

**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 plant nutrients and soil amendments.

PURPOSES

Nutrient management plans are intended to help producers improve or maintain their level of management and expertise related to the application of nutrients on the lands they manage in order to:

- Budget and supply nutrients for plant production
- Properly utilize manure or organic by-products as a plant nutrient source
- Minimize agricultural non-point source pollution of surface and ground water resources
- Protect air quality by reducing nitrogen emissions (ammonium and NOx compounds) and the formation of atmospheric particulates.
- 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

A nutrient budget for nitrogen, phosphorous, 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.

CAFO operations seeking permits under USEPA regulations (40 CFR Parts 122 and 412) should consult with Nevada Division of Environmental Protection for additional criteria.

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

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 and 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.

Plant nutrient utilization values may be obtained from the NRCS Agricultural Waste Management Field Handbook (Chapter 6), the Western Fertilizer Handbook, Utah Fertilizer Guide, or the Ortho Agronomy Handbook. Values based on University research or Cooperative Extension recommendations may be used if available.

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

Plans for nutrient management shall be developed in accordance with policy requirements of the NRCS General Manual, Title 450, Technology, Part 401.03 Technical Guides, Policy and Responsibilities; Title 190, Ecological Sciences, Part 402 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

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [electronic Field Office Technical Guide](#)

Ex. H

**NRCS NV
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General Criteria *continued*

Nutrient management plans must be reviewed and approved by individuals who are certified in accordance with NRCS, General Manual, Title 190, Ecological Sciences, Part 402, Nutrient Management.

Certification can be obtained by:

- Completing the requirements to become a *CNMP-Nutrient Management and Land Treatment Specialist* as outlined in Nevada supplement to General Manual, Title 180, Conservation Planning and Application, Parts NV 409 Policy and NV409.1 0 Certification.
- Completing the requirements to become a Technical Service Provider (TSP) in CNMP Plan Development - Nutrient Management and CNMP Plan Development – Land Treatment

Where plans for nutrient management are included as elements of a Resource Management System (RMS) or a Comprehensive Nutrient Management Plan (CNMP) for livestock operations, the requirements for nutrient management shall be compatible with other provisions of the plan.

Irrigation Water Management (449) shall be a component of a nutrient management plan when nutrients are applied on irrigated land.

Areas contained within established minimum application setbacks (e.g., wells, gullies, ditches, or areas with rapidly permeable soil) shall not receive direct application of nutrients. Rapidly permeable soils have a soil water transmission rate of 6-in/hr or a representative value K_{sat} of 42.33- $\mu\text{m}/\text{sec}$ (USDA Soil Survey Manual).

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

Soil and Tissue Sampling and Laboratory Analysis (Testing).

Nutrient planning shall be based on current soil and tissue (where used as supplemental information) test results. Current soil tests are those that are no older than five years. Annually cropped fields will have a soil test taken the first year of a new planting or rotation, thereafter once in five years as a minimum.

On fields where manure and other organic-by-products are applied for two or more consecutive years, annual soil testing will be required. After a baseline is established from two sampling periods, similar fields (crop rotation, soil, slope, organic nutrient application, and irrigation type) can use a composite or aggregate (combined) sample to represent the group of fields. Nutrient recommendations for each crop can be made according to the results of the composite soil test.

The nutrient management component of the conservation plan will include a schedule for soil sampling and analysis for all fields in the planning unit.

Soil samples and tissue shall be collected and prepared in accordance with University or Cooperative Extension guidance, or by following standard industry practice.

Soil and tissue test analyses shall be performed by laboratories that meet one of the following criteria:

- Laboratories successfully meeting the requirements and performance standards of the North American Proficiency Testing Program (NAPT) under the auspices of the Soil Science Society of America. A current list of these laboratories can be found at: <http://www.napt-pap.org>.
- Laboratories whose tests are accepted by University of Nevada Cooperative Extension.

See *Appendix A* for a list of approved soil testing laboratories.

