NATURAL RESOURCES CONSERVATION SERVICE

VIRGINIA CONSERVATION PRACTICE STANDARD

NUTRIENT MANAGEMENT

(Acre)

Code 590

DEFINITION

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

PURPOSES

- To budget and supply nutrients for plant production
- To properly utilize manure or organic by-products as a plant nutrient source
- To minimize agricultural nutrient contamination of surface and groundwater resources
- 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

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

Virginia Code 4 VAC 5-15-10 to 5-15-150 will be the main state regulation governing NRCS policy and procedures in Virginia in order to maintain consistency with state partners.

Plans for nutrient management shall be developed in accordance with policy requirements of:

- NRCS General Manual, Title 450, Part 401.03 (Technical Guides, Policy and Responsibilities)
- NRCS General Manual, Title 190, Part 402 (Ecological Sciences, Nutrient Management Policy)
- NRCS Field Office Technical Guide (FOTG)
- NRCS National Planning Procedures Handbook (NPPH)
- NRCS National Agronomy Manual, Section 503
- Commonwealth of Virginia, Nutrient Management Handbook (DCR)
- Nutrient Management Training and Certification Regulations (DCR)
- Virginia Nutrient Management Standards and Criteria (DCR)

All nutrient management plans shall be developed by individuals certified by the Commonwealth of Virginia as Certified Nutrient Management Planners under 4 VAC 5-15-30 of the Virginia Administrative Code.

Plans required by Virginia Pollution Abatement Permits, Poultry Waste Permits, or Biosolids Use

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

Regulations must be reviewed and approved by the Department of Conservation and Recreation.

Plans required for Virginia tax credit for precision nutrient and pesticide application equipment purchases must be approved by the local soil and water conservation district.

Plans for nutrient management prepared by NRCS are elements of a more comprehensive conservation plan and will only be developed as part of Resource Management System (RMS) plan (or progressive plan) and Comprehensive Nutrient Management Plan (CNMP).

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, biosolids, commercial fertilizer, crop residues, legume credits, and irrigation water. Realistic yield goals shall be established based on soil productivity information, historical yield data, climatic conditions, level of management and /or local research on similar soil, cropping systems, and soil and manure/organic by-product tests. For new crops, industry or university research yield data may be used until documented yield information is available.

Plans for nutrient management shall specify the form, source, amount, timing, and method of application of nutrients on each field to achieve expected crop yield, while minimizing nitrogen and/or phosphorus movement to surface and/or groundwaters.

Erosion, runoff, and water management controls shall be installed, as needed, on fields that receive nutrients. **NRCS staff in Virginia will not provide nutrient management planning assistance on fields eroding at rates greater than 2T unless the nutrient management plan is a part of a comprehensive approach to reduce erosion through the conservation planning process to the RMS level of treatment.**

Soil Sampling and Laboratory Analysis (Testing)

Nutrient management planning shall be based on soil sampling and laboratory analysis procedures consistent with 4 VAC 5-15-150. Current soil tests are those that are no older than three years.

Plant Tissue Testing

Tissue sampling and testing shall be done in accordance with appropriate procedures contained in Virginia Nutrient Management Standards and Criteria and Cooperative Extension recommendations and procedures.

Nutrient Application Rates

Soil amendments shall be applied, as needed, to adjust soil pH to the specific range of the crop for optimum availability and utilization of nutrients.

Nutrient application rates contained in nutrient management plans shall be determined as prescribed in 4 VAC 5-15-150 except when manure, biosolids, or other organic by-products are used, nutrient management plans shall use criteria listed below.

- Nitrogen Application – Planned nitrogen application rates shall match the recommended rates as closely as possible, except when manure or other organic by-products are a source of nutrients. When manure or other organic by-products are used, follow criteria listed below.

- Phosphorus Application – Planned phosphorus application rates shall match the recommended rates as closely as possible, except when manure and other organic by-products are a source of nutrients. When manure or other organic by-products are used, follow criteria listed below.

- Potassium Application – Excess potassium shall not be applied in situations in which it causes unacceptable nutrient imbalances in crops or forages. When forage quality is an issue associated with excess potassium application, apply no more than soil test recommendations.

- Other Plant Nutrients – The planned rates of application of other nutrients (includes micronutrients) shall be consistent with Virginia Tech (or approved laboratory) guidance.

