1) SCOPE

a) The work shall consist of designing an annual nutrient management plan for the timing, form, method, rate, and location (including application setbacks) of nutrient application used to supply nutrients to plants while minimizing environmental losses due to runoff, erosion, leaching, denitrification, volatilization or other losses.

b) Each nutrient management plan must include a nutrient budget for each field and include maps (aerial site photograph or USGS map, soils map and topography map). Sensitive areas (i.e. surface water, sandy soils) and setbacks shall be indicated on the maps.

c) Use soil samples and manure nutrient analysis (as applicable) when making nutrient management decisions.

d) Complete nitrogen (N) leaching risk assessment (for all fields) and phosphorus (P) index risk assessments (for fields where manure, compost, organic by-products or municipal biosolids is applied) for each field in the nutrient management plan.

e) Identify low risk fields for surface application of nutrients on frozen and snow-covered-soils. When necessary to apply nutrients on frozen or snow-covered soils use application guidelines in Section 11.

f) Develop and maintain a nutrient management recordkeeping system as defined in section 13 of this document.

2) DEFINING SOIL SAMPLING AND NUTRIENT BUDGET AREAS. Additional sampling guidelines can be found in University of Nebraska (UNL) NebGuide G1740 “Guidelines for Soil Sampling”.

a) Soil samples for nutrient analysis should always be taken from fields with similar soils and managements and should never represent an area greater than 40 acres. Areas of the field for which any of the following are different should be sampled separately.

   i) Soil texture, slope or landscape position that affect yield potential or nutrient availability (i.e. soil organic matter, soil texture, bottomland versus upland),

   ii) Previous crop (i.e. soybeans or other legume that provide an nitrogen credit),

   iii) Manure history (i.e. manure applied to only a portion of a field),

   iv) Fertilizer history (i.e. higher rate of nitrogen applied in one area versus another in previous year),

   v) Dryland vs. irrigated,

   vi) Irrigation water management practices that may have leached nitrate differently (i.e. upper, middle and lower end of a gravity irrigated field), and

   vii) Other significant differences in site conditions, or management history.
b) One nutrient budget can be developed for multiple fields or sampling areas if soil test values are similar, and the following are the same:
   i) Crop planted (i.e. corn, wheat, sorghum, etc.),
   ii) Irrigation method,
   iii) Realistic yield goals, and
   iv) Nitrogen credits (i.e. previous legume crop, manure history, etc.).

   c) Additional requirements if site specific nutrient management is utilized are as follows:
      i) Soil samples will be taken using either grid sampling and/or management zones (directed) sampling. Additional information on soil sampling for site specific nutrient management can be found in University of Nebraska Extension Circular EC-154 “Soil Sampling for Precision Agriculture”.
         (1) Grid Sampling
            (a) When using grid sampling a sampling density of at least one sample per 2.5 acres is required. A sampling density of one sample per acre is recommended for fields with more apparent variability;
            (b) Grid sampling is typically used for surface samples and all nutrients other than nitrogen.

         (2) Management Zone (directed) Sampling
            (a) When using directed sampling, each management zone shall be no larger than 20 acres in size;
            (b) Spatial tools such as soil maps, aerial photos, yield maps, and other maps of soil variability such as maps from previous grid sampling efforts can be used to direct where samples are taken to determine if they have different fertilizer needs;
            (c) In addition, if parts of the field had different preceding crops, different fertilizer/manure history, eroded areas, or old farmsteads they should be sampled separately;
            (d) Ideally each management zone should have similar site and soil conditions (i.e. soil texture, soil color, organic matter, slope, drainage, etc.);
            (e) Soil samples for nitrogen management generally use directed sampling rather than grid sampling because it is more practical.

         (3) A combination of grid and directed sampling may be utilized. For example, surface grid samples may be utilized for amendments/nutrients other than nitrogen, and directed management zone sampling used for nitrogen management.

      ii) In order to utilize site specific nutrient management a variable rate fertilizer applicator equipped with GPS guidance technology must be available to apply recommended nutrients and the management zones must be identified with GPS coordinates.

3) DETERMINING REALISTIC YIELD GOALS
   a) Realistic yield goals are attainable yields and should be based on expected yields with clear documentation as follows:
i) Use a five-year average yield plus 5% based on actual records such as scale tickets, yield monitors, certified crop insurance yield documentation, or Farm Service Agency (FSA) certified yields when available. Do not include yields from when a significant crop loss occurred from hail, drought, wind or other natural disasters, or

ii) If actual yields are not available, use five year county average yields from FSA or National Agricultural Statistics Service plus 5%.

b) For new crops, industry-demonstrated yield, and nutrient utilization information may be used until University of Nebraska information is available.

