



# NUTRIENT MANAGEMENT and WASTE UTILIZATION PLAN SUPPLEMENTAL INFORMATION

N.C. Practice Job Sheet: NC-590-633  
(08/28/03)

Prepared for: \_\_\_\_\_

By: \_\_\_\_\_

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## WHAT IS NUTRIENT MANAGEMENT?

The conservation practice, Nutrient Management, is managing the amount, source, placement, form and timing of the application of nutrients and soil amendments to achieve realistic production goals, while minimizing nutrient movement to surface or ground waters. The practice, Waste Utilization, is using agricultural waste such as manure or wastewater in an environmentally sound manner. These practices are jointly accomplished through the development of a Nutrient Management/Waste Utilization Plan, which is normally part of a broader Conservation Plan that addresses multiple natural resource concerns on the land.

## PURPOSE OF NUTRIENT MANAGEMENT and WASTE UTILIZATION PRACTICES

Your nutrient management/waste utilization plan is intended to accomplish one or more of the following objectives:

- To budget nutrients for plant production.
- To properly utilize manure or organic by-products as a plant nutrient source.
- To minimize the delivery of agricultural nutrients to surface and ground water resources.
- To maintain or improve the physical, chemical, and biological condition of the soil.
- To utilize agricultural wastes for livestock feed or as an energy source.

## CONTENTS OF THE NUTRIENT MANAGEMENT / WASTE UTILIZATION PLAN

The information provided in this Job Sheet and the attachments meet the minimum requirements for a Nutrient Management Plan for USDA-NRCS purposes. This Nutrient Management Plan includes:

1. A plan map and soils map for the area planned (these may be part of the overall Conservation Plan).
2. Location of designated sensitive areas or resources (streams, wells, sinkholes, etc.) and any associated nutrient application setbacks, etc.
3. Your planned crop rotation.
4. Results of soil, plant, water tests.
5. Results from Phosphorus Loss Assessment Tool (PLAT) or Leaching Index (LI) as required.
6. Realistic yield expectations for the crops in the rotation, and their source if other than default values approved for N.C.
7. Recommended nutrient application rates for nitrogen, phosphorus, and potassium, as well as timing, form, and method of application and incorporation, if applicable.
8. This Job Sheet (or comparable information), that provides the following:
  - General requirements of this practice, as well as additional requirements to meet the natural resource protection purposes listed above.

- Additional considerations specific to this plan.
- Operation and maintenance information associated with this practice.

Because this Nutrient Management Plan includes agricultural organic sources, additional items are required in the plan to ensure proper waste utilization:

- Waste Utilization Agreement (if applicable)
- Waste Utilization Third Party Agreement (if applicable)
- Additional engineering design and operating information for waste storage structures, transport, and application system, as applicable. These designs, and the instructions for operating these structures, is an integral component of your overall Nutrient Management/ Waste Utilization Plan.
- Emergency Action Plan to prevent overtopping or other discharges from storage structures or facilities, as applicable.

This plan was developed based on the current NRCS 590 and 633 standards and Federal, state, or local regulations or policies. Changes in laws or regulations may necessitate a revision of the plan.

## **BASIC REQUIREMENTS FOR WASTE UTILIZATION**

### **General**

All manure and organic residues must be applied according to a nutrient management plan (see the following section, "BASIC REQUIREMENTS FOR NUTRIENT MANAGEMENT")

You are required to acquire and comply with all federal, state, or local permit requirements related to the handling and application of manure or organic materials.

The nutrient management/waste utilization plan must address all organic waste generated at or brought to the facility. A Waste Utilization Third Party Agreement must

exist to address all organic waste not handled by the nutrient management/waste utilization plan.

Manure or organic wastes will not be applied to the following areas:

- surface waters,
- wetlands, unless constructed as a component in a waste treatment system,
- soils subject to frequent flooding during the period when flooding is expected,
- frozen, snow-covered, or saturated soils,
- within 200 feet of a dwelling other than those owned by the producer,
- within 100 feet of a well,
- within 25 feet of surface waters, or
- within any other setbacks as identified by federal, state, or local laws or regulations (e.g. NC General Statute prevents swine lagoon effluent from being applied within 75 feet of a residential property boundary or perennial stream or river if the facility was sited on or after October 1995.)