- Starter Fertilizers – Starter fertilizer containing nitrogen, phosphorous and potassium may be applied according to recommendations. When used, they shall be included in the nutrient budget.

Nutrient Application Timing

Timing and method of nutrient application shall correspond as closely as possible with plant uptake characteristics, while considering cropping system limitations, weather and climatic conditions, and field accessibility.

Nutrient Application Methods

Nutrients shall not be applied to frozen, snow covered, or saturated soil except as listed below. Dry or semi solid manure (85.5% moisture content or less) should not be applied to frozen, ice, or snow covered ground unless necessary to manage storage system emergencies on sites with less than 6% slope and having at least 60% uniform ground cover such as small grain or fescue with exposed plant height of at least three (3) inches over the entire site. Liquid manure (above 85.5% moisture content) shall not be applied to frozen, ice or snow covered ground.

Nutrient applications associated with irrigation systems shall be applied in accordance with the requirements of Virginia Conservation Practice Standard *Irrigation Water Management (Code 449).*

ADDITIONAL CRITERIA APPLICABLE TO MANURE OR ORGANIC BY-PRODUCT APPLIED AS A PLANT NUTRIENT SOURCE

Nutrient values of manure and organic by-products shall be based on laboratory analysis of the material prior to land application or a historical average of lab testing from that specific farm operation. For new operations with no accumulated manure or by-products, “book values” for nutrient content of manures can be found in Section 6 of the Virginia Nutrient Management Standards and Criteria. These should be used to develop a preliminary plan that should be revised upon availability of actual on-farm samples.

Nutrient Application Rates

The planned rates of nitrogen and phosphorous application recorded in the plan shall be determined based on the following guidance.

* Phosphorous Application

All fields receiving manure (except poultry waste – See EXCEPTION) will be evaluated using a Soil Phosphorous Threshold Value and, if necessary as prescribed below, a Phosphorous Index (PI) Rating.

For all fields with a Phosphorous Saturation Level less than twenty percent (<20%), NRCS will recommend use of a land application rate based on calculated plant available nitrogen of manure, nitrogen credits for legumes and past nutrient applications, and the nitrogen needs of the crop, expressed by soil test results as follows:

Lower Coastal Plain
(MLRA 153-A, B, & C) 59ppm
(Mehlich 1)

Upper Coastal Plain and Piedmont
(MLRA 136, 148, 149A) 60ppm
(Mehlich 1)

Mountain and Valley
(MLRA 125,128, 130,147) 53ppm
(Mehlich 1)

For all fields with a Phosphorous Saturation Level greater than sixty five percent (>65%), NRCS will not recommend application of any phosphorus and are expressed by soil test results below. Saturation levels this high have the greatest ability to release phosphorous and contribute to nonpoint source pollution.

Lower Coastal Plain
(MLRA 153-A, B, & C) 295ppm
(Mehlich 1)

Upper Coastal Plain and Piedmont
(MLRA 136,148,149A) 397ppm
(Mehlich 1)

Mountain and Valley
(MLRA 125,128,130,147) 560ppm
(Mehlich 1)

For all fields with a Phosphorous Saturation Level between twenty and sixty five percent (20%-65%), the Phosphorous Index (PI) will be calculated, and application rates will be as follows:

PI of "LOW" (0-30), application rates will be based on nitrogen.

PI of "MEDIUM" (31-60), application rates will be based on phosphorus.

PI of "HIGH" (61-100), application rates will be based on crop removal of phosphorus.

PI of "VERY HIGH" (greater than 100), NRCS will not recommend any phosphorus application.

EXCEPTION: For all fields receiving poultry waste, state regulations allow land application based on phosphorous by either soil test recommendation or by crop nutrient removal.

For liquid material applied through irrigation systems, the application rate (inches per hour) shall not exceed the soil intake/infiltration rate. The total liquid application shall not exceed the field capacity of the soil.

Field Risk Assessment

When animal manures or other organic by-products are applied, a field specific assessment of the potential for phosphorous transport from the field shall be completed. This assessment will be done using the most current version of the Phosphorous Index for Virginia developed by Virginia Tech and approved by the Department of Conservation and Recreation's Nutrient Management Program.