Soil and tissue testing shall include analysis for all nutrients and/or soil conditions for which specific information is needed to develop the nutrient management plan, including:

- soil pH
- electrical conductivity [EC]
- soil organic matter [O.M.]
- nitrate nitrogen [$\text{NO}_3\text{-N}$]
- phosphorous [P]
- potassium [K]
- magnesium [Mg]
- calcium [Ca]
- sodium [Na]

Many Nevada soils also show a need for sulfur, zinc, manganese, and other micronutrients.

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 current soil test results, realistic yield goals, management capabilities, and plant nutrient utilization values.

Plant nutrient uptake rates recognized by NRCS are listed in the NRCS Agricultural Waste Management Field Handbook, Chapter 6, *Role of Plants in Waste Management*, Table 6-6. Other approved references providing estimates of nutrient uptake rates by plants include the Utah Fertilizer Guide, Western Fertilizer Handbook, and the Ortho Agronomy Handbook.

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

Nitrogen and Phosphorous Application -

Planned nitrogen and phosphorous application rates shall match the recommended rates as closely as possible, except when manure or other organic by-products are a source of nutrients.

Potassium Application - Excess potassium shall not be applied in situations in which it causes unacceptable nutrient imbalances in crops or forages.

High concentrations of potassium and nitrogen in manure applied on forages may cause grass tetany, a serious disorder in lactating ruminants.

When soil test potassium levels exceed 800 ppm, potential animal health concerns will be discussed with the producer and noted in the nutrient management plan.

Other Plant Nutrients - Planned rates of application of other nutrients shall be consistent with Cooperative Extension guidance or industry practice.

Starter Fertilizers - Starter fertilizers containing nitrogen, phosphorous and potassium may be applied in accordance with Cooperative Extension recommendations or industry practice. When starter fertilizers are used, they shall be included in the nutrient budget.

When manure or other organic by-products are a source of nutrients, see *Additional Criteria Applicable to Manure or Organic By-Products or Biosolids Applied as a Plant Nutrient Source* below.

Nutrient Application Timing.

Timing and method of nutrient application (particularly nitrogen) shall correspond as closely as possible with plant nutrient uptake characteristics, while considering cropping system limitations, weather and climatic conditions, risk assessment tools (e.g., leaching index, P index), and field accessibility.

Nutrient Application Methods.

Nutrients shall not be applied to frozen, snow-covered, or saturated, soil if a potential risk for runoff exists.

Apply nutrient materials uniformly to application area(s).

Nutrient applications through irrigation systems shall be applied in accordance with the requirements of *Irrigation Water Management* (Code 449). The application rate shall not exceed the soil intake/infiltration rate as defined by NRCS Nevada Irrigation Guide. Individual applications shall not exceed the field capacity (available water capacity) of the soil.

Liquid manure applications through irrigation systems may be made outside the active growing season where a water budget shows that deep percolation or runoff will not occur.

Agricultural waste shall not be land-applied on soils that are frequently flooded (USDA Soil Survey Manual) during the period when flooding is expected.

Conservation Management Unit (CMU) Risk Assessment.

Current soil tests and analyses are required during the inventory and evaluation phase of the nutrient management planning process on *critical* fields. The number of *critical* fields to be sampled will be determined by the planner and decision-maker.

Critical fields in the planning unit are identified as those that meet one or more of the following criteria:

- Where manure or organic-by-products are, or will be, applied.
- Located within areas with designated nutrient related water quality concerns.
- Located over an unconfined aquifer.
- Contain soil map units subject to frequent flooding.
- Contain soils with high or very high runoff classes.
- Contain soils with high leaching potential.
- Within 200-feet of perennial surface waters.
- Receiving nitrogen or phosphorous applications in excess of plant uptake for any crop in the crop rotation.

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

Manure and "organic by-products" are any organic material applied to land as a source of plant nutrients (e.g. food processing waste).

