NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

NUTRIENT MANAGEMENT

(Ac.)

CODE 590

DEFINITION

Managing the amount, source, placement, form and timing of the application of plant nutrients and soil amendments.

PURPOSE

- To budget and supply nutrients for plant production.
- To properly utilize manure or organic by-products as a plant nutrient source.
- To minimize agricultural nonpoint source pollution of surface and ground water resources.
- To protect air quality by reducing nitrogen emissions (ammonium and NO_x compounds) and the formation of atmospheric particulates.
- To maintain or improve the physical, chemical and biological condition of soil.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all lands where plant nutrients and soil amendments are applied.

CRITERIA

General Criteria Applicable to All Purposes

Plans for nutrient management shall comply with applicable Federal, state, and local laws and regulations.

Nutrient management practices that are components of a comprehensive conservation plan shall be compatible with the plan's other resource concern solutions.

For applications of nutrients generated by animal feeding operations, this standard is applied jointly with NRCS NC practice standard 633, Waste Utilization.

A nutrient budget for nitrogen, phosphorus, and potassium shall be developed that considers all potential sources of nutrients including, but not limited to, animal manure and organic by-products, waste water, commercial fertilizer, crop residues, legume credits, and irrigation water.

Realistic yield expectations (RYEs) have been established for common North Carolina crops, based on soil productivity information, yield data, and research with North Carolina soils, and cropping systems. Planned nitrogen application rates may be based on either these established yield goals or documented actual yield data from the site. To identify an RYE based on actual yield data, determine 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. Established RYE data for each NC county is available at the NC Nutrient Management website: *http://www.soil.ncsu.edu/nmp/yields/*

If no yield data or established RYE values exist for a crop, a nitrogen fertilization rate recommended by North Carolina State University specialists may be used. In the absence of this recommendation, or until documented yield information has been collected, the nutrient management planner may infer a realistic yield from a similar crop on

a soil with similar physical and chemical features. The same procedure applies when establishing a RYE for a new crop. The nutrient management plan should document the source of the RYE.

Plans for nutrient management shall specify the source, amount, timing and method of application of nutrients on each field to achieve realistic production goals, while minimizing movement of nutrients and other potential contaminants to surface and/or ground waters. Animal operations that meet the NC state regulatory size thresholds (NC GS 143-215.10B) must operate without discharge of applied materials. See the NC DWQ Animal Feeding Operations Unit website (*http://h2o.enr.state.nc.us/aps/afou/rules.htm*) for more information.

CAFO operations seeking or holding permits under USEPA regulations (40 CFR Parts 122 and 412) should consult with the NC Division of Water Quality for additional criteria. Additional information on the EPA CAFO Rule is available at *http://cfpub.epa.gov/npdes/afo/cafofinalrule.cfm*

Areas contained within established minimum application setbacks (e.g., sinkholes, wells, gullies, ditches, surface inlets or rapidly permeable soil areas) shall not receive direct application of nutrients.

Erosion, runoff, and water management controls shall be installed, as needed, on fields that receive nutrients.

Soil and Tissue Sampling and Laboratory Analyses (Testing). Nutrient management plans shall be developed based on current soil test results. Current soil tests are those that are no older than three years, although fields that receive animal waste materials and are included in nutrient management/waste utilization plans are subject to more frequent soil tests, as required by state and NPDES permit conditions.

Soil samples shall 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 nutrient management planning and assessment tools. All laboratories used must provide fertilization recommendations using guidelines and methodologies similar to those used by the NCDA&CS Agronomic Division. Growers are encouraged to use a laboratory that is supported by field research within the state.

Soil and tissue testing shall include analyses for any nutrients for which specific information is needed to develop the nutrient plan. Request analyses pertinent to monitoring or amending the annual nutrient budget, e.g. pH, electrical conductivity (EC), soil organic matter, nitrogen, phosphorus and potassium.

Nutrient Application Rates.