Manure or organic wastes will be applied in a manner not to reach surface waters, wetlands (unless constructed as a component in a waste treatment system), property owned by others, or public right-of-way.

Sludge that accumulates in waste storage structures must be analyzed prior to land application. Adequate provisions (available land and/or third party manure agreements) must exist to ensure sludge is applied in adherence to all nutrient application requirements. All federal and state guidance regarding the proper testing, handling, planning, and application of sludge must be followed for regulated operations.

Since compliance with all applicable North Carolina laws is the responsibility of the producer, you should consult the most current version of the Guidance Memo for Implementing the Environmental Management Commission's Regulations for Animal Waste Management for questions.

## **ADDITIONAL REQUIREMENTS FOR PROVIDING LIVESTOCK FEED**

If applicable, all agricultural wastes or other organic residues used for feedstock must be

handled in a manner to minimize contamination and preserve its feed value. Chicken litter stored for this purpose must be covered. A qualified animal nutritionist shall develop rations that utilize animal wastes.

### **ADDITIONAL REQUIREMENTS FOR PROVIDING A SOURCE OF ENERGY**

If your facility is to be used for energy production, all energy producing components of the system are included in the Nutrient Management/Waste Utilization Plan and provisions for the utilization of residues of energy production identified. Your Nutrient Management Plan includes the use of these residues, if applicable.

### **BASIC REQUIREMENTS FOR NUTRIENT MANAGEMENT**

#### **General**

Application of nutrients must comply with all applicable Federal, state, and local laws and regulations.

The realistic yield expectations (RYEs) in this plan are based on one or more of the following:

- Default values approved by the N.C. Interagency Nutrient Management Committee that incorporate soil productivity information, yield data, and research with North Carolina soils, and cropping systems. Additional information on the default values may be found at:

[www.soil.ncsu.edu/nmp/ncnmwq/index.htm](http://www.soil.ncsu.edu/nmp/ncnmwq/index.htm)

- Documented actual yield data from the site, determined by the average of the highest three yields of the last five consecutive specific crop harvests. (For forage crops, determine the average of the highest three years of the last five years.)
- A fertilization rate recommended by North Carolina State University may be used in cases where no yield data or approved RYE values exist for a crop.
- An RYE inferred from a similar crop on a soil with similar physical and chemical features may be used for new crops or in the absence of other RYE data. This

inferred RYE may ONLY be specified by a certified Nutrient Management planner.

Erosion, runoff, and water management controls have been planned, as needed, on fields that receive nutrients.

#### **Soil Testing**

This nutrient management plan has been developed based on current soil test results (no older than three years).

Soil samples must be collected and prepared in accordance with North Carolina State University or the North Carolina Department of Agriculture and Consumer Services (NCDA&CS) Agronomic Division standards or recommendations.

Soil test analyses can be performed by any laboratory or program that is certified by the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Water Quality, Laboratory Section.

NCDA&CS Agronomic Division uses the Mehlich-3 extractant process for soil testing. Growers who utilize other laboratories must request the use of the Mehlich-3 methodology to ensure the test results are compatible with North Carolina's nutrient management planning and assessment tools. For statewide consistency, all laboratories used must provide fertilization recommendations using guidelines and methodologies as referenced at the NCDACS website:

[www.ncagr.com/agronomi/obook.htm](http://www.ncagr.com/agronomi/obook.htm)

Growers are encouraged to use a laboratory that is supported by field research within the state.

Soil testing shall include analysis for all nutrients for which specific information is needed to develop the nutrient plan.

#### **Plant Tissue Testing**

Tissue sampling and testing, when used, shall be done in accordance with North Carolina State University or NCDA&CS standards or recommendations.

## Manure Testing

Nutrient values of manure and organic by-products shall be established for planning purposes based on laboratory analysis, acceptable default values, or historic records for the operation.

When determining actual application rates, a laboratory analysis is required. State regulations require that waste be tested within 60 days of utilization for some operations. In the case of daily spreading, the waste must be sampled and analyzed at least once a year. Acceptable laboratories include the NCDA&CS Agronomic Division, or others certified by the NCDENR.

## Field Risk Assessment

A field-specific assessment of the potential for phosphorus transport from each field (or groups of similar fields) have been conducted, using the North Carolina Phosphorus Loss Assessment Tool (PLAT).