4) SOIL SAMPLING AND ANALYSIS REQUIREMENTS.

a) Use appropriate soil test methods (refer to appropriate University of Nebraska NebGuides and/or Extension Circulars).

b) Soil samples must be collected prior to application of fertilizer and/or manure.

c) Surface Soil Sampling and Analysis:

i) Surface soil samples must be collected at 0-8” for most nutrients (University of Nebraska guidelines). Refer to University of Nebraska (UNL) NebGuide G1740 “Guidelines for Soil Sampling” for the number of samples, methods of sampling, etc. required for surface soil sampling.

(1) For fields that must complete Phosphorus Index Risk Assessments, soil samples for soil test phosphorus (STP) levels should be collected at depths of 0-2” or 0-8”.

(a) It is preferred that soil samples are collected at depths of 0-2” if:

(i) tillage is conservation tillage or no-till, including perennial grass or forage;

(ii) manure and/or phosphorus fertilizer is predominantly surface applied; and

(iii) STP is greater than 25 ppm Bray1-P.

(b) If the above conditions are met and soil samples are collected at depths of 0-8”, the Phosphorus-Index will estimate the STP concentration the 0-2” depth based on soil texture and the type of phosphorus test used. (See Extension Circular EC195 “The Nebraska Phosphorus Index (2012): Background and Users Guide).

ii) Surface soil samples must be analyzed for pH, organic matter, nitrates, phosphorus and potassium.

iii) Where salts or excess sodium are a concern, samples should be analyzed for electrical conductivity (EC) and sodicity.

iv) Surface soil test for other nutrients may be done as necessary if nutrient deficiencies are suspected.

v) At a minimum, surface soil tests for organic matter, pH, phosphorus and potassium must be completed at least once every five years (unless more stringent testing is required).

vi) Surface soil samples must be collected at the same point in the crop rotation and during the same time of the year in subsequent years to determine trends.

d) Deep Nitrate Sampling and Testing:

i) Nitrate-N soil test results must be from a current year test or they are not valid.

ii) Nitrate-N values (in ppm) shall be listed for each depth sampled.
iii) Refer to NebGuide G1740 for the timing, number of samples, methods of sampling, depth of samples, etc. required for deep nitrate sampling. Additional guidelines are as follows:

1. Deep nitrate sampling depths will never be less than 2 feet.

2. University of Nebraska nitrogen recommendations for corn and sorghum are based on a 48-inch sampling depth and on a 36-inch depth for most other crops. When depth of sampling is less than this, an appropriate estimated value can be used below the sampling depth. When soil test results for nitrate-N are not available and to avoid over-crediting soil nitrate, use a default value of 3 ppm for medium and fine textured soils and 1.5 ppm for sandy soils to calculate the N recommendation. For additional information see University of Nebraska Extension Circular EC117 “Fertilizer Suggestions for Corn”.

3. Timing of soil nitrate sampling:
   a. For spring planted crops on medium and fine textured soils, samples can be taken in the fall after the harvest of the previous crop;
   b. For fall planted crops on medium and fine textured soils, samples can be taken during the early fall prior to planting, or after emergence of the crop;
   c. Samples on coarse textured (sandy) soils must be taken in the same season that the crop is planted (i.e. spring for corn, fall for winter wheat), or after emergence of the crop unless manure or fertilizer is fall applied in which case soil samples must be taken prior to nutrient application.

4. Deep nitrate soil tests are required annually whenever nitrogen fertilizer or manure will be applied with the following exceptions and guidelines:
   a. Non-legume crops following annual or biennial legumes (i.e. corn following soybeans and clover) – Deep nitrate tests are not necessary unless there is a reason to believe nitrate levels are elevated due to previous applications of manure or nitrogen fertilizer, drought, crop failure, or any other reason there might be residual nitrogen in the soil profile;
   b. Non-legume crops following alfalfa or other perennial legume (i.e. corn following alfalfa) – Deep nitrate tests are not necessary unless there is a reason to believe they are elevated;
   c. Pastures/CRP – Deep nitrate tests are not necessary unless there is a reason to believe they are elevated due to previous applications of manure or nitrogen fertilizer. Refer to University of Nebraska recommendations for fertilizing grass pastures and haylands;
   d. Deep nitrate tests are not required when the only source of nitrogen is a starter fertilizer and less than 25 pounds of total nitrogen will be applied;
   e. When deep nitrate tests are not taken, an assumed value of at least 3-ppm for residual nitrate values will be used in the nutrient budget in addition to appropriate nitrogen-credits when following legumes.