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

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 planned rates of nutrient application, as documented in the nutrient budget, shall be determined based on the following guidance:

- **Nitrogen Application -** Planned nitrogen application rates shall match the recommended rates as closely as possible, except when manure or organic by-products are a source of nutrients. When manure or organic by-products are a source of nutrients, see “Additional Criteria” below.

- **Phosphorus Application -** Planned phosphorus application rates shall match the recommended rates as closely as possible, except when manure or organic by-products are sources of nutrients. When manure or organic by-products are a source of nutrients, see "Additional Criteria" below.
- **Potassium Application** - Potassium shall not be applied in situations in which excess (greater than soil test potassium recommendation) causes unacceptable nutrient imbalances in crops or forages. When forage quality is an issue associated with excess potassium application, state standards shall be used to set forage quality guidelines.
- **Other Plant Nutrients** - The planned rates of application of other nutrients shall be consistent with NC State University or NCDA&CS guidance recommendations.
- **Starter Fertilizers** - When starter fertilizers are used, they shall be included in the overall nutrient budget, and applied in accordance with NC State University or NCDA&CS recommendations. Recent NCSU research indicates that nitrogen-based starter fertilizers give an equal crop response to starter fertilizers containing both N and P on soils with Very High agronomic (according to NCDA soil tests) and/or PLAT ratings. Thus, current NCSU recommendations are that no starter P is to be applied to soils or sites that rate Very High through NCDA Soil Tests or PLAT.

Nitrogen, phosphorus, or potassium may exceed recommended rates only when custom blended commercial fertilizers are not available, or when animal manure or other by-products are used as a nutrient source (see additional criteria applicable manure application). Several sources of varying analysis fixed-ratio fertilizers should be used whenever possible to match the specified application rate as closely as possible. This provision exists to facilitate the practical application of this standard on a periodic basis. Exceeding the recommended nutrient rates (from soil test/RYE) using inorganic fertilizer on a long-term or continuous basis is not acceptable

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.

Nutrient applications associated with irrigation systems shall be applied consistent with the requirements of Irrigation Water Management (NRCS practice code 449). Application equipment should be properly calibrated to ensure uniform distribution of material at planned rates.

Plan Review and Revision Period. A complete review and, if needed, revision of the nutrient management plan shall be conducted on a regular basis of at least once every five years. Animal operations permitting conditions may require more frequent reviews of the nutrient management/waste utilization plan. For animal operations that hold NPDES permits, plan revisions could trigger a permit revision process that may include public review of the nutrient management plan.

Nutrient Management Plan Development

The acceptable values for use in nutrient management planning for RYEs, nitrogen factors, phosphorus removal rates, and default nutrient values for animal waste, are those that have been approved by the N.C. Interagency Nutrient Management Committee, and may be found at: *www.soil.ncsu.edu/nmp*

Additional Criteria Applicable to Manure or Organic By-Products Applied as a Plant Nutrient Source

When developing the nutrient management plan, nutrient values of manure and organic by-products (excluding sewage sludge) shall be established based on laboratory analysis, acceptable default values, or historic records for the operation. Acceptable default values are recognized by NRCS as those that are referenced on the North Carolina Nutrient Management website: *http://nutrients.soil.ncsu.edu/*.
For livestock classes not on the website, planners should use values from

the USDA Agricultural Waste Management Field Handbook, Chapter 4 - Agricultural Waste Characteristics.

When determining actual application rates, a laboratory analysis is the preferred method to determine nutrient values of the manure and organic by-product to be applied, and is required by state laws or rules for regulated operations. Acceptable laboratories include the NCDA&CS Agronomic Division, or others certified by the NCDENR. For determining the actual nutrient content of biosolids (sewage sludge), the materials must be analyzed annually for a minimum of 3 consecutive years. A cumulative record shall be developed until a consistent level of nutrient values is realized, and the average used as a basis for land application. Biosolids must be applied in accordance with US EPA and North Carolina regulations.