PLAT assesses the potential for phosphorus (P) to be transported from the site to surface water through each of the four primary loss pathways:

- sediment-bound P transported through erosion,
- soluble P transported through surface runoff,
- soluble P leached through the soil profile, and
- non-incorporated source P transported through surface runoff.

Based on the assessment of each loss pathway, PLAT produces a single rating for each field. As shown below, this rating will identify whether nitrogen or phosphorus shall be the rate-determining element in developing the planned application rate for manure.

| PLAT Rating | Nutrient Application Criteria  |
|-------------|--|
| LOW         | Nitrogen-based manure application.   |
| MEDIUM      | Nitrogen-based manure application.   |
| HIGH        | Manure application limited to phosphorus removal from site in harvested plant biomass. |
| VERY HIGH   | No additional manure application to be specified in plan for the site.                 |

On all sites, regardless of the PLAT rating, starter fertilizers may be recommended in accordance with NCSU guidelines or recommendations.

In some cases, specific conservation practices that reduce the potential for phosphorus transport have been incorporated into PLAT. Examples include buffers or filter strips, ponds, water table management, and residue management and conservation tillage. Similarly, soil erosion rates, either existing or planned, have been incorporated into your PLAT analysis. This information is shown on the PLAT results enclosed. Because the management of the site actually affects the PLAT rating, all practices identified on the PLAT analysis (including any required to achieve the specified erosion rate) must be either already installed or included in a Conservation Plan for the Nutrient Management Plan to be approved.

## Nutrient Application Rates

Recommended nutrient application rates are based on North Carolina State University or NCDA&CS recommendations that consider current soil test results, RYEs, and management.

Liming material shall be applied as needed to adjust soil pH to the specific range required by the crop or crops in the rotation for optimum availability and utilization of nutrients.

The application amount and rate (in/hr) for liquid wastes (e.g. applied through irrigation) shall not result in runoff from the site. The application shall not exceed the field capacity of the soil.

The planned rates of nutrient application are shown on the attached sheets. These rates have been computed as follows:

- **Nitrogen Application** - When the plan is nitrogen-based (a PLAT rating of Low or Medium), the application rate of manure or organic by-products shall be based on the recommended nitrogen rate using the RYE for the site (or a rate recommended by NCSU or NCDA in the case of crops without established RYEs). This may result in an application rate for other nutrients that exceeds the soil test recommendation.
- When the plan is being implemented on a phosphorus standard (a PLAT rating of High or Very High), manure or other organic by-products shall be applied at rates consistent with the phosphorus application guidance below. In such situations, an additional nitrogen application from non-organic sources may be required to supply nitrogen at the rate recommended by the RYE.
- Within the limits allowed by PLAT, manure or other organic by-products may be applied on soybeans at rates equal to the estimated removal of nitrogen in harvested plant biomass.
- All nitrogen rates for hay production are for pure grass stands. Due to the nutrient recycling by grazing animals, the planned nitrogen rate per unit yield for hay crops shall be reduced by 25% for the portion of the expected yield that is removed through grazing.
- **Phosphorus Application** – When manure or other organic by-products are used, the planned rates of phosphorus application shall be based on the PLAT rating for the site, as follows:

Low or Medium Rating – The planned manure or organic by-product application rate is based on the nitrogen needs of the crop.

High Rating – The planned manure or organic by-product application rate is

limited to the phosphorus removal rate of the harvested plant biomass.

Very High Rating – No additional manure or organic by-product application is specified in the plan.

On all sites, regardless of the PLAT rating, starter fertilizers containing nitrogen, phosphorus, and potassium may be recommended in accordance with North Carolina State University guidelines or recommendations. .

A single application of phosphorus applied as manure or organic by-product may be made at a rate equal to the recommended phosphorus application or estimated phosphorus removal in harvested plant biomass for the crop rotation or multiple years in the crop sequence.