5. Soil test analyses must be performed by laboratories successfully meeting the requirements and performance standards of the North American Proficiency Testing Program-Performance Assessment Program (NAPT-PAP) under the auspices of the Soil Science Society of America (SSSA) and NRCS, or other
NRCS-approved program that considers laboratory performance and proficiency to assure accuracy of soil test results.

5) SUPPLEMENTAL TESTS FOR NITROGEN MANAGEMENT (optional tests)

a) Cornstalk Nitrate Test. *Additional information can be found in the Iowa State University (ISU) Extension publication, PM 1584 “Cornstalk Testing to Evaluate Nitrogen Management”:*

i) The concentration of nitrate in the stalk at the end of the growing season reflects all factors that influenced nitrogen availability and nitrogen needs during the growing season. This test is used to determine if the crop had adequate nitrogen at the end of the growing season and enables the producer to evaluate their current fertility program and adjust accordingly.

ii) Sampling Procedures:

   (1) Stalks should be sampled up to three weeks after black layer has formed on 80% of the kernels.

   (2) Each sample will consist of 15 8-inch stalk segments taken from 6 inches above the soil surface according to criteria outlined in Section 2 “Defining Soil Sampling and Nutrient Budget Areas”;

iii) Stalk nitrate concentrations can be divided into four categories (based on ISU Extension publication PM-1584): **low** (less than 250 ppm), **marginal** (250 to 700 ppm), **optimal** (700 to 2,000 ppm), and **excess** (greater than 2,000 ppm), where:

   (1) *Low* category indicates high probability that greater availability of nitrogen would have resulted in higher yields. Visual signs of nitrogen deficiency usually are clear when nitrate concentrations are in this range.

   (2) *Marginal* category indicates that nitrogen availability was very close to the minimal amounts needed. Visual signs of nitrogen deficiency often are observed in this range.

   (3) *Optimal* category indicates high probability that nitrogen availability was within the range needed to maximize profits for the producer. The higher end of this range is more appropriate when fertilizer nitrogen is relatively inexpensive and grain prices are relatively high. The lower end of the range is most appropriate when fertilizer nitrogen is relatively expensive and grain prices are relatively low.

   (4) *Excess* category indicates high probability that nitrogen availability was greater than if fertilizer nitrogen had been applied at rates that maximize profits for producers.

iv) When interpreting the results of the test, considerations must be given to weather conditions that occurred during the growing season, where:

   (1) Drought conditions can result in elevated nitrates in the lower stalk. This can be due to nitrate uptake late in the season in combination with much reduced grain fill or missing ears. For chopping grain silage, the long-standing suggestion is to raise the cutter bar and leave more of the stalk portion with high nitrate to reduce nitrate toxicity in feeding livestock (ISU Extension publication PM-1584).

   (2) With extremely wet conditions, stalk nitrate concentrations may be unusually low due to excess rainfall and nitrogen losses and/or high grain yield. (ISU Extension publication PM-1584).
b) Pre-Sidedress Soil Nitrate Test (PSNT). Additional information can be found in the ISU Extension publication PM-1714 “Nitrogen Fertilizer Recommendations for Corn in Iowa”.

i) The PSNT is an in-season soil nitrate test for corn production used to determine soil nitrogen availability prior to side-dress applications.

ii) The PSNT is recommended for fields to which manure has been regularly applied because it accounts for mineralized nitrogen from the manure as well as some of the variability associated with manure application.

iii) Sampling Procedures:
   1. Soil samples for the PSNT should be taken to a depth of 12 inches when the corn is 6 to 12 inches tall.
   2. Collect a minimum of 15 cores for each sample using the criteria outlined in Section 2 “Defining Soil Sampling and Nutrient Budget Areas”. If the field has had manure applied, 20-25 cores should be collected.

iv) Interpreting PSNT Results. (Follow ISU Extension Publication PM 1714.)
   1. Iowa State University has the most specific PNST-based nitrogen recommendations. For fields in continuous corn or corn following soybeans, ISU recommends subtracting the soil nitrates from 25 ppm (critical level) and multiplying the difference by 8. For example, with a soil test of 18 ppm nitrate-N, the nitrogen recommendation would be: 25-18 =7 x 8= 56 lb Nitrogen/acre.

v) Recommendations. (Follow ISU Extension publication PM-1714.)
   1. Manured fields, fields with alfalfa the prior year, and fields where more nitrogen loss than normal is thought to have occurred, are excellent candidates for the PSNT test.
   2. The ISU Extension publication PM-1714 “has a specific table for this situation. If soil tests are over 23 ppm, additional nitrogen is not recommended. The University of Nebraska nitrogen algorithm does not use PSNT values but uses pre-plant nitrate-nitrogen tests and gives 8 lb of nitrogen credit for each ppm of residual nitrate-nitrogen (See EC117 “Fertilizer Suggestions for Corn”).