Field Risk Assessment

When animal manure or other organic byproducts are applied, a field-specific evaluation of the potential for phosphorus transport from the field shall be conducted. The North Carolina Phosphorus Loss Assessment Tool (PLAT) shall be used to complete this assessment, and the results discussed with the producer. PLAT is available for download at the NC Nutrient Management website, *http://nutrients.soil.ncsu.edu/*

Once all necessary PLAT field scenarios have been completed, the nutrient management shall include:

♦ a record of the PLAT assessment rating for each field or sub-field, and

♦ information about conservation practices and management activities that can reduce the potential for phosphorus movement from the site.

PLAT will assess the potential for phosphorus (P) to be transported from the field or sub-field 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 will produce a single rating for each site. 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	P-based manure application (limited to P uptake in harvested biomass).
VERY HIGH	No additional manure OR starter P application to be specified in plan

On all sites, regardless of the PLAT rating, starter fertilizers may be recommended in accordance with NCSU guidelines or recommendations. *Current NCSU recommendations are that no starter P is to be applied to soils or sites have a very high PLAT rating.*

Using the PLAT results as a guide, management strategies and supporting conservation practices should be planned and applied to reduce the potential for excessive phosphorus loss to surface water. In some cases, the PLAT rating can be changed for a site by modifying the factors that affect the potential for loss. Examples include:

- planning buffers or filter strips to reduce sediment-bound phosphorus delivery,

- planning residue management to reduce

runoff and soluble phosphorus delivery,

- applying erosion control practices to reduce sediment delivery,

- limiting manure application to selected portions of fields that are flatter, less erosive, or further from surface water,

- improving pasture stand condition to reduce runoff of soluble phosphorus, or modifying the amount and application method of manure.

Nutrient Application Rates. The application amount and rate (in/hr) for material 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 nitrogen and phosphorus application recorded in the plan shall be determined based on the following guidance:

Nitrogen Application Rates

- 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 Rates

- 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, organic by-product, or starter P 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. *Current NCSU recommendations are that no starter P is to be applied to soils or sites that have Very High PLAT ratings.*

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.

Nutrient Application Timing and Methods

Manure or organic by-products shall not be applied more than 30 days prior to planting of the crop or forages breaking dormancy. Manure shall be applied in accordance with criteria contained in the Waste Utilization Standard (Code 633)

Heavy Metal Monitoring. When sewage sludge (biosolids) is applied, the accumulation of potential pollutants (including arsenic, cadmium, copper, lead, mercury, selenium, and zinc) in the soil shall be monitored in accordance with the US Code, Reference 40 CFR, Parts 403 and 503, and/or any applicable state and local laws or regulations.

Additional information on heavy metal criteria for sewage sludge and biosolids may be found at *http://www.epa.gov/ebtpages/watewastewbiosolids.html*

For all animal manure or organic by-product application sites, 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.

Additional Criteria to Minimize the Delivery of Agricultural Nutrients to Surface and Ground Water Resources

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, even when no manure or organic by-products are being applied. The streams / water bodies in this category are listed in the USDA-NRCS Field Office Technical Guide, Section I, and in the NCANAT software.

The assessment tools to be used in North Carolina are the Leaching Index for Soluble Nutrients (LI) and/or the Phosphorus Loss Assessment Tool (PLAT), and may be found in the USDA-NRCS Field Office Technical Guide Sec III. PLAT is available for download within the NCANAT software at the NC Nutrient Management website: *http://www.soil.ncsu.edu/nmp/ncnmwg.* In these instances, PLAT shall only be used when the existing soil test phosphorus index (P-I) is at a level of High or Very High and no crop response is expected for the planned

crop from the additional application of phosphorus. Similarly, the LI shall only be used when the site conditions indicate the potential for leaching of nutrients.