- When such single applications are made, the rate shall:
  - ◆ not exceed the recommended nitrogen application rate during the year of application, or
  - ◆ not exceed the estimated nitrogen removal in harvested plant biomass during the year of application when there is no recommended nitrogen application, or
  - ◆ not be made on sites with a Very High PLAT risk rating.
- **Potassium Application** – Planned potassium application rates should match the soil test recommended rates as closely as possible. (This is particularly critical in situations where a potentially harmful nutrient imbalance in crops or forages may occur, such as grass tetany). When using manure or other organic sources, the addition of potassium from non-organic sources may be required.
- **Other Plant Nutrients** - The planned rates of application of other nutrients if applicable are consistent with North Carolina State University or the NCDA&CS guidelines or recommendations.

## Nutrient Application Timing

Timing of nutrient application shall correspond as closely as possible with plant nutrient uptake characteristics, while considering cropping system limitations, weather and climatic conditions, and field accessibility. Nutrients shall not be applied to frozen, snow-covered, or saturated soil.

Manure or organic by-products shall not be applied more than 30 days prior to planting of the crop or forages breaking dormancy.

For nutrients applied through irrigation systems, application equipment should be properly calibrated to ensure uniform distribution of material at planned rates.

## Plan Review and Revision Period

A thorough review and revision (if needed) of the nutrient management plan shall be conducted on a regular cycle, not to exceed five years.

## Heavy Metals Monitoring

For animal waste, including sludge, zinc and copper concentrations shall be monitored and alternative crop sites for application shall be sought when these metals approach excessive concentrations. The following criteria and actions are provided:

| ZINC                   |  |
|------------------------|--|
| Mehlich-3 Index (Zn-I) | Action   |
| 300 (21 lbs/ac)        | Peanuts are very sensitive to zinc, and application on peanuts should be limited. Seek alternative sites when possible. The risk of zinc toxicity is greater with low soil pH and has been seen at Zn-I as low as 300. * |
| 500 (35 lbs/ac)        | Critical toxic level for peanuts. Cease application on peanuts. *  |
| 2,000 (142 lbs/ac)     | Caution: Seek alternative sites when possible for all crops. *   |
| 3,000 (213 lbs/ac)     | Critical toxic level for all crops. Cease application for all crops. *   |

| COPPER                 |   |
|------------------------|---|
| Mehlich-3 Index (Cu-I) | Action  |
| 2,000 (72 lbs/ac)      | Caution: Seek alternative sites when possible for all crops. *        |
| 3,000 (108 lbs/ac)     | Critical toxic level for all crops. Cease application on all crops. * |
|                        | * Maintain pH at 6.0 on these sites.                                  |

When sewage sludge is applied, the accumulation of potential pollutants (including arsenic, cadmium, copper, lead, selenium, and zinc) in the soil shall be monitored in accordance with the US Code, Reference 40 CFR, Parts 403 and 503, and applicable state and local laws or regulations. Additional information on heavy metal criteria for sewage sludge may be found in Land Application of Sewage Sludge, EPA/831-B-93-002b publication number at:

<http://www.epa.gov/npdes/pubs/sludge.pdf>

## ADDITIONAL REQUIREMENTS FOR MINIMIZING DELIVERY OF NUTRIENTS TO SURFACE AND GROUND WATER

In areas that have been identified as impaired with agricultural nutrients being a likely source, an assessment shall be completed of the potential for nitrogen or phosphorus transport from the site. (The streams/water bodies in this category are listed in the USDA-NRCS Field Office Technical Guide, Section I.)

**NO**

This nutrient management plan **IS NOT** in an area where surface waters are impaired, with agricultural nutrients identified as a likely source. The Leaching Index (LI) is not required.

**YES**

This nutrient management plan **IS** in an area where surface waters are impaired, with agricultural nutrients identified as a likely source. The Leaching Index (LI) is included in this plan.

While the results of the LI does not affect your planned nutrient application rates, some additional conservation practices may be specified in the plan to reduce the risk of nutrient movement from the field, if applicable.

## **IMPORTANCE OF MANAGING NUTRIENTS**

Nitrogen and phosphorus are water soluble elements and either or both may be components of organic and inorganic fertilizers. In soluble forms, both can move with water as leachate down through the soil, or over the soil surface as runoff after rainfall. While nitrogen and phosphorus exist in different forms and may move through different transport processes on the same site, they both can have detrimental effects on both surface and shallow ground water quality. As an example, excess nutrients can result in accelerated eutrophication with severe algal blooms and fish kills.