When animal manures or organic by-products are applied, a risk assessment of the potential for nutrient transport from the application site shall be completed to adjust the amount, placement, form and timing of application of nutrient sources.

Nutrient values of manure and organic by-products (excluding sewage sludge or biosolids) shall be determined prior to land application. Samples will be taken and analyzed with each hauling/emptying cycle for a storage/treatment facility.

Manure sampling frequency may vary based on the operation's manure handling strategy and spreading schedule.

If there is no prior sampling history, the manure shall be analyzed at least annually for a minimum of three consecutive years.

A cumulative record shall be developed and maintained until a consistent (maintaining a certain nutrient concentration with minimal variation) level of nutrient values is realized. The average of results contained in the operation's cumulative manure analyses history shall be used as a basis for nutrient allocation to fields.

Manure samples shall be collected and prepared according to University or Cooperative Extension guidance or industry practice.

In planning for new operations, acceptable "book values" recognized by the NRCS and/or western Land Grant Universities may be used if they accurately estimate nutrient output from the proposed operation (e.g., NRCS Agricultural Waste Management Field Handbook).

At a minimum, manure analyses shall identify:

- nutrient and specific ion concentrations
- percent moisture
- percent organic matter

Salt concentration shall be monitored so that manure applications do not cause plant damage or negatively impact soil quality.

Biosolids (sewage sludge) shall be applied in accordance with USEPA regulations. (40 CFR Parts 403 (Pretreatment) and 503 (Biosolids) and other state and/or local regulations regarding biosolids as a nutrient source.

Manure and Organic By-Product Application Rates

The application rate (in/hr) of liquid materials applied shall not exceed the soil intake/infiltration rate and shall be adjusted to minimize ponding and to avoid runoff. The total application shall not exceed the field capacity of the soil and shall be adjusted, as needed, to minimize loss to subsurface tile drains.

Manure and Organic By-Product Application Rates *continued*

A current phosphorous soil test based on Soil Test Phosphorous (STP) (*Olsen Method*) shall be used in determining the basis for the nutrient management plan and shall also be used in determining the Phosphorous Index (PI) rating.

When the nutrient management plan is being developed, the following pre-screening process shall be used to determine the basis for the nutrient management plan:

<u>STP</u>	<u>Apply Based On</u>
< 50 ppm	Nitrogen based plan
> 50 ppm	Phosphorous Index (PI) Rating

Nitrogen Application.

On sites allowing nitrogen based nutrient application planning, manure and other organic by-products shall be applied according to University or Cooperative Extension recommendations for nitrogen.

On legume-only forage and seed stands, manure and other organic by-products may be applied at rates equal to the estimated removal of nitrogen in harvested plant biomass.

Excessive N test - When the soil N test is greater than 200 ppm nitrate, no more manure is to be applied until the soil nitrate level drops below 80 ppm. A supplemental soil test can be done at 25% of the way into the growth period of the crop (120-day corn would be tested 30-days after planting). If the pre-application (crop growing) soil test is less than 80 ppm, a maximum rate of 30 lbs/ac of N can then be applied.

Phosphorous Application.

Section I

When nutrient applications are made on a phosphorous basis, additional nitrogen from non-organic sources may be required to supply, but not exceed, recommended amounts of nitrogen to crop in any given year.

Acceptable manure application rates may be based on either soil test recommendations or crop nutrient utilization values.

Section II

Phosphorous Index (PI). 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 shall be completed using the Nevada Phosphorous Index (PI).

In such cases, plans shall include:

- A record of the PI for each field or sub-field
- Plan maps that show the location of sensitive areas (e.g., wells, open water, areas with rapidly permeable soil, etc.)
- Information about conservation practices and management activities that can reduce the potential for phosphorous movement from the site.

When PI ratings are completed, the results and recommendations are to be discussed with the producer during the development of the plan. The following guidance is provided for interpretations of Phosphorous Index (PI) risk assessment evaluations based on criteria applicable to closed basins within Nevada:

Phosphorous Index (PI) Site Risk Ratings.