In all cases where the PI is calculated, the nutrient management plan will contain documentation to record the rating for each field or sub field and information about the conservation practices and management activities used (C factor).

The PI assessment and recommendations shall be discussed with the producer during the development of the plan. Alternatives used to reduce the PI value and prevent phosphorous movement from the site should be discussed and documented.

Heavy Metal Monitoring

When sewage sludge 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 US CODE Reference 40 CFR, Parts 403 and 503, and regulations of the Virginia Department of Health and Virginia Department of Environmental Quality.

ADDITIONAL CRITERIA TO MINIMIZE AGRICULTURAL NUTRIENT CONTAMINATION OF SURFACE AND GROUNDWATER RESOURCES

In areas with an identified or designated nutrient related water quality impairment, an assessment shall be completed of the potential for nitrogen and/or phosphorous transport from the field. The Leaching Index (LI) and/or Phosphorous Index (PI), or other recognized tools may be used or required in these areas beyond current standards. Any additional requirements would be documented as part of the quality criteria in Section III of the FOTG and this standard amended as necessary.

ADDITIONAL CRITERIA TO IMPROVE THE PHYSICAL, CHEMICAL, AND BIOLOGICAL CONDITION OF THE SOIL

Nutrients shall be applied in such a manner as not to degrade the soil's structure, chemical properties, or biological conditions. Use of nutrient sources with high salt content will be minimized. Use of bio-solids that have been treated with lime should also be carefully planned as to minimize any adverse impact to soil pH.

Nutrients shall not be applied to flooded or saturated soils when the potential for soil compaction and creation of ruts is high.

CONSIDERATIONS

Give careful consideration to the planning and feasibility (timing and method of application) when applying supplemental nitrogen to fields receiving manure based on phosphorous. Deficiencies of nutrients due to excessive levels of other nutrients or pH levels should be considered.

Cover crops should be used whenever possible to utilize and recycle residual nitrogen. This may be needed in plans (especially on high leaching

soils) as an emergency measure after a season of drought or other natural condition where crop uptake is below normal.

Additional Virginia Conservation Practice Standards to improve soil nutrient and water storage, infiltration, aeration, tilth, diversity of soil organism and to protect or improve water quality, may be needed such as:

Conservation Cover (Code 327)
Grassed Waterway (Code 412)
Contour Buffer Strips (Code 332)
Filter Strip (Code 393)
Irrigation Water Management (Code 449)
Riparian Forest Buffer (Code 391)
Conservation Crop Rotation (Code 328)
Cover Crop (Code 340) and
Residue Management (Codes 329A, 329B, 329C, and *344)*

Application methods and timing may 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
- Avoiding winter applications for spring seeded crops
- Band application of phosphorous near seed row
- Applying nutrient materials uniformly to application areas or as prescribed by precision agricultural techniques
- Immediate incorporation of land applied manures or organic by-products
- Delaying field application of animal manures or other organic by-products if precipitation capable of producing runoff and erosion is forecast within a 24 hours of the time of the planned application

Minimum application setback distances from environmentally sensitive areas, such as sinkholes, wells, gullies, and ditches shall be observed. Minimum distances, where established by the Commonwealth of Virginia, will be recognized and maintained. These areas should be removed from planning considerations for nutrient application and the area deducted from acreage calculations in the planning process. Discussions with the producers will be needed to develop long-term strategies for use of these areas. These items should be included in the site specification.

Consider the potential problems from odors associated with the land application of animal manures, especially when applied near or upwind of residences.

Evaluate the potential to affect National Register listed or eligible cultural resources and the impact on T & E species.

Use soil test information no older than one year when developing new plans, particularly if animal manures are to be a nutrient sources.

Annual reviews should be discussed with the producer to determine if changes in the nutrient budget are desirable (or needed) for the next planned crop. Review and/or revision should be conducted at least once every three years. Any change to cropping patterns, rotations, and tillage may warrant review and/or revision to the nutrient plan.

On sites where there may be special environmental concerns, consider other sampling techniques. For example: soil profile sampling for nitrogen, Pre-Sidedress Nitrogen Testing (PSNT), or soil surface sampling for phosphorous accumulation or pH changes.

Consider ways to modify the chemistry of animal manure, including modification of the animal's diet to reduce the manure nutrient content, to enhance the producer's ability to manage manure effectively. Use of enzyme (phytase) treated feed and alum amended poultry litter will all be considered in the development of the rates of manure applied.