The results of these assessments, when required, shall be discussed with the producer and included in the nutrient management plan. Regardless of the results from these assessments, the nutrient application rates shall be based on RYE rates for nitrogen and soil test recommendations for phosphorus. Conservation plans developed to minimize the delivery of agricultural nutrients to surface and groundwater resources shall include appropriate practices to reduce the risk of nutrient movement from the field.

Recent NCSU research indicates that acutely acidic soil conditions contribute to high levels of water solubility of soil P reactive products when organic waste P is applied. Thus, when soil tests show that pH is below soil target pH and lime is recommended, soils should be limed to increase soil pH to soil target levels prior to application of organic waste materials. Target pHs as established by NCDA Agronomic Division are 5.0 for Organic soil class (ORG), 5.5 for Mineral-Organic soil class (M-O), and range from 6.0 to 6.5 for Mineral soil class (MIN) depending on the crop.

Additional Criteria to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere

In areas with an identified or designated nutrient management related air quality concern, any component(s) of nutrient management (i.e., amount, source, placement, form, timing of application) identified by risk assessment tools as a potential source of atmospheric pollutants shall be adjusted, as necessary, to minimize the loss(es).

When tillage can be performed, surface applications of manure and fertilizer nitrogen formulations that are subject to volatilization on the soil surface (e.g., urea) shall be incorporated into the soil within 24 hours after application.

When manure or organic by-products are applied to grassland, hayland, pasture or minimum-till areas the rate, form and timing of application(s) shall be managed to minimize volatilization losses. Appropriate odor control checklists shall be utilized as required by state law and permitting requirements. Animal waste application setbacks as detailed in the NC NRCS Practice Standard 633, Waste Utilization, under “Additional Criteria to Protect Air Quality” shall be observed.

When liquid forms of manure are applied with irrigation equipment, operators will select weather conditions during application that will minimize volatilization losses.

Operators will handle and apply poultry litter or other dry types of animal manures when the potential for wind-driven loss is low and there is less potential for transport of particulates into the atmosphere.

Weather and climatic conditions during manure or organic by-product application(s) shall be recorded and maintained in accordance with the operation and maintenance section of this standard.

Additional Criteria to Improve the Physical, Chemical and Biological Condition of the Soil

Nutrients shall be applied and managed in a manner that maintains or improves the physical, chemical and biological condition of the soil.

Minimize the use of nutrient sources with high salt content unless provisions are made to leach salts below the crop root zone.

To the extent practicable nutrients shall not be applied when the potential for soil compaction and rutting is high.

CONSIDERATIONS

Consider that NC Conservation Partnership cost-share programs may require the development of a Comprehensive Nutrient Management Plan (CNMP). A CNMP is an NRCS conservation plan that addresses the natural resource concerns associated with the management of manure and wastewater from livestock operations. Further information on NRCS policy concerning CNMPs is available at the NC NRCS website

(*http://www.nc.nrcs.usda.gov/technical/TechRef/techref-water.html*

Consider developing a CNMP for all organic waste application systems.

Consider induced nutrient imbalances due to excessive levels of fertilizer application.

Consider complementing or enhancing nutrient management by relieving moisture stress in crops by using practices that promote infiltration or reduce evaporation and those that intercept surface runoff.

Some supporting practices to consider when developing the nutrient management plan include:

Practices that Promote Infiltration or Reduce Evaporation
- Chiseling and Subsoiling (324)
- Conservation Crop Rotation (328)
- Contour Farming (330)
- Cover Crop (340)
- Irrigation Water Management (449)
- Land Smoothing (466)
- Long Term No-Till (778)
- Precision Land Forming (462)
- Residue Management, No-Till & Strip Till (329A)
- Residue Management, Seasonal (344)
- Stripcropping, Contour (585)
- Stripcropping, Field (586)
- Water Table Control (641)
- Windbreak/Shelterbelt Establishment (380)