- ◆ Nitrogen based manure application is allowed on *Very Low, Low, and Medium Risk Sites*.
- ◆ Phosphorous based manure application (*Phosphorous Standard*) is required on *High and Very High Risk Sites*.
- ◆ Conservation practice and management alternatives that will reduce PI transport and source factors and lower the PI site rating from *Very High to High* (or lower) site risk will be scheduled as components of a RMS or CNMP.

Phosphorous based manure applications may continue during implementation of the required conservation practices and/or management alternatives.

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

Section III

Additional Phosphorous Criteria:

Phosphorous Limits. Manure or other organic by-products will be applied on the basis of crop phosphorous utilization on areas with the following soil limitations:

- Where available water holding capacity is less than 3-inches in the top 5-feet of the soil profile.
- Where depth to bedrock or cemented pan is less than or equal to 2-feet from the surface.
- Where depth to the seasonal water table is less than or equal to 2-feet from the surface.
- Where the soil saturated hydraulic conductivity is greater than 14- μ m/sec (soil permeability is greater than 2-in/hr).

Applications of manure may be made for crop phosphorous needs for multiple years in the crop sequence. When such applications are made, daily air temperatures must exceed 50° F for a minimum of 7-days prior to incorporation, and the application rate shall:

- Not exceed the recommended phosphorous needs for the crop rotation
 - Not exceed the 50-ppm STP (*Olsen method*) level after application
 - Not be made on frozen/snow covered ground
 - 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

- Not be made on sites considered high or medium risk to runoff or leaching unless appropriate conservation practices, best management practices, or management activities are used to reduce the risk to low or very low

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 Criteria to Minimize Agricultural Non-point Source Pollution of Surface and Ground Water Resources

In areas with 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.

Designated nutrient-related water quality impairment areas will be determined using the following (current) Nevada Division of Environmental Protection (NDEP) documents:

- ◆ Water Quality Limited Streams 303(d) List
- ◆ Total Maximum Daily Load (TMDL) and Water
- ◆ Quality Management Planning.
- ◆ NDEP designated groundwater areas.

The Leaching Index (LI) and/or Phosphorous Index (PI), or other recognized assessment tools, shall be used to make these assessments. The results of these assessments and recommendations shall be discussed with the producer and included in the plan.

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

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 of application.

When manure or organic by-products are applied to hay, pasture, or minimum-till areas, the rate, form and timing of application(s) shall be managed to minimize volatilization losses.

When applying liquid forms of manure with irrigation equipment, select application conditions when there is high humidity, little/no wind blowing, a rainfall event is forecast, and/or other conditions that will minimize volatilization losses into the atmosphere.

Handle and apply dry types of animal manures when weather conditions are calm and there is less potential for blowing and emission 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 specifications for the Operation and Maintenance of this practice.

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. Nutrients shall not be applied to wet soils by ground equipment when the potential for soil compaction and creation of ruts is high.

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

Manure and other organic-by-products applied to improve soil tilth shall be evaluated using the current approved Soil Condition Index procedure.

CONSIDERATIONS

The use of management activities and technologies listed in this section may improve both the production and environmental performance of nutrient management systems. The addition of these management activities, when applicable, increases the management intensity of the system and is recommended in a nutrient management system.

Action should be taken to protect National Register listed and other eligible cultural resources.

The nutrient budget should be reviewed annually to determine if any changes are needed for the next planned crop.

On sites where special environmental concerns exist, consider other sampling techniques. For example: soil profile sampling for nitrogen, where cultural resources exist, or soil surface sampling for phosphorous accumulation or pH changes. Consider annual reviews to determine if changes in the nutrient budget are desirable (or needed) for the next planned crop.

Soil test information should be no older than one year when developing new plans, particularly if animal manures are to be used as a nutrient source.

Excessive levels of some nutrients can cause induced deficiencies of other nutrients.