6) MANURE, COMPOST, ORGANIC BY-PRODUCTS, AND BIOSOLIDS SAMPLING AND LABORATORY ANALYSIS (TESTING). Additional sampling and testing guidelines can be found in University of Nebraska (UNL) NebGuides G1450 “Sampling Manures for Nutrient Analysis” and G1780 “Manure Testing: What to Request”.

a) Nutrient values of manure, compost, organic by-products and biosolids must be determined prior to land application.

i) For existing operations, if manure is tested before the application event, the nutrient test results can be used to determine application rates for the manure and commercial fertilizers.
   1. When manure sampling prior to application not practical due to agitation limitations, feeding operations that have consistent feeding and manure management history can determine application rates based on 5-year average results of past manure analysis.
   2. If no prior test results are available, use “book values” recognized by the NRCS, University of Nebraska or 5-year average results of past manure analyses from a

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similar operation in the same geographic area (as approved by NRCS) for determining application rates and sample the manure during the application event. Upon receipt of the manure nutrient test analysis results, the actual manure nutrient application rates can be re-calculated and the subsequent commercial fertilizer application rates can be adjusted.

ii) When planning for new or modified livestock operations, “book values” are acceptable.

b) Manure shall be sampled annually in accordance with University of Nebraska guidelines. Each type of livestock waste (e.g. beef, swine, dairy, poultry, etc. and solids, litter, slurry, wastewater, runoff, etc.) and each type manure storage structure (e.g. pens, debris basin, stockpile, compost pile, holding pond, storage structure, deep pits and lagoons, etc.) should be sampled and analyzed. Sampling procedures include:

i) Solid and Semi-Solid Manure:
   (1) Collecting samples from open lots and manure piles is acceptable.
      (a) Collect 20 or more samples from open lots, avoiding feed and watering areas. Place samples in a 5-gallon bucket, mix thoroughly and sub-sample.
      (b) For manure piles, use an auger or soil probe to collect samples from 6 inches below the surface targeting the center of the pile. Collect 15 or more samples (30 is optimum) from stacks into a 5-gallon bucket. Mix samples thoroughly and collect a sub-sample to be sent to the laboratory.

   (2) Collecting samples during loading or application is preferable.
      (a) Hand-grab samples from at least 10 spreader loads to form a composite sample, or

   (3) Sample manure during application by spreading a plastic sheet or tarp at least 4 foot by 4 foot in the path of applicator.

ii) Liquid and Slurry Manure:
   (1) Remember, NEVER ENTER CONFINED MANURE STORAGE DEEP PITS WITHOUT APPROPRIATE SAFETY EQUIPMENT.
   (2) Sampling during pumping, loading, or after loading of liquid and slurry manure is preferred. Collect a sample in a clean container from the pump during loading or when pumping to an irrigation system or an umbilical cord applicator. Samples can be taken from the unloading part of a tank spreader immediately after loading. Take samples from several loads or at several pumping intervals to ensure a representative sample.

   (3) If sampling from the storage facility is the only option, development of a sampling tool made with PVC pipe should be considered. If a storage structure is sampled without agitation, it is important to obtain samples from various depths due to stratification of nutrients. Collect at least 20 sub-samples in order to obtain a good estimate of manure nitrogen content.

   (4) Liquid manure applied through sprinkler irrigation systems can also be collected during application. Place collection pans or buckets at eight or more points throughout the application area to collect the manure.
c) Label the sample container for identification, including your name and address, sample identification, date of sampling, manure type and sample location. Use University of Nebraska guidance for storage and delivery/shipping. Keep samples chilled (refrigerated) and if shipped by package, insulate container in layers of newspaper or add cold packs. Avoid weekend delays in shipping by sending early in week.

d) Manure nutrient analysis should be completed in accordance with University of Nebraska guidelines. Manure testing shall be done by laboratories successfully meeting the requirements and performance standards of the Manure Testing Laboratory Certification program (MTLCP) under the auspices of the Minnesota Department of Agriculture, or State recognized program that considers laboratory performance and proficiency to assure accurate manure test results.

i) Manure and wastewater samples must be analyzed annually for the following:

1. Total Nitrogen,
2. Total Ammonium-N,
3. Total Phosphorus,
4. Total Potassium, and
5. Percent moisture or dry mater concentrations or content.

ii) Manure and wastewater sample reports should include the above nutrients plus Total Organic-N.

