Components of a Nutrient Management Plan

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Nutrient & Pest Management Program

Soil & Water Management
Farm & Industry Short Course
Nutrient Management

- Combine on-farm nutrient sources, with commercial fertilizer, to meet crop need

  - On-farm nutrient sources (manure and legumes)
  - Commercial fertilizer

- Minimize nutrient losses
Nutrient management strategy

- Measure current levels of soil fertility
- Determine crop nutrient needs
- Account for on-farm nutrient resources
  - Manure applications
  - Legumes in crop rotation
  - Residual soil nitrate
- Adjust commercial fertilizer application rates
What is a Farm Nutrient Management Plan?

- A strategy for obtaining the maximum return from on-farm and commercial fertilizer resources in a manner that protects water quality.

- If required for compliance with an agricultural or environmental program, the plan must meet the USDA-Natural Resources Conservation Service Nutrient Management Standard – 590.
Nutrient Management Plan
- Basic Components -

- Soil Test Reports
- Inventory of On-farm Nutrient Resources
- Nutrient Crediting
- Farm Conservation Plan
- Manure Inventory
- Manure Spreading Plan
  - Map showing restricted areas
- Meets the 590 Nutrient Mgmt. Standard
- Annual Updates
Components of the 590 Nutrient Management Standard

- General concepts of nutrient management
  - Based on University of Wisconsin-Extension research recommendations
- Broken into three criteria:
  - Minimum requirements
  - Minimize nutrient entry to groundwater
  - Minimize nutrient entry to surface water
Nutrient Management Standard: Minimum Requirements

- Soil testing
  - Every four years (minimum)

The soil sample has to represent the field.
Nutrient Management Standard: Minimum Requirements

- Soil testing
- Field-specific nutrient budgets
  - Consistent with UWEX fertilizer recommendations.
Nutrient Management Standard: Minimum Requirements

- Soil testing
  - Every four years (minimum)
- Field-specific nutrient budgets
  - Consistent with UWEX fertilizer recommendations.
- Credit nutrients from non-commercial fertilizers according to UWEX recs.
Efficient fertilization utilizes all sources of nutrients!
On-farm Nutrient Sources

1. Manure
If You Are Going To Use Manure as a Fertilizer...

Treat It Like A Fertilizer!
Needed To Properly Credit Manure Nutrients:

- Available nutrient content
  - Book values
  - Laboratory analysis
Needed To Properly Manage Manure Nutrients:

- Available nutrient content
  - Book values
  - Laboratory analysis
- Manure application rate
On-farm Nitrogen Sources

1. Manure
2. Legumes
Legume Nitrogen Credits

Alfalfa provides significant amounts of nitrogen to crops following in the rotation.
On-farm Nitrogen Sources

- 1. Manure
- 2. Legumes
- 3. Residual Soil Nitrate
# Worksheet for a Step-by-Step Guide to Nutrient Management on Your Farm

Complete One Form Per Field

## 1. Field Information

<table>
<thead>
<tr>
<th>a) Field ID</th>
<th>b) Year</th>
<th>c) Acres</th>
<th>d) Crop to be grown</th>
<th>e) Soil name</th>
<th>f) Previous crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td>15</td>
<td>Corn</td>
<td>Sisson silt loam</td>
<td>Corn</td>
</tr>
</tbody>
</table>

## 2. Nutrient Need

<table>
<thead>
<tr>
<th>N (lbs/acre)</th>
<th>P(_2)O(_5) (lbs/acre)</th>
<th>K(_2)O (lbs/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>c) Total nutrient need</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

## 3. Nutrient Credit

<table>
<thead>
<tr>
<th>a) Manure</th>
<th>b) Legume</th>
<th>c) Residual nitrate (if test was not conducted enter 0)</th>
<th>d) Other sources (whey, sludge, etc., must have sample analysis)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>e) Total nutrient credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

## 4. Adjusted Nutrient Need

(Total nutrient need - Total nutrient credit)

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
</table>
Nutrient Management Standard: Groundwater Protection Requirements

- UWEX rate recommendations for nitrogen
- On sands and loamy sands:
  - No fall application of commercial nitrogen
  - Fall liquid manure applications when soil temperatures are > 50° must contain a nitrification inhibitor
Nutrient Management Standard: Groundwater Protection Requirements

- UWEX rate recommendations for nitrogen
- On sands and loamy sands:
  - No fall application of commercial nitrogen
  - Fall liquid manure applications when soil temperatures are $> 50^\circ$ must contain a nitrification inhibitor
- No manure can be applied to the following areas unless incorporated:
  - 200 feet up-gradient of wells, sinkholes, cracked bedrock
  - Other locally identified areas
Nutrient Management Standard: Surface Water Protection Requirements

- UWEX rate recommendations for phosphorus (P).
- Manure application rates limited by either:
  1) Soil test P criteria, or
  2) Phosphorus Index (PI) ranking
Soil Test Phosphorus
- Critical Values -

- < 50 ppm P:
  N-based nutrient management plan.