If increases in soil phosphorus levels are expected, consider a more frequent (annual) soil testing interval.

To manage the conversion of nitrogen in manure or fertilizer, use products or materials (*e.g.* nitrification inhibitors, urease inhibitors and slow or controlled release fertilizers) that more closely match nutrient release and availability for plant uptake. These materials may improve nitrogen use efficiency by reducing losses of nitrogen into water and/or the atmosphere.

Consider practices to modify the chemistry of animal manure, including modification of animal diet to reduce manure nutrient content, or utilizing manure amendments that stabilize or tie-up nutrients

Considerations to Minimize Agricultural Nonpoint Source Pollution of Surface and Ground Water.

Consider additional NRCS conservation practices such as Conservation Cover (327), Grassed Waterway (412), Contour Buffer Strips (332), Filter Strip (393), Dike (356), Tailwater Recovery (447), Conservation Crop Rotation (328), Cover and Green Manure (340), and Residue Management (329, 345, or 346; and 344) to improve soil nutrient and water storage, infiltration, aeration, soil tilth, diversity of soil organisms, and to protect or improve water and air quality.

Consider double cropping or crops that have high nutrient requirements whenever possible to utilize and recycle residual nitrogen and/or phosphorous.

Consider the use of minimum application setback distances from environmentally sensitive areas, such as wells, gullies, ditches, surface inlets or areas having rapidly permeable soils. See conservation practice Waste Utilization (Code 633) for guidance.

Consider 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
- Band applications of phosphorous near the seed row
- Avoid winter plow-out of alfalfa that releases nitrate when plants can use it in the spring
- Avoid winter nutrient application for spring seeded crops
- Apply nutrient materials uniformly
- Incorporate surface applied manures or organic by-products as soon as possible after application to minimize nutrient losses
- Ammonia based N fertilizers should be incorporated the same day applied
- For rapidly growing crops, apply waste in a manner that covers no more than 25% of the leaf surface with solids.
- Cover crops can effectively utilize and/or recycle residual nitrogen.

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

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

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

When planning nutrient applications and tillage operations, encourage soil carbon buildup while discouraging greenhouse gas emissions (e.g., nitrous oxide N₂O, carbon dioxide CO₂). 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.

PLANS AND SPECIFICATIONS

Plans and specifications shall describe the requirements for applying the practice to achieve intended purpose(s), using nutrients to achieve production goals and to prevent or minimize resource impairment.

Nutrient management plans shall include a statement that the plan was developed based on requirements of the current standard and any applicable Federal, state, or local regulations, policies, or programs, which may include the implementation of other practices and/or management activities. Changes in any of these requirements may necessitate a revision of the plan

PLANS AND SPECIFICATIONS *continued*

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

The following components shall be included in the nutrient management plan:

- Aerial photograph or site map(s) and a soil map of the site,
- Location of designated sensitive areas and the associated nutrient management restrictions,
- Current and/or planned plant production sequence or crop rotation,
- Results of soil, plant, water, manure and/or organic by-product sample analyses,
- Realistic yield goals for the crops in the rotation,
- Recommended nutrient rates, timing, form, and method of application and incorporation,
- Listing and quantification of all nutrient sources,
- Guidance for implementation, operation, maintenance, recordkeeping,
- Nutrient budget for nitrogen, phosphorous, and potassium for the crop being grown and/or for the crop rotation.

If increases in soil phosphorous levels are expected where manure is applied based on the nitrogen standard, plans shall document:

- The soil phosphorous threshold values at which it is necessary to convert to phosphorous based application.
- The relationship between soil phosphorous levels and potential for phosphorous transport from the field, and
- The potential for soil phosphorous draw down from the production and harvesting of crops.

