

NATURAL RESOURCES CONSERVATION SERVICE
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 minimize agricultural nonpoint source pollution of surface and ground water resources [by properly managing manure or organic by-products as a plant nutrient source](#).
- ◆ To protect air quality by reducing nitrogen and/or particulate emissions to the atmosphere.
- ◆ 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 all applicable Federal, state, tribal, and local laws and regulations [pertaining to on farm manure as well as additional materials imported to the farm](#). The owner or operator shall be responsible for securing any and all permits required for activities of the plan.

Plans for nutrient management in Vermont will follow the University of Vermont's (UVM's) ["Nutrient Recommendations for Field Crops in Vermont"](#) and the Vermont Accepted Agricultural Practice Regulations.

Plans for nutrient management shall be developed in accordance with policy requirements of the NRCS General Manual Title 450, Part 401.03 (Technical Guides, Policy and Responsibilities) and Title 190, Part 402 (Ecological Sciences, Nutrient Management, Policy); technical requirements of the NRCS Field Office Technical Guide (FOTG); procedures contained in the National Planning Procedures Handbook (NPPH), and the NRCS National Agronomy Manual (NAM) Section 503.

Persons who review or approve plans for nutrient management shall be certified through [the Vermont NRCS Certification Program for Nutrient Management Specialists](#). [Persons who develop nutrient management plans for USDA programs must be certified or work under the direction of a Certified Nutrient Management Specialist](#). [Producers can produce their own nutrient management plans that will be reviewed and approved by a certified nutrient management specialist](#).

Plans for nutrient management that are elements of a more comprehensive conservation plan shall recognize, and be compatible with, other requirements of the conservation plan.

[If all agricultural waste on an operation is exported to land not owned or controlled by the producer, a nutrient management plan is not required](#). [In situations where only a percentage of agricultural waste is to be exported, a nutrient management plan is required only on the land that is controlled or owned, receiving application of nutrients](#). [In both cases, documentation shall be furnished on the amount of waste being exported, the nutrient analysis of the material and who will be responsible for the use of the exported waste](#).

<p>Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.</p>
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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. [If excess nutrients are available, develop alternatives for off-farm use.](#)

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-products tests. For new crops or varieties, industry yield recommendations may be used until documented yield information is available. [A realistic yield goal is one which is achievable 60% of the time. If the goal is not achieved, the entire crop management system shall be re-evaluated to identify those factors, other than soil fertility, that are limiting yield.](#)

Plans for nutrient management shall specify the form, source, amount, timing and method of application of nutrients on each field to achieve realistic production goals, while minimizing nitrogen and/or phosphorus movement to surface and/or ground waters.

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

Field Risk Assessment

[At a minimum a field by field assessment will be conducted to flag environmentally sensitive features identified in Table A-1/B-1. Identify sensitive areas adjacent to or near the fields to receive nutrients and locate them on plan maps:](#)

- [Wells and other potable water supplies.](#)
- [Vegetated drainageways or waterways.](#)
- [Streams, rivers, lakes, ponds and seasonally flooded or ponded wetlands.](#)
- [Property lines.](#)

[Where nutrients \(organic or inorganic\) are applied, soil erosion will be controlled to tolerable soil loss limits as determined by RUSLE2 \(Revised Universal Soil Loss Equation\) \(Section ID of the Vermont NRCS Field Office Technical Guide \(FOTG\)\).](#)

Nutrient Application Setbacks and Restrictions

Ground Water Protection

[No agricultural activities including nutrient \(organic or inorganic\) applications will occur within 200 feet of a public well \(Zone A of the Source Protection Areas \(SPA\), Vermont Water Supply Rule\); and no manure or nitrogen fertilizer can be applied within 50 feet of a private well. All other nutrient applications around a private well, with the exception on nitrogen, will be limited to commercial fertilizer applied during the growing season according to soil test and corresponding fertilizer recommendations.](#)

Surface Water Protection

[A perennial vegetative buffer is required within 25 feet of the top of the bank of the adjoining surface waters, including intermittent waterways that are determined to potentially transport significant waste or nutrients. These vegetative buffers may be harvested and commercial fertilizer can only be applied during the growing season according to soil test and corresponding fertilizer recommendations.](#)