- 50 – 100 ppm P:
  P application not to exceed total crop P removal over the rotation.

- > 100 ppm P:
  Eliminate P applications
  - Unless required for high-demanding crop in rotation.
  - Unless no other option, then apply at less than crop removal of P with soil conservation practices in place.
  - Use P Index.
Phosphorus Index

- Measures the relative potential for a field to deliver P to surface waters.
- Evaluates site loading (quantity of P) and transport potential (erosion and runoff) from individual fields.
- Field characteristics required.
- Agricultural management practice recommendations based on PI value.
The Wisconsin P Index

L. G. Bundy, L. Ward Good, and W.M. Jarrell
Dept. of Soil Science - University of Wisconsin-Madison

http://wpindex.soils.wisc.edu
Nutrient Management Standard: Surface Water Protection Requirements

- UWEX rate recommendations for phosphorus.
- Manure application rates limited by either:
  1) Soil test P criteria, or
  2) Phosphorus Index (PI) ranking
- Soil loss tolerance (T) is not to be exceeded on fields receiving nutrients.
Nutrient Management Standard: Surface Water Protection Requirements

- UWEX rate recommendations for phosphorus.
- If not incorporated within 3 days, manure applications not to exceed 75 lb of available P$_2$O$_5$/acre/year. If incorporated, nitrogen becomes the restricting nutrient.
- Soil loss tolerance (T) is not to be exceeded on fields receiving manure.
- Manure not to be spread in waterways, wetlands, terrace channels, etc.
Nutrient Management Standard: Surface Water Protection Requirements

▪ Manure not to be applied to the following areas unless injected or incorporated:
  ▪ 300 feet of streams or 1,000 feet of lakes
  ▪ 200 feet up-gradient of wells, sinkholes, cracked bedrock

*Remember: Do not exceed “T”.*
Nutrient Management Standard: Surface Water Protection Requirements

- Manure applications not to be applied on frozen or snow covered fields in the following areas:
  - Within 300 feet of streams or 1,000 feet of lakes
  - Slopes > 9% (up to 12% with soil conservation practices)
  - Other locally identified areas
Nutrient Management Planning
- Information Needed -

- Soil test reports & fertilizer recommendations
- Soil conservation plan
  - Identifies crop rotation, soils, slopes, waterbodies, etc
  - May need updating
- On-farm nutrient resource inventory
  - Manure, legumes, organic wastes
- Manure spreading restrictions
  - Usually identified with a map
- Manure spreading plan
Nutrient Management Planning
- Plan Delivery -

- Farmer friendly & understandable
- “Do-able”
- Updated at least annually
MECHANICS OF PLAN ASSEMBLY

Nutrient Mgmt Plan Components:

Soil Test Reports

- Are they current?
- Are they from an approved lab?
- Have acreage guidelines been met?
MECHANICS OF PLAN ASSEMBLY

Nutrient Mgmt Plan Components:

Conservation Plan Information

- Actual vs tolerable soil loss
- Crop rotation
- Field slope (%)
- Residue / tillage requirements
- Soil maps
- Aerial photos
- Are farmer’s field id consistent with plan?
- Are field boundaries and acreage accurate?
Nutrient Mgmt Plan Components:

- Inventory of Manure Production and Equipment Capabilities
  - Annual manure production estimate
  - Manure spreader calibration
  - Manure spreader capabilities
MECHANICS OF PLAN ASSEMBLY

Nutrient Mgmt Plan Components:

ID Areas With Manure Restrictions

- Slopes greater than 9 or 12%
- Waterways
- Frozen or snow-covered ground restrictions
  - Within 1000 ft of lake, pond, or flowage
  - Within 300 ft of river or stream
  - 200 ft uphill of direct groundwater conduits, etc.
Nutrient Mgmt Plan Components:

**Narrative**
- Explain deviations from the 590 standard
- Explain manure application restrictions
  - no winter spreading
  - critical areas
  - surface water setbacks
- Verify farms ability to utilize produced manure
- Manure spreading agreements
- Fertility or liming alerts
MECHANICS OF PLAN ASSEMBLY

Nutrient Mgmt Plan Components:

Provide Fertilizer Recommendations

- Balance crop nutrient needs with on-farm nutrients and commercial fertilizers
- Grouping/lumping of similar fields is allowed and encouraged on farms with numerous, small fields
Nutrient management strategy

- Measure current levels of soil fertility
- Determine crop nutrient needs
- Account for on-farm nutrient resources
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