In addition to the requirements described above, the planner shall discuss with the producer:

- How the plan is intended to prevent the nutrients (nitrogen and phosphorous) supplied for production purposes from contributing to water quality impairment.
- The relationship between nitrogen and phosphorous 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 phosphorous should include information about phosphorous accumulation in the soil, the increased potential for phosphorous transport in soluble form, and the types of water quality impairment that could result from phosphorous movement into surface water bodies.
- How the plan is intended to prevent the nutrients (nitrogen and phosphorous) supplied for production purposes from contributing to water quality impairment.

OPERATION AND MAINTENANCE

The land owner/operator is responsible for safe operation and maintenance of this practice including all equipment.

Operation and Maintenance addresses the following:

- Nutrient management plans will be reviewed and/or revised a minimum of once every five years.

Annual reviews are required for a National Pollutant Discharge Elimination System (NPDES) permit, or when significant changes occur such as crop rotation changes, change in nutrient handling methods, or when animal numbers or types and/or feed management change.

If livestock numbers change up or down by 20%, or land area increases or decreases by 20%, or the crop rotation changes, a review of the nutrient budget is needed.

OPERATION AND MAINTENANCE *continued*

- 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 the material and that nutrient applications are within 25% of the planned rate.
- Maintaining records to document plan implementation.

As applicable, records shall include:

- Soil test results and results of water, plant, and organic by-product analyses and recommendations for nutrient application.
- Actual rate at which nutrients were applied. When the actual rates used differ from the recommended and planned rates, records will indicate the reasons for the differences.
- Quantities, analyses and sources of nutrients applied.
- Dates and method(s) of nutrient applications,
- Weather conditions and soil moisture at the time of application; lapsed time to manure incorporation, rainfall or irrigation event.
- Crops planted, planting and harvest dates, yields, and crop residues removed.
- Dates of nutrient plan 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, Tribal, state, or local ordinances, or program.

Workers should be protected from and avoid unnecessary contact with chemical fertilizers and organic by-products. Extra caution must be taken when handling ammoniacal nutrient sources, or when dealing with organic wastes stored in unventilated enclosures.

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.

When cleaning nutrient application equipment, excess material should be collected and stored or field applied in an appropriate manner.

Application equipment should not be cleaned in areas where a high risk for runoff, leaching, or well contamination exists.

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

REFERENCES

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- Thorup, R.M., 1989, *Ortho Agronomy Handbook*. Chevron Chemical Company
- James, DW., and Topper, K.F. 1989, *Utah Fertilizer Guide*. Utah State University.
- Nevada Division of Environmental Protection (NDEP) Bureau of Water Pollution Control. *Nevada Water Pollution Control Law*. Dec 2002 (NRS445A.300 through 445A.730) <http://ndep.nv.gov/admin/nrs445a.htm>
- Nevada Division of Environmental Protection (NDEP) Bureau of Water Pollution Control. *NPDES Permit Forms and Fee Schedules*. <http://ndep.nv.gov/bwpc/forms.htm>
- Nevada Division of Environmental Protection (NDEP) Bureau of Water Quality Planning. *Nevada Water Quality Standards (NRS445A.010 through 445A. 730)*. <http://ndep.nv.gov/bwqp/stdsw.htm>
- Nevada Division of Environmental Protection (NDEP) Bureau of Water Quality Planning. Water quality documents available on web site at:
including:
Nevada Water Quality Limited Streams 303(d) List
<http://ndep.nv.gov/bwqp/303dlist.htm>
Total Maximum Daily Load (TMDL) data
<http://ndep.nv.gov/bwqp/tmdl.htm>
- USDA. 1993. *Soil Survey Manual*. USDA Handbook No. 18. Washington, D.C.
- USDA-ARS. 1999. *Agricultural Phosphorous and Eutrophication*. ARS-149.
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- USDA-NRCS. 2002. *National Agronomy Manual*. Washington, D.C.
- USDA-NRCS, 1992. *Agricultural Waste Management Field Handbook*. National Engineering Handbook. Washington, D.C.
- USDA-NRCS. 1999. *Core 4 Conservation Practices. Nutrient Management Chapters 1 to 6*, Washington, D.C.
- USDA-NRCS, *Phosphorous In Agriculture*. Soil Quality Institute Technical Pamphlet NO.2.