[Additional conservation practices such as Filter Strips \(393\), Riparian Forest Buffers \(391\), and Riparian Herbaceous Cover \(390\) should be installed in certain sensitive areas. The location of sensitive areas and conservation practices that are needed to protect them shall be discussed with the producer during the development of the plan and documented in the plan.](#)

[Do not apply nutrients within intermittent ditches, diversions, grassed waterways, drainage ditches or other areas of concentrated flow. Do not spread manure or commercial fertilizer nutrients over bedrock outcrops or on frozen or snow-covered ground. The Vermont Accepted Agricultural Practices \(AAP's\) impose a manure spreading ban between December 15 and April 1.](#)

[Avoid applying nutrients during normal flooding periods on the fields with historical flooding. On row crop fields with overland flows, manure shall be incorporated within 24 hours to the degree possible based on limiting site conditions.](#)

Soil Sampling and Laboratory Analysis (Testing)

Nutrient planning shall be based on current soil test results developed in accordance with UVM's guidance or industry practice if recognized by UVM. Current soil tests are those that are no older than [three](#) years. [At least one third of all fields must have a current soil test at the time of the development of the nutrient management plan. Those fields without a current test must have a soil test no older than 5 years. On all fields without current soil tests, application rates of manure or other organic by-products will be planned based on phosphorus removal rates and revised accordingly within 1 year based on current soil tests.](#)

Soil samples shall be collected and prepared according to [UVM](#) guidance or standard industry practice. Soil test analyses shall be performed by:

- [The UVM Soil Testing Laboratory; or](#)
- [Laboratories whose tests are accepted by UVM.](#)

Soil testing shall include analysis 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 ([PSNT](#)), phosphorus, and potassium.

Plant Tissue Testing

Tissue sampling and testing, where used, shall be done in accordance with [UVM](#) standards or recommendations.

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.

Recommended nutrient application rates shall be based on [The UVM's "Nutrient Recommendations for Field Crops in Vermont"](#) (and/or industry practice when recognized by the university) that consider current soil test results, realistic yield goals, [mineralization of prior year manure applications, previous crop nitrogen](#), and management capabilities. [The UVM "Nutrient Recommendations for Field Crops in Vermont" utilizes the following soil testing protocol: Available Phosphorous](#)

[extracted with a modified Morgan solution and reactive Aluminum in the same extractant. Available Potassium is extracted using \$\text{NH}_4^+\$ acetate, pH of 4.8.](#)

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 other 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 other organic by-products are a source of nutrients (see "Additional Criteria" 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, 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 [UVM](#) or industry practice if recognized by [UVM](#).
- ◆ **Starter Fertilizers** - Starter fertilizers containing nitrogen, phosphorus and potassium may be applied in accordance with [UVM](#) recommendations, or industry practice if recognized by [UVM](#). When starter fertilizers are 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 nutrient uptake characteristics, while considering cropping system limitations, weather and climatic conditions, and field accessibility.

Nutrient Application Methods

Nutrient applications associated with irrigation systems shall be applied in accordance with the requirements of Irrigation Water Management (Practice Code 449). [The application rate \(in/hr\) and application amounts](#)

for material applied through irrigation shall not be at rates which result in runoff. Consult the soil survey for infiltration/permeability rates and available water capacity for the soil(s) receiving the application. Limit application to the volume of liquid that can be stored in the root zone.

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

Nutrient values of manure and organic by-products (excluding sewage sludge) shall be determined prior to land application based on laboratory analysis. Manure storages will be sampled annually as close as possible to the time of application (upon thorough agitation of liquid systems) for two years, then evaluate needs.

Additional testing will be needed, for example, if variability of base line test is large, weather conditions are extreme, or feed program changes. Field Stacking Sites: Test for at least one stack per year for two years, then evaluate records.

Take credit for nutrients supplied legumes, manure, or other bio-solids. See *"Nutrient Recommendations for Field Crops in Vermont"* for numerical credits.

Nutrient Application Rates

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

Nitrogen Application - When the plan is being implemented on a phosphorus standard, manure or other organic by-products shall be applied at rates consistent with the phosphorus standard, but shall not exceed the recommended nitrogen application rate during the year of application (based on a nitrogen budget). Recommended nitrogen application rates will be determined based on UVM crop specific nitrogen recommendations less expected nitrogen mineralization from prior year manure applications, and expected previous crop nitrogen credits. Additional nitrogen application, from non-organic sources, may be required to supply the recommended amounts of nitrogen.