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.

All plans must meet the requirements of the Commonwealth of Virginia Nutrient Management Program and contain the following:

- Field map (aerial photo) indicating areas to be treated and location of environmentally

sensitive or other resource areas to be avoided and the associated nutrient management restrictions

- Expected crop yields by soil group
- Current and/or planned rotation or production sequence
- Results of soil, plant, water, manure or organic by-product sample analyses (no older than three years)
- Quantification of all nutrient sources
- Complete nutrient budget for nitrogen, phosphorous and potassium for the rotation or crop sequence
- Recommended nutrient rates, timing, form, and method of application and incorporation
- Documentation of Soil Phosphorous Threshold Level and Phosphorous Index for all fields receiving animal manures and organic waste
- Guidance in the form of a narrative plan that addresses implementation, operation, maintenance, and record keeping
- Signature of the certified nutrient planner and operator (decision maker)

OPERATION AND MAINTENANCE

The operator is responsible for safe operation and maintenance of this practice including all equipment used to apply nutrients at proper rates.
Operation and maintenance addresses the following:

- Periodic plan review to determine if adjustments or modifications to the plan are needed. As a minimum, plans will be reviewed and revised with each soil test cycle.
- Calibration of application equipment to ensure uniform distribution of materials at planned rates
- Protection of fertilizer and organic by-product storage facilities from weather and accidental leakage or spillage
- Documentation of the actual rate at which nutrients were applied. When the actual rates used differ from or exceed the recommended and planned rates, records will indicate the reasons for the differences.
- Maintaining records to document plan implementation (see Virginia Conservation Practice Standard *Record Keeping* (*Code* VA #748). As applicable, records include:
  - ♦ Soil test results and recommendations for nutrient application
  - ♦ Quantities, analyses and sources of nutrients applied
  - ♦ 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
  - ♦ Dates of review and person performing the review and recommendations that resulted from the review

Records should be maintained for five years unless specified for a longer period by other Federal, state, or local regulation, ordinance, or program requirement.
Workers should be protected from and avoid unnecessary contact with chemical 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.

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 and leaching.

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

REFERENCES

1. Natural Resources Conservation Service (NRCS) - Agricultural Waste Management Field Manual.

2. Virginia Department of Conservation and Recreation (DCR), Division of Soil and Water Conservation – Nutrient Management Handbook.

3. Commonwealth of Virginia – Virginia Code: 4 VAC 5-15-10 et seq.

4. NRCS General Manual, Title 450, Part 401.03 (Technical Guides, Policy and Responsibilities).

5. NRCS General Manual, Title 190, Part 402 (Ecological Sciences, Nutrient Management Policy).

6. NRCS, Virginia Field Office Technical Guide (FOTG).

7. NRCS National Planning Procedures Handbook (NPPH).

8. NRCS National Agronomy Manual, Section 503.

9. Virginia Nutrient Management Standards and Criteria.

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VIRGINIA CONSERVATION PRACTICE STANDARD

NUTRIENT MANAGEMENT

Approved Practice Narratives

(Acre)

CODE 590

590 D1 Nutrient Management: Nutrients will be applied based on soil test results for the expected crop yield. All sources of nutrients will be credited. The rate, timing and method of application are shown in the attached Nutrient Management Plan. This plan was developed and signed by a Nutrient Management Planner certified by the Commonwealth of Virginia's Nutrient Management Program.

590 D2 Nutrient Management: Nutrients in the form of animal manures will be applied based on soil test results for the expected crop yield. All sources of nutrients will be credited. The rate, timing and method of application are shown in the attached Nutrient Management Plan. This plan is based on the nitrogen rate for application. This plan was developed and signed by a Nutrient Management Planner certified by the Commonwealth of Virginia's Nutrient Management Program.

590 D3 Nutrient Management: Nutrients in the form of animal manures will be applied based on crop nutrient needs and crop nutrient removal. All sources of nutrients will be credited. The rate, timing and method of application are shown in the attached Nutrient Management Plan. This plan is based on the phosphorous rate for application. This plan was developed and signed by a Nutrient Management Planner certified by the Commonwealth of Virginia's Nutrient Management Program.