APPENDIX A

North American Proficiency Testing Performance Assessment Program (NAPT-PAP) Laboratories

and/or

Soil Testing Labs Recommended by University of Nevada Cooperative Extension

Agri-Check, Inc.
323 6th S1.
Umatilla, OR 97882
Phone: 541-922-4894
Fax: 541-922-5496
ioe@agri-check.com

Agvise Laboratories Inc.
P.O. Box 510
Highway 15
Northwood, ND 58267
Phone: 701-587-6010
Fax: 701-587-6013
<http://www.agvise.com>

A & L Western Agric Labs
1311 Woodland Ave., NO.1
Modesto, CA 95351
Phone: 209-529-4080
Fax: 209-529-4736
<http://www.al-labs-wes1.com>

B&C Ag Consultants
P.O. Box 1184
Billings, MT 59103
Phone: 406-259-5779
Fax: 406-259-1038
mdchoriki@aol.com

Best-Test Analytical Services
3394 Bell Road N E
Moses Lake, WA 98837
Phone: 509-766-7701
Fax: 509-766-7705
besttest@atne1.net

CSU Testing Lab
A319 NESB 200 West Lake
Fort Collins, CO 80523-1120
Phone: 970-491-5061
Fax: 970-491-2930
<http://www.colostate.edu/Depts/SoilCrop/soiliab/soillab.html>

Dellavalle Laboratory Inc.
1910 W. McKinley, Ste 110,
Fresno, CA 93728-1298. Phone:
559-233-6129
Fax: 559-268-8174
<http://www.dellavallelab.com>

IAS Laboratories
2515 E University Dr Phoenix, Al.
85034
Phone: 602-273-7248
Fax: 602-275-3836

KSU Soil Testing Lab
2004A Throckmorton Hall
Manhattan, KS 66506
Phone: 785-532-7898
Fax: 785-532-7412
www.oznet.ksu.edu/agronomy/soiltesting

MDS Harris
621 Rose Street
Lincoln, NE 68501
Phone: 402-437-4944
Fax: 402-476-7598
<http://www.mdsharris.com/ag>

Midwest Laboratories Inc.
13611 B Street
Omaha, NE 68144-3693
Phone: 402-334-7770
Fax: 402-334-9121
<http://www.midwestlabs.com>

Northwest Agric Consultants
2545 West Falls Ave. Ste A
Kennewick, WA 99336
Phone: 509-783-7450
Fax: 509-783-5305
<http://www.nwaq.com>

Olsen's Agric Laboratory
P.O. Box 370
210 E. First Street
McCook, NE 69001
Phone: 308-345-3670
Fax: 308-345-7880
<http://www.olsenlab.com>

Precision Agri Lab
24730 Ave. 13
Madera, CA 93637
Phone: 559-661-6386
Fax: 559-661-6135
cbethel@agriumretail.com

Soil Test Farm Consultants 2925
Driggs Drive
Moses Lake, WA 98837
Phone: 509-765-1622
Fax: 509-765-0314
<http://www.soiltestlab.com>

Stanworth Crop Consultants 413
W. Hobson Way
Blithe, CA 92225
Phone: 760-922-3106
Fax: 760-922-2770
stanworth@mail.telis.org

USU Analytical Laboratories Utah
State University
Ag. Science Rm. 166
Logan, UT 84322-4830
Phone: 801-797-2217
Fax: 801-797-2117
<http://www.usual.usu.edu>

University of Wyoming Soil Testing
P.O. Box 3354
University Station
16th and Gibbon
Laramie, WY 82071
Phone: 307-766-2135
Fax: 307-766-5549
soiltest@uwvo.edu

Western Laboratories
211 W. Hwy. 95
P.O. Box 1020
Parma, ID 83660
Phone: 208-722-6564
Fax: 208-722-6550
<http://www.westernlaboratories.com>