Manure or other organic by-products may be applied on legumes at rates equal to 75% of the estimated removal of nitrogen in harvested

plant biomass (Note: Applications should be split applied before significant re-growth occurs for each crop to be harvested—in early spring, and after each harvest except the last harvest of the year).

The level of nitrogen management will be based on the Leaching Index (LI) in Section IIA of the NRCS FOTG. The LI is to be used as a planning tool to assist the planner and producer in determining appropriate practices to minimize nitrogen leaching as follows:

< 2 Inches (LOW) - Nitrogen applications rates based on UVM recommendations.

2 – 10 Inches (MODERATE) - Nutrient management practices such as split nitrogen application rates, pre-sidedress nitrogen testing and use of nitrification inhibitors should be considered.

> 10 Inches (HIGH) - Requires intense nitrogen management to minimize nitrate movement, including: careful management of applied nitrogen, avoidance of fall spreading on bare ground or dormant crop, precise timing to match crop utilization, conservation practices that restrict water percolation and leaching, and cover crops that capture and retain nutrients in the upper soil profile. Additional nitrogen management requirements include the following actions:

- For row and cereal crops, including corn, maintain starter fertilizer nitrogen rates below 50 lbs/acre actual nitrogen under normal conditions.
- Evaluate the need for sidedress nitrogen applications on corn based on PSNT or other soil nitrate-nitrogen tests.
- Do not incorporate sod crops in the Fall and chemical herbicide treatment of sod shall not be carried out until soil temperatures at 4 inches are below 45°F (October 1st or later).

Phosphorus Application - Planned rates of phosphorus application shall be consistent with the Vermont Phosphorous Index (See <http://pss.uvm.edu/vtcrops/?Page=nutrientmanure.html>). At a minimum, the erosion component of the Vermont Phosphorous Index will be based on the average erosion rate across the entire rotation determined using RUSLE2. Use the Phosphorous Index Screening Matrix to determine which fields to conduct the rating (see above website). For those fields that do not require the PI, a

nitrogen based application rate is acceptable. CAUTION: Soil phosphorus levels and phosphorus loss potential may increase in the future due to continued nitrogen based management and may eventually limit application amounts.

Phosphorus Index (PI) Rating. The phosphorus loss rating determined by the PI is based on phosphorus loss potential due to site and transport characteristics as well as management practices and phosphorus source characteristics. The PI is to be used as a planning tool to assist the planner and producer in determining appropriate practices to minimize phosphorus transport into surface waters as follows:

0 – 30 - LOW potential for phosphorus movement from this site given current management practices and site characteristics. There is a low probability of adverse impact to surface waters from phosphorus losses from this site. Nitrogen-based nutrient management planning is satisfactory for this site. Soil phosphorus levels and phosphorus loss potential may increase in the future due to continued nitrogen-based management.

31 – 60 - MEDIUM potential for phosphorus movement from this site given current management practices and site characteristics. Practices shall be implemented to reduce phosphorus losses by surface runoff, subsurface flow, and erosion. Nitrogen based management can be implemented UNTIL AVAILABLE PHOSPHORUS LEVELS REACH 20 PPM OR MORE during which time phosphorus applications should be limited to crop removal rates of phosphorus or soil test recommendations for phosphorus, whichever is greater.

61 – 100 - HIGH potential for phosphorus movement from this site given current management practices and site characteristics. Phosphorus based nutrient management planning shall be limited to crop removal rates for phosphorus or soil test recommendations for phosphorus. All practical management practices for reducing phosphorus losses to surface runoff, subsurface flow, or erosion shall be implemented.

> 100 - VERY HIGH potential for phosphorus movement from this site given current

management practices and site characteristics. No manure phosphorus shall be applied to this site. Phosphorus fertilizer application shall be limited to soil test recommendations. Active remediation techniques shall be implemented to reduce phosphorus loss potential from this site.

The crop nutrient removal rates are found in *“Nutrient Recommendations for Field Crops in Vermont.”*

The use of certain conservation practices may reduce the risk of phosphorus movement, thereby lowering the risk level from a higher category to a lower category.