7) NITROGEN RECOMMENDATIONS

a) Follow University of Nebraska recommendations per Extension Circular EC155 “Nutrient Management for Agronomic Crops in Nebraska”, current University of Nebraska NebGuides or software.

b) Appropriate nitrogen credits must be accounted for as follows:

i) Soil Test Residual:

1. The amount of residual soil nitrogen is based on the average nitrate-N in the root zone in parts per million (ppm) to a depth of 2-4 feet depending on the crop to be grown according to University of Nebraska guidelines.

ii) Soil Organic Matter:

1. Nitrogen credit for organic matter is based on the percent organic matter from a surface soil test and can be calculated using the algorithm in Nebraska NRCS Conservation Planning Sheet 11 or in University of Nebraska NebGuide G174 for corn. For corn grown for grain the soil organic matter nitrogen credit = (0.14 x Expected Yield x % Organic Matter).

2. Nitrogen credit from organic matter for other crops will be based on current University of Nebraska software, NebGuides or Extension Circular(s) for a given crop as appropriate.

iii) Irrigation Water Nitrate:

1. If the field is irrigated and is located in an area where ground water nitrate concentrations of 10 ppm or greater have been documented, analyze irrigation water for nitrate content during the irrigation season.
(2) In subsequent growing seasons when nitrogen will be applied, credit nitrogen in irrigation water when the nitrate concentration is 10 ppm or greater based on a nitrate test from the previous irrigation season.

(3) Nitrogen is credited based on normal seasonal application rates during the growing season (prior to milk stage for grain crops), or as follows: 6” (east), 9” (central), 12” (west), or 15” (Panhandle).

(4) Pounds of nitrogen/acre credited = [(inches pumped X ppm nitrate-N X 2.7) ÷ 12].

(5) Nebraska NRCS Conservation Planning Sheet 11 “Nutrient Management” contains an example chart listing pounds of nitrogen/acre credited based upon water application rate and ppm nitrogen content of water.

iv) Legume Nitrogen:

(1) Pounds of nitrogen credited are based on Nebraska NRCS Conservation Planning Sheet 11, or current University of Nebraska software, NebGuides or Extension Circulars.

v) Manure or other organic amendments:

(1) Manure application over the past three years will be credited per University of Nebraska recommendations (NebGuide G1335 “Determining Crop Available Nutrients from Manure”).

8) MANAGEMENT ADJUSTMENTS FOR NITROGEN APPLICATION

a) Complete a Nitrogen Leaching Risk Assessment for each field in the nutrient budget using Table 1. Adjust management (e.g. timing of application, method, use of a nitrification inhibitor, and/or formulation of manure/fertilizer applied) in order to avoid excessive nitrogen leaching losses. Note: For Nitrogen Leaching Risk Assessment purposes do not include starter fertilizers or manure that is high in organic nitrogen, such as swine slurry or chicken litter, which is surface applied on medium or fine textured soils and not incorporated within 72 hours.

Table 1. Nitrate Leaching Potential of Inorganic Nitrogen Sources*

<table>
<thead>
<tr>
<th>Timing of Application</th>
<th>Soil Texture</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Coarse</td>
</tr>
<tr>
<td>Fall Application</td>
<td>High</td>
</tr>
<tr>
<td>Spring Application, Pre-plant</td>
<td>High-Medium</td>
</tr>
<tr>
<td>Sidedress or Split Application</td>
<td>Medium-Low</td>
</tr>
</tbody>
</table>

| Soil Textures                  | Sand, loamy sand and sandy loam | Silt, silt loam and loam | Clay, silty clay loam, silty clay, clay loam, sandy clay loam and sandy clay |

*Leaching Potential for inorganic sources of nitrogen are based on soil texture and timing of application.

b) Where Nitrogen Leaching Risk Assessment results equate to:

i) **High Risk**, adjust nitrogen application timing and/or methods as follows:
(1) Commercial nitrogen fertilizer or manure high in inorganic nitrogen, such as swine slurry or chicken litter, shall not be fall applied when growing spring-planted crops;

(2) Commercial nitrogen fertilizer or manure high in inorganic nitrogen, such as swine slurry or chicken litter, shall be split applied when growing fall-planted crops, such as wheat or rye, with no more than 50% of the nitrogen applied in the fall;

(3) Organic sources of nitrogen such as feedlot manure may be applied in the fall when soil temperatures are 50 degrees Fahrenheit or less;

(4) Liquid manure may be applied through irrigation systems during crop growth season.

ii) Medium and Low Risk, adjust nitrogen application timing as follows:

(1) Commercial nitrogen fertilizer or manure that is high in crop available inorganic nitrogen, such as swine slurry or chicken litter, may be applied in the fall for growing spring planted crops when:
   (a) Soil temperatures are 50 degrees Fahrenheit or less; or
   (b) A cover crop, such as wheat or rye, is established.

(2) Manure that is high in crop available inorganic nitrogen, such as swine slurry or chicken litter, may be applied in the summer for growing spring planted crop when:
   (a) Manure application rates are based on phosphorus uptake rates for the planned spring crop, or
   (b) A cover crop, such as wheat or rye, is established.

(c) For site specific nutrient management a variable rate fertilizer applicator equipped with GPS guidance technology will be used to apply nitrogen at recommended rates.

9) PHOSPHORUS RECOMMENDATIONS

a) Phosphorus application rates will be based from one of the following:

   i) University of Nebraska recommendations when soil test levels are less than 30 ppm using the Bray P-1, Mehlich II or Mehlich III test or less than 20 ppm using the Olsen (Sodium bicarbonate) test.

   ii) Rates equal or less than the estimated crop removal of phosphorus in harvested biomass on sites when soil tests are greater than 30 ppm using the Bray P-1, Mehlich II or Mehlich III test, or 20 ppm using the Olsen test. Crop removal estimates can be found in Chapter 6 of the Agricultural Waste Management Field Handbook or based on University of Nebraska guidelines.

   iii) Phosphorus applications in excess of crop (or crops in a rotation) phosphorus removal are allowed when commercial phosphorus is the only source and a Phosphorus-Index Risk Assessment has been completed for each field or management unit using the Nebraska Phosphorus-Index (NE P-Index). Crop removal estimates can be found in Chapter 6 of the Agricultural Waste Management Field Handbook or based on University of Nebraska guidelines.

   iv) Phosphorus applications in excess of crop (or crops in a rotation) phosphorus removal are allowed when manure, compost, organic by-products, or biosolids of
phosphorus are the primary source and the Phosphorus Index (P-index) Risk Assessment has been completed for each field or management unit using the NE P-Index. For additional information on the NE-Index, see the University of Nebraska Extension Circular EC195.

b) Where Nebraska P-Index Risk Assessment has been completed and the phosphorus risk assessment results equate to:

i) **Low or Medium Risk**, additional phosphorus may be applied at rates greater than crop (or crop rotation) removal rate not to exceed nitrogen-based rates as follows:

(1) Annual nitrogen applications shall not exceed the University of Nebraska recommended rates for non-legume crops.

(2) Annual nitrogen applications shall not exceed nitrogen removal in harvested biomass for legume crops.

ii) **High Risk**:

(1) Additional phosphorus may be applied at a rate Phosphorus-Based manure application at a phosphorus-rate equal to the estimated phosphorus removal over a period of 5 years or less in harvested biomass (grain and crop residue) for the planned crop rotation. When such applications are made, the nitrogen application rate shall:

(a) Not exceed the University of Nebraska recommended nitrogen application rate during the year of application for non-legume crops.

(b) Not exceed nitrogen removal in harvested plant biomass during the year of application for legume crops.

(2) A strategy to reduce the NE P-Index rating to medium within five years is implemented. The strategy should include:

(a) Completed site assessment for nutrients and soil loss to determine which practices can reduce the P-Index rating to medium within five years,

(b) Change of practices to lower soil phosphorus and/or to reduce erosion and runoff sufficiently through management and/or added structures,

(c) Alternative crop rotations that may uptake more phosphorus that the normal rotation.

iii) **Very High**, no manure applications allowed until risk rating is lowered.

(1) Implement soil phosphorus drawdown and erosion/runoff reduction strategy in developing a plan to reduce Phosphorus-Index rating to a medium within five to ten years, dependant on Phosphorus-Index numerical score.

**Table 2. NE Phosphorus Index Score and Risk Ratings**

<table>
<thead>
<tr>
<th>NE P-Index Score</th>
<th>Risk Rating</th>
<th>Application Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>Low</td>
<td>N-Based</td>
</tr>
<tr>
<td>2-5</td>
<td>Medium</td>
<td>N-Based</td>
</tr>
<tr>
<td>5-15</td>
<td>High</td>
<td>P-Based plus strategy to lower risk to medium in 5 years</td>
</tr>
<tr>
<td>&gt;15</td>
<td>Very High</td>
<td>No P application until score is lowered and strategy to lower risk to medium in 5-10 years.</td>
</tr>
</tbody>
</table>
10) SURFACE APPLICATION OF MANURE TO SOILS WHEN THE TOP 2 INCHES OF SOIL ARE SATURATED FROM RAINFALL OR SNOW MELT.
   a) Under normal operating conditions for livestock wastewater structure, liquids shall not be applied to saturated soils,
   b) During chronic wet periods and 25-year, 24-hour storm events outlined in the Department of Environmental Quality Title 130, Livestock Waste Control Regulations, a discharge of effluent is not permitted unless the livestock operation has met National Pollutant Discharge Elimination System (NPDES) permit and/or State permit requirements. Discharges may include the application of wastewater onto saturated soils. State regulations must be followed.

11) SURFACE APPLICATION OF NUTRIENTS TO FROZEN AND/OR SNOW-COVERED SOILS
   a) Definitions:
      i) Frozen soil is defined as impenetrable due to frozen soil moisture but not does not include soil that is frozen to a depth of two inches or less; and
      ii) Snow-covered soil is defined as ground covered by one inch or more of snow or one-half inch of ice.
      iii) Management units are fields sub-units based on slope, soil type, etc.
   b) Nutrient Management Plans and Comprehensive Nutrient Management Plans should identify lower risk fields or management units for spreading and stacking/stockpiling manure on frozen or snow-coved soils based on the following:
      i) Low phosphorus delivery potential based on Phosphorus-Index rating score of 3.0 or less,
      ii) Manure application rates are not more than those listed in the Phosphorus-Index Summary developed for the field,
      iii) Slope of 12% or less,
      iv) Greater than 30% ground cover by plants or crop residues,
      v) Existing land treatment conservation practices (e.g. buffers, field borders, filter strips) are in average condition and maintained,
      vi) Management practices (i.e. no-till, mulch-till, contour farming, etc.) are appropriate for low erosion and runoff,
      vii) State required setbacks from surface water (e.g. bed and bank streams, wetlands, lakes, etc.) are respected, and
      viii) No manure is applied within 100 feet of drainage tile inlets that outlet directly into surface water.
   c) Surface application of manure is restricted on frozen ground (where frozen ground conditions apply) and/or snow-covered soils (where snow-covered ground conditions apply); except when the above field conditions in (12) (b) (i) thru (viii) are met and the application event complies with all applicable Federal, State and local laws and regulations.
d) Surface application of commercial fertilizer is restricted on frozen ground (where frozen ground conditions apply) and/or snow-covered soils (where snow-covered ground conditions apply); except when the above field conditions in (12) (b) (iii) thru (vii) are met and the application event complies with all applicable Federal, State and local laws and regulations and applicable setbacks.

e) Consider the following guidelines during winter application of manure:
   i) Apply to leveler fields or management units without channelized flow,
   ii) Apply to fields or management units farthest from surface water, conduits to ground water and areas of concentrated flow,
   iii) When possible, apply to the driest fields or management units, and
   iv) Minimize manure application to grass waterways.

f) Consider delaying or rescheduling manure application events if large amounts of rain are forecast (with the probability of creating runoff).

12) APPLICATION OF OTHER PLANT NUTRIENTS AND SOIL AMENDMENTS

a) All other plant nutrients and soil amendments (lime) other than nitrogen and phosphorus can be applied according to crop consultant or University of Nebraska recommendations.

b) For site specific nutrient management a variable rate fertilizer applicator equipped with GPS guidance technology will be used to apply nutrients and soil amendments at the recommended rates.

13) APPLICATION EQUIPMENT CALIBRATION

a) Calibrate nutrient application equipment annually. Like calibration of any commercial fertilizers spreader, annual calibration of manure application equipment is a key component to efficient nutrient use.
   i) Calibrate manure spreaders and irrigation pumps in accordance with University of Nebraska guidelines. (See Manure Application Calibrator Guide, pages 87-88 for solids, slurry or liquid manure, including pivot calibration. http://water.unl.edu/c/document_library/get_file?folderId=139733&name=DLFE-2379.pdf.)
      (1) Contact UNL Extension office for assistance in calibrating manure application equipment. Some offices have calibrating kits for check-out and staff trained to assist with calibration. Click on the following link for information on extension offices with these kits: http://water.unl.edu/web/manure/calibration-kits.
   ii) Calibrate irrigation pumps used for chemigation or fertigation.

   i) If manure is custom hauled and/or applied (by a professional manure applicator, etc.), retain copies of:
      (1) current equipment maintenance logs,
      (2) documented calibration events, and
(3) manure analysis reports if the manure applicator submits a manure sample to laboratory for analysis.

ii) Other important documents to obtain from a professional manure applicator include, but are not limited to:

(1) current liability insurance policy and
(2) business certifications and/or employee training certificates (for manure application) as available (certification for a business and/or their employees is voluntary in Nebraska).