Practices that Intercept Surface Runoff or Shallow Ground Water
- Conservation Cover (327)
- Constructed Wetland (656)
- Controlled Drainage (335)
- Field Border (386)
- Filter Strip (393)
- Grassed Waterway (412)
- Hedgerow Planting (422)
- Pond (378)
- Riparian Herbaceous Cover (390)
- Riparian Forest Buffer (391)
- Sediment Basin (350)
- Structure For Water Control (587)
- Water And Sediment Control Basin (638)
- Wetland Restoration (657)

Practices that Promote Better Moisture Distribution and Nutrient Use on Grassland
- Grazing Land Mechanical Treatment (548)
- Prescribed Grazing (528)
- Forage Harvest Management (511)

Consider cover crops whenever possible to scavenge and recycle residual nitrogen.

Consider alternative application methods and timing that further reduce the risk of nutrients being transported to ground and surface waters, or into the atmosphere. Suggestions include:

- split applications of nitrogen to provide nutrients at the times of maximum crop utilization,
- band applications of phosphorus near the seed row,
- applying nutrient materials uniformly to application areas or as prescribed by precision agricultural techniques,
- immediate incorporation of land applied manure or organic by-products,
- delaying field application of fertilizer, animal manure or other organic by-products if precipitation capable of producing runoff and erosion is forecast within 24 hours of the time of the planned application.

Consider for all soil amendments, minimum application setback distances from environmentally sensitive areas, such as sinkholes, wells, gullies, ditches, surface inlets or rapidly permeable soil areas.

Consider the potential problems from odors associated with the land application of animal manure or organic by-products, especially when applied near or upwind of residences.

Consider nitrogen volatilization losses associated with the land application of animal manure. Volatilization losses can become significant, if manure is not immediately incorporated into the soil after application.

Consider the potential to affect National Register listed or eligible cultural resources.

Consider using soil test information no older than one year when developing new plans, particularly if animal manure is to be a nutrient source.

Consider annual reviews to determine if changes in the nutrient budget are desirable (or needed) for the next planned crop.

Consider soil sampling by depth to determine feasibility of diluting a high phosphorus level in the soil surface with precise plowing. (Caution: While this practice may lower the soil test phosphorus in the surface and reduce the potential for soluble phosphorus losses in surface runoff, it may also increase particulate phosphorus losses through soil erosion. Impacts on HEL compliance plans should also be considered.)

Consider ways to modify the chemistry of animal manure, including modification of the animal's diet to reduce the manure nutrient content, and enhance the producer's ability to manage manure effectively.

Consider amending poultry litter with alum since it is recognized as an economical means of reducing ammonia volatilization in the poultry house and soluble phosphorus in runoff waters.

Considerations to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere.

Odors associated with the land application of manures and organic by-products can be offensive to the occupants of nearby homes. Avoid applying these materials upwind of occupied structures when residents are likely to be home (evenings, weekends and holidays).

When applying manure with irrigation equipment, modifying the equipment can reduce the potential for volatilization of nitrogen from the time the manure leaves the application equipment until it reaches the surface of the soil (e.g., reduced pressure, drop down tubes for center pivots). N volatilization from manure in a surface irrigation system will be reduced when applied under a crop canopy.

When planning nutrient applications and tillage operations, encourage soil carbon buildup while discouraging greenhouse gas emissions (e.g., nitrous oxide N_2O, carbon dioxide CO_2).

Nutrient applications associated with irrigation systems should be applied in accordance with the requirements of Irrigation Water Management (Code 449).

PLANS AND SPECIFICATIONS

Plans and specifications shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose(s), using nutrients to achieve production goals, and to prevent or minimize water quality impairment.

The following components shall be included in the nutrient management plan or nutrient management/waste utilization plan:

1. aerial photograph or map and a soil map of the site identifying areas of planned nutrient application,
2. planned plant production sequence or crop rotation,
3. results of soil, plant, water, manure or organic by-product sample analyses,
4. results of PLAT and LI assessments (if required),
5. RYEs for the crops in the rotation and the source of information if other than default values,
6. quantity of all nutrient sources planned,
7. recommended nutrient rates, timing, and method of application and incorporation,
8. location of designated sensitive areas or resources (e.g. streams, wells, sinkholes, etc.) and the associated nutrient management restriction, if present in the conservation management unit,

9. operation and maintenance information, and

10. complete nutrient budget for nitrogen, phosphorus, and potassium for the rotation or crop sequence.

If increases in soil phosphorus levels are expected, plans shall document:

a. that the planned nutrient application level is not sustainable, and that eventually, a High rating with the Phosphorus Loss Assessment Tool will result based on this field's specific soil loss rate, runoff amount, leaching loss, and animal waste source (if applicable),

b. the relationship between soil phosphorus levels and potential for phosphorus transport from the field (as reported by the PLAT assessment), and the potential for cumulative soil phosphorus removal from the production and harvesting of crops (as reported in the North Carolina Nutrient Management Software). For more information on crop removal rates, see the Nutrient Management in NC RYE website: *http://www.soil.ncsu.edu/nmp/yields/*

When applicable, the conservation plan for the site shall include other practices or management activities as required by specific laws or regulations (e.g. .0200 regulations), program requirements, or producer goals.

In addition to the requirements described above, plans for nutrient management shall also include a copy of either the NRCS Nutrient Management Job Sheet, the NRCS Nutrient Management/Waste Utilization Job Sheet (if manure is applied), or comparable information that contains:

a. a discussion about the relationship between nitrogen and phosphorus transport and water quality impairment. The discussion about nitrogen should include information about nitrogen leaching into shallow groundwater and potential health impacts. The discussion about phosphorus should include information about phosphorus accumulation in the soil, the increased potential for phosphorus transport in soluble form, and the types of water quality impairment that could result from phosphorus movement into surface water bodies. The basis for this information is found in the results of the Phosphorus Loss Assessment Tool or Leaching Index analysis.

b. a discussion about how the plan is intended to prevent the nutrients (nitrogen and phosphorus) supplied for production purposes from contributing to water quality impairment.

c. a statement that the plan was developed based on the requirements of the current standard and any applicable Federal, state, or local regulations or policies; and

d. that a change in any of these requirements may necessitate a revision of the plan.

OPERATION AND MAINTENANCE

The owner/client is responsible for safe operation and maintenance of this practice, including all equipment. Operation and maintenance information is included in the USDA-NRCS Nutrient Management Job Sheet. Operation and maintenance guidance provided to the client must address the following:

1. The producer is encouraged to 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 (now Sec. 1300 of 15A NCAC 02T) 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.

2. Protection of fertilizer and organic by-product storage facilities from weather and accidental leakage or spillage.

3. Proper calibration of application equipment to ensure uniform distribution of material at planned rates.

4. Maintaining records to document plan implementation. 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 differ from or 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.

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

6. Workers should be 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 unventilated enclosures.

7. The disposal of material generated by the cleaning of nutrient application equipment should be accomplished properly. 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.

8. The disposal or recycling of nutrient containers should be done according to state and local guidelines or regulations.

REFERENCES

Nutrient Management in North Carolina website: *http://nutrients.soil.ncsu.edu/*

EPA CAFO website: *http://cfpub.epa.gov/npdes/afo/cafofinalrule.cfm*

North Carolina Interagency Nutrient Management Committee website: *http://www.nc.nrcs.usda.gov/technical/TechRef/nut-mgt-comm.html*

NC NRCS 633 Waste Utilization practice standard: *http://www.nrcs.usda.gov/technical/efotg/*

NC DWQ Animal Feeding Operations Unit website: *http://h2o.enr.state.nc.us/aps/afou/rules.htm*

NRCS Agricultural Waste Management Field Handbook: *http://www.wcc.nrcs.usda.gov/awm/awmfh.html*

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