A single application of phosphorus applied as manure 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 applications are made, the application 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. (See *“Nutrient Recommendations for Field Crops in Vermont.”*)
- Not be made on sites considered vulnerable to off-site phosphorus transport unless appropriate conservation practices, best management practices, or management activities are used to reduce the vulnerability.

The application of manure or organic by-products will be in accordance with the standard WASTE UTILIZATION (633). This includes the development of alternative uses of the manure or organic by-products if excess nutrients exist.

Field Risk Assessment

When animal manures or other organic by-products are applied, a field-specific assessment of the potential for phosphorus and nitrogen transport from the field shall be completed using the Phosphorous Index and Leaching Index as indicated above. In such cases, plans shall include:

- ◆ A record of the assessment rating for each field or sub-field, and
- ◆ Information about conservation practices and management activities that can reduce the potential for phosphorus **and nitrogen** movement from the site.

When such assessments are done, the results of the assessment and recommendations shall be discussed with the producer during the development **and implementation** of the plan.

Heavy Metals 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 the US Code, Reference 40 CFR, Parts 403 and 503, and/or any applicable state and local laws or regulations.

Where non-farm bio-solids are to be utilized for crop nutrients, recommended application rates will be determined by using current UVM recommendations for the crop to be grown. These materials must be applied as prescribed by federal, state, tribal, or local regulations. Appropriate documentation must be maintained according to state regulations. The Vermont Department of Environmental Conservation (DEC) regulates the collection, handling, burning, storage, treatment, land application, disposal, and transportation of bio-solids, septage, or any produce containing these materials which is generated or utilized in Vermont.

Additional Criteria to Minimize Agricultural Non-point Source Pollution of Surface and Ground Water 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 phosphorus transport from the field. See Vermont's DEC's latest 305b Report and 303d list of impaired waters. The Leaching Index (LI) and/or Phosphorus Index (PI), or other recognized assessment tools, may be used to make these assessments. When the LI is > than 10 directly adjacent to a private well, the setback distance will be increased to 100 feet. The results of these assessments and recommendations shall be discussed with the producer and included in the plan.

Plans developed to minimize agricultural nonpoint source pollution of surface or ground water resources shall include practices and/or management activities that can reduce the risk of nitrogen or phosphorus movement from the field.

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

Incorporate surface applications of solid forms of manure or some commercial fertilizer nitrogen formulations (i.e. Urea) into the soil within 24 hours of application.

When applying liquid forms of manure with irrigation equipment select application conditions when there is high humidity, little/no wind blowing, a forth coming rainfall event, and/or other conditions that will minimize volatilization losses into the atmosphere. The basis for applying manure under these conditions shall be documented in the nutrient management plan.

Handle and apply poultry litter or other dry types of animal manures when weather conditions are calm and there is less potential for blowing and emission of particulates into the atmosphere. The basis for applying manure under these conditions shall be documented in the nutrient management plan.

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 condition. Use of nutrient sources with high salt content will be minimized unless provisions are used to leach salts below the crop root zone.

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

CONSIDERATIONS

Consider implementing the following as appropriate:

Additional practices such as Conservation Cover (327), Grassed Waterway (412), Contour Farming (330), Contour Buffer Strips

(332), [Stripcropping \(585\)](#), Filter Strips (393), Irrigation Water Management (449), Riparian Forest Buffer (391), [Riparian Herbaceous Cover \(390\)](#), [Diversion \(362\)](#), Conservation Crop Rotation (328), Cover and Green Manure (340), and Residue Management (329A, 329B, or 329C, and 344) to improve soil nutrient and water storage, infiltration, aeration, tillage, diversity of soil organisms and to protect or improve water quality.

Using of cover crops whenever possible to utilize and recycle residual nitrogen.

Application methods and timing that 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 [fall and early winter](#) nutrient application for spring seeded crops,
- ◆ Band applications of phosphorus near the seed row,
- ◆ Applying nutrient materials uniformly to application areas or as prescribed by precision agricultural techniques, and/or
- ◆ 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 24 hours of the time of the planned application.

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

The potential to affect National Register listed or eligible cultural resources.

Soil testing crop fields annually for the first three years to establish a baseline and then test ever three years thereafter.