14) RECORDKEEPING

a) Records will be kept for a minimum of five years for each nutrient budget field or combined fields if applicable.

b) At a minimum the following records will be kept for each nutrient budget field or combined fields if applicable:

i) Copies of applicable test results such as: soil tests, manure tests, irrigation water tests, PSNT tests, cornstalk nitrate tests, or other applicable test results.

ii) Maps showing the location of each field or management zone for which a nutrient budget was developed. Maps must include legal description.

iii) Nutrient budget calculations including crop rotation, realistic yield goal, nitrogen credits and planned nutrient application rates for nitrogen and phosphorus.

iv) Actual application location, timing, method, and rate (lbs./acre, gals./acre, tons/acre, etc.) for each nutrient and nutrient source applied, the total amount of nutrients applied per acre from all sources, and whether or not a nitrification inhibitor was used.

(1) If manure is exported, document:

(a) name and address of individual the manure was exported,
(b) type of manure and source (e.g. beef solids – stockpile; wastewater – swine storage pond, etc.),
(c) date and quantities exported, and
(c) indication that a copy of the manure nutrient analysis was provided to recipient.

(2) If manure is imported and applied, document:

(d) type of manure and source (e.g. beef solids – stockpile, wastewater – swine storage pond, etc.),
(e) name and address of individual from which the manure was imported from,
(f) date and quantities imported, and
(g) copy of the manure nutrient analysis.

(3) If manure is applied, weather conditions and soil moisture 24-hours prior to application, at the time of application, and 24-hours after application.

v) Crop type(s) and actual yield(s) in bushels/ac, tons/acre or other appropriate measurement unit and any crop residue removed;
vi) Unusual weather conditions affecting yields, e.g. drought, hail, heavy rain events, flooding, etc.

vii) Calibration date(s) of application equipment. If using a professional manure applicator, obtain copies of application equipment calibration documentation with date of calibration. See section 13 of this document.

viii) Dates of plan review, name of reviewer and any changes made as result of review.

c) Example job sheets for nutrient management records include:
   i) NE-CPA-38 “Annual Nutrient Budget/Management Plan Job Sheet”,
   ii) NE-CPA-78 “Nutrient and Irrigation Water Management Recordkeeping Job Sheet”,
   iii) NE-CPA-82 “Client Recordkeeping Worksheet”, or
   iv) Equivalent recordkeeping systems.

A complete list of all job sheets is available on the following web address: http://efotg.nrcs.usda.gov/references/public/NE/NE_Job_Sheets_TOC_NPPH.pdf.

d) Additional record keeping requirements for site specific nutrient management based on grid or directed management zone soil sampling will document the following in addition to records listed above.

i) Maps showing the locations of the grid or management zones and the associated soil test values;

ii) Variable rate documentation of the amount of each nutrient applied in each grid or management zone, such as computer generated GIS maps from variable rate application equipment.

15) FEDERAL, TRIBAL, STATE, OR LOCAL REGULATIONS/RESTRICTIONS

a) Follow federal, tribal, state, or local requirements when procedures are more restrictive than outlined in this document. This may include, but is not limited to, soil sampling procedures including soil sampling depths; soil and/or manure nutrient testing requirements; nutrient application form and/or timing restrictions; record keeping, etc. Examples include, but not limited to the following:

i) Nebraska Department of Environmental Quality (NDEQ)
   (1) Nutrient management plans for permitted livestock waste control structures.
   (2) Chemigation permitting and chemigation safety equipment for fertilizer and livestock waste.

ii) Natural Resource Districts
    (1) Nitrogen management for ground water protection,
    (2) Chemigation safety equipment for fertilizer and livestock waste.

16) PUBLICATIONS

A complete list of all University of Nebraska publications is available on the following web address: http://www.ianrpubs.unl.edu/epublic/pages/index.jsp.

a) Blackmer, A.M. Corn Testing to Evaluate Nitrogen Management. Iowa State University Extension PM 1584. Ames, IA.
b) Blackmer, A.M. Nitrogen Fertilizer Recommendations for Corn in Iowa. Iowa State University Extension PM 1714. Ames, IA.