Because of the topography, hydrology, and other factors in the state, the environmental problems from excess nutrients reaching surface water may not be exhibited near the contributing source, but rather create water quality problems far downstream. Consequently, the Neuse River Basin, Tar-Pamlico Basin, the Chowan River, the watershed of the B. Everett Jordan Reservoir, and the watershed of the New River in Onslow County are listed as Nutrient Sensitive waters in North Carolina.

**Nitrogen:** Nitrogen applied as fertilizer or organic material is transformed into nitrate and can move with the water moving downward into the shallow ground water and eventually to surface waters. (Relatively small amounts of nitrogen reach our surface waters through rainfall runoff. ) The Leaching Index (LI) is a required part of the nutrient management plan in some areas of the state with surface water impairments. The LI uses soils information and local climate data to assess the potential hazard from leaching of nutrients. The results of the LI analysis and recommended actions are included in your nutrient management plan, if applicable.

**Phosphorus:** Research in recent decades indicates that, with high soil phosphorus

levels, phosphorus has more potential to be transported off-site than recognized in the past. Phosphorus can be transported in several ways: (1) attached to soil particles leaving the field through erosion, (2) in soluble form leaving the field in surface runoff, and (3) in soluble form leaching downward through the soil profile, and eventually into surface water. Unlike nitrogen, the most likely transport pathway for phosphorus varies by site, and depends upon such factors as soil erosion rate, soil phosphorus levels, texture of soils, existence of buffers, and other factors. In N.C., PLAT is the tool used to assess potential excessive phosphorus losses. The results of the PLAT analysis and recommended actions are included in your nutrient management plan, if applicable.

If a site receives a PLAT rating of Low or Medium, then applying manure at rates based on the nitrogen needs of the crop is allowed. It is important to realize that this may result in phosphorus being applied at rates that significantly exceed the crop's phosphorus removal rate. In these cases, the planned nutrient application rate is not sustainable, and eventually a PLAT rating of High may be reached.

## **OPERATION & MAINTENANCE**

You are responsible for safe operation and maintenance of this practice, including all equipment. The following Operation & Maintenance should be conducted:

1. Review the plan annually to determine if adjustments or modifications to the plan are needed. (The S.B. 1217 interagency group guidelines accepted by the N.C. Division of Water Quality for .0200 operations specify a plan revision when there are changes in crops or cropping patterns that utilize more than 25 percent of the nitrogen generated by the operation.) As a minimum, nutrient management plans shall be thoroughly reviewed every five years and revised if necessary. The next review will be performed in \_\_\_\_\_.

2. Protect fertilizer and organic by-product storage facilities from weather and accidental leakage or spillage.
3. Ensure proper calibration of application equipment to ensure uniform distribution of material at planned rates.
4. Inspect and maintain the equipment and facilities used to implement the Nutrient Management/Waste Utilization Plan regularly. Any needed repairs should be made in a timely manner.
5. Review the Emergency Action Plan, if applicable, annually.
6. Records should be maintained for five years, or for a period as required by other Federal, state, or local ordinances, or program or contract requirements. To ensure adequate information exists to support sound nutrient management, NRCS recommends the following records be included:
  - Soil test results and recommendations for nutrient application,
  - Quantities, analyses and sources of nutrients applied (When the actual rates used exceed the recommended and planned rates on inorganic fertilizer plans, records should indicate the reasons for the differences, e.g. inability to acquire custom blended fertilizer.)
  - Dates and method of nutrient applications,
  - Crops planted, planting and harvest dates, yields, and crop residues removed,
  - Results of water, plant, and organic by-product analyses, and
  - Dates of review and person performing the review, and recommendations that resulted from the review.
7. Ensure that workers are protected from and avoid unnecessary contact with inorganic fertilizers and organic by-products. Protection should include the use of protective clothing when working with plant nutrients. Extra caution must be taken when handling ammonia sources of nutrients, or when dealing with organic wastes stored in poorly ventilated enclosures.
8. Properly dispose of material generated by the cleaning of nutrient application equipment. Excess material should be collected and stored or field applied in an appropriate manner. Excess material should not be applied on areas of high potential risk for runoff or leaching.
9. Properly dispose of or recycle nutrient containers according to state and local guidelines or regulations.

NOTE: State laws or regulations may define record-keeping requirements for some operations.