Pre-sidedress nitrate test (PSNT) on all corn fields annually, especially on sensitive sites such as fields with moderate to high nitrate leaching potential and fields with wells or waterbodies in close proximity. The PSNT can help minimize costs associated with side-

dressing of nitrogen fertilizer and can also give the producer and planner an indication of the effectiveness of the manure management program.

Using products or materials (e.g. nitrification inhibitors) that slow the conversion of nitrogen in manure or fertilizer into forms that move rapidly in the soil or into the atmosphere, and that reduce the potential for losses into water or air, especially on sites with a LI > 10.

Making nutrient management recommendations based on dominant soil types. Highly permeable sands and gravels and soils that are shallow to bedrock provide poor ground water protection. Steeply sloping soils and those with very low permeability have increased instances of runoff. Timing and placement of nutrients are critical on marginal soils. Split or foliar applications will reduce risk to ground water. On soils with seasonal high water tables, nutrients should be applied after mid June and before mid September.

Adjusting low pH soils to levels best suited for the crops being grown. Soil pH can impact the availability of both soil and applied phosphorous.

Using organic nutrients and green manure as much as possible and avoiding excessive field operations that may result in soil compaction. Soil tillage and organic matter content are very important in plant nutrient absorption, root development, and desirable soil structure.

Including organic matter test with a standard soil test analysis to monitor trends in organic matter content. In addition to its importance to soil quality, organic matter can impact the effectiveness of herbicide application.

Remote storages to allow more even distribution of manure. Residuals storage options may enhance proper nutrient applications.

Monitoring soil test levels to avoid chemical imbalances. Continuous application of residuals can result in an imbalance of base cations.

Evaluating use of plant varieties and cropping systems that enhance nutrient uptake.

Using cropping systems that integrate crops like BMR Sorghum, and corn silage into a forage rotation thereby reducing grain input and phosphorus import. BMR Sorghum provides forage results equal or better than

corn, and requires no herbicides, pesticides or cultivation to manage. It can be cut up to three times and benefits from excessive split applications of manure. The residue stays on the soil as a cover and provides organic matter to the soil.

Incorporation to minimize potential nutrient loss from the soil surface. In heavy rains, surface applied manure can be lost in eroding soil or runoff water. At times, excessive amounts of manure are used to make up for losses. In addition, economic loss of nutrient value can be high. Manure applied on cropland should be incorporated as soon as possible to minimize nutrient loss, particularly on areas where runoff potential is high or odor is a concern. Weather patterns should be observed to avoid spreading prior to heavy rains. Losses of available ammonium nitrogen from un-incorporated manure are rapid. In addition to economic considerations, nitrogen management is particularly important where soil test levels of phosphorus or potassium are approaching the excessive range.

Incorporating/injecting manure into the soil using equipment that preserves surface residue, reduces odors, reduces nitrogen losses and limits the potential for surface runoff and nutrient transport.

Increasing soil organic matter to improve the water holding capacity of the soil.

Evaluating the impacts of nutrients, metals, and other contaminants on animal health.

Manure application strategies that minimize potential odor problems, especially when applied near or upwind of residences.

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

Enhancing the producer's ability to manage manure more effectively by modifying the chemistry of animal manure, including modification of the animal's diet to reduce the manure nutrient content.

Modifying application equipment to 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. drop down tubes for center pivots). Nitrogen volatilization from manure in a surface irrigation system will be reduced when applied under a crop canopy.

Minimizing greenhouse gas emissions by reducing tillage operations and avoiding nitrogen applications on saturated soils.

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:

- ◆ Identification of landowner, plan developer, and certified nutrient management specialist approving the plan,
- ◆ Identification of landowner objectives that takes long term goals and available land base into consideration.
- ◆ Aerial photograph or map and a soil map of the site,
- ◆ Current and/or planned plant production sequence or crop rotation,
- ◆ Results of soil, plant, water, manure or organic by-product sample analyses,
- ◆ Realistic yield goals for the crops in the rotation,
- ◆ Quantification of all nutrient sources,
- ◆ Recommended nutrient rates, timing, form, and method of application and incorporation,
- ◆ Location of designated sensitive areas or resources and the associated, nutrient management restriction,
- ◆ Guidance for implementation, operation, maintenance, recordkeeping, and
- ◆ 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:

- ◆ The soil phosphorus levels at which it may be desirable to convert to phosphorus based implementation,
- ◆ The relationship between soil phosphorus levels and potential for phosphorus transport from the field, and

- ◆ The potential for soil phosphorus drawdown from the production and harvesting of crops.

