial waste) shall be analyzed for nutrient content and spread according to existing regulations
   C. If phosphorus (P) is to be applied in one year to meet P need over the crop rotation, subsequent nutrient applications shall be adjusted so as to not exceed crop removal of P over the rotation

CRITERIA FOR GROUNDWATER PROTECTION
Applies to high permeability soils (sands, etc.), soils with less than 20 inches to bedrock, or soils with less than 12 inches to apparent water table.
1. Commercial N Application Restrictions:
   A. No fall N applications - Exception: Establishment of fall-seeded crops, 30 lb N/acre max.
   B. Meet one of the following on irrigated fields:
1) Apply majority of crop N after crop establishment (sidedress or split), or 
2) Utilize a nitrification inhibitor

2. Manure N Application Restrictions:
   A. When applied at soil temperatures greater than 50°F, meet one of the following:
      1) Use a nitrification inhibitor and limit rate to 120 lbs. N/acre, or
      2) Apply after Sept. 15 and limit rate to 90 lbs. N/acre, or
      3) Apply to perennial or fall-seeded crops and limit rate to 120 lbs. N/acre or the 
crop’s N requirement – whichever is less.
   B. When manure is applied in fall and soil temperatures are 50°F or lower, limit rate to 120 
lbs. N/acre

3. Phosphorus Leaching Restrictions:
   A. The leaching index component of the phosphorus index (PI) shall be used to identify 
fields with a high risk of P delivery to groundwater under the following circumstances:
      1) Fields receiving nutrients are located in an area of documented P enrichment 
         of groundwater
      2) Fields receiving nutrients have highly permeable soils and tile drainage out-
         letting to surface water
   On those fields identified as high risk, additional P restrictions shall be implemented.

CRITERIA FOR SURFACE WATER PROTECTION
A strategy for managing P must use either criterion 1 or 2 on all farm fields/tract that receive nutrients

1. Criterion 1: Conduct a PI to Rank Individual Fields for P Delivery Potential
   A. The PI integrates soil erosion estimates, soil test P values, P transport mechanisms, 
      manure and fertilizer management practices of fields. PI model, interpretations, and 
      management recommendations found at: http://wpindex.soils.wisc.edu
   (July 2002) 590 Standard Wisconsin Technical Note Part I, page 5
   Apply one of the P management Criterion strategies uniformly to all fields within a tract.
   The Phosphorus Index (PI) management strategy calculated on individual fields:

<table>
<thead>
<tr>
<th>PI</th>
<th>Description</th>
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<tbody>
<tr>
<td>PI 0 to 2</td>
<td>Minimal risk, N-based</td>
</tr>
<tr>
<td>PI 2 to 6</td>
<td>PI should not increase over 4 years or length of average rotation.</td>
</tr>
<tr>
<td>PI greater than 6 but less than 10</td>
<td>Implement nutrient management plans to decrease the PI &lt;6 over two rotations (6 years). Determine how much is due to particulate P and how much to soluble, then implement improved management strategies to lower P Index.</td>
</tr>
<tr>
<td>PI 10 and up</td>
<td>Implement nutrient management plans to decrease the PI to less than 10 in one rotation (4 years) and to less than 6 over two additional rotations (6 years).</td>
</tr>
</tbody>
</table>

2. Criterion 2: P Application Restrictions Based on Soil Test P Values:
   A. 50 ppm P or less - Nutrient applications allowed up to crop N need
   B. 50 – 100 ppm P - Applications of P shall not exceed crop removal over a 4-year 
      rotation
   C. 100 ppm P or greater - Eliminate P applications
      - Exception: If P (i.e. manure) must be applied, applications shall be less than 
        annual crop removal and one of the following must be in place: minimum 30% 
        residue cover, fall cover crops, or contour and/or buffer strips
      - Exception: For potatoes, P applications shall not exceed rotational crop removal 
        if soil tests are optimum, high, or excessively high
   C. Nutrient applications on non-frozen areas within 1,000 feet of a lake, pond, flowage or 
      within 300 feet of a river or stream require use of one or more of the following 
      management practices:
vegetative buffers, 30% or greater crop residue, incorporation of nutrients, leaving adequate residue to meet “T”, or fall cover crops