When applicable, plans shall include other practices or management activities as determined by specific regulation, program requirements, or producer goals.

In addition to the requirements described above, plans for nutrient management shall also include:

- ◆ 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 ground water 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.
- ◆ Discussion about how the plan is intended to prevent the nutrients (nitrogen and phosphorus) supplied for production purposes from contributing to water quality impairment.
- ◆ A statement that the plan was developed based on the requirements of the current standard and any applicable Federal, state, tribal, or local regulations or policies; and that changes in any of these requirements may necessitate a revision of the plan.
- ◆ The basis for the decisions for applying liquid or solid forms of manure with the intent of reducing nitrogen or particulate emissions to the atmosphere.

OPERATION AND MAINTENANCE

The owner/client is responsible for safe operation and maintenance of this practice including all equipment. Operation and maintenance addresses the following:

- ◆ **Annual** plan review to determine if adjustments or modifications to the plan are needed. **Annual plan reviewers need not be certified, nor NRCS employees. However, revisions to the plan must be approved by a certified nutrient**

management specialist. Plans should be reviewed and revised as necessary when changes occur with crop types, animal number changes or land base changes of 10% or greater, etc. A certified nutrient management specialist shall do a thorough review of the nutrient management plan on a three-year cycle.

- ◆ Protection of fertilizer and organic by-product storage facilities from weather and accidental leakage or spillage.
- ◆ Calibration of application equipment to ensure uniform distribution of material at planned rates.
- ◆ Documentation of the actual rate at which nutrients were applied.
- ◆ **Review annual nutrient budgets prior to applying commercial fertilizer to determine if the actual manure application rates used differ from or exceed the recommended and planned rates. Records will indicate the reasons for differences that may occur.**
- ◆ Maintaining records to document plan implementation. 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,
 - Weather conditions at the time of application and time until a rainfall event occurred after application (applicable only to situations when air quality issues are being addressed in the plan),
 - 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.

Records should be maintained for five years; or for a period longer than five years if required by other Federal, state, tribal, or local

ordinances, or program or contract requirements.

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 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

Nutrient Recommendations for Field Crops in Vermont 2004, University of Vermont

Williams, J.R., and D.E. Kissel. 1991. Water percolation: An indicator of nitrate nitrogen leaching potential. (In) R.F. Follett, D.R. Keeny, and R.M. Cruse (eds), *Managing Nitrogen for Groundwater Quality and Farm Profitability*, Soil Science Society of America, Madison, WI.

Proceedings from the 1988 Water Quality Workshop, Integrating Water Quality and Quantity into Conservation Planning. October 1988.

Nutrient Management Plan

Environmental Concerns Checklist

Producer Name:	Farm Name:	Farm #:	Tract #:
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Assisted By:	Date:
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Field ID	Soil Types and Extent	Dominant Drainage Class	Minimum Depth to Bedrock	Leaching Potential ¹	Erosion Rate	Soil Test Level	Water Quality Site Consideration ²	Current Management Practices	Other Site and Soil Limitations	Nutrient Management Recommendation ³

¹ or permeability or hydrologic group

² consider flooding potential, drinking water supplies, and surface water

³ can use narrative section below to document recommendations

Producer Name:	Farm Name:	Farm #:	Tract #:
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Assisted By:	Date:
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Recommendations due to site and/or soil limitations for nutrient application, site sketch (if desired)

**Nutrient Management Plan
Environmental Concerns Checklist**

Producer Name:	Tract Number:	Field Number:
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Field Name:	Field Acres:
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Assisted By:	Date:
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Soil Limitations:

Soil Type	Acres or Approx. % of Area	Dominant Drainage Class	Depth to Bedrock	Leaching Potential	Erosion Rate	Other Concerns

Soil Test Levels: N: _____, P: _____, K: _____

Other:

Site Limitations:

Flooding Potential (Frequency and Duration):

Drinking Water Supply (Proximity, Well Type, Condition, Topography):

Surface Waters (Proximity, Type, Topography):

Current Management Practices:

Other Site Considerations:

