Handout # 6

What must be included in a CAFO's Nutrient Management Plan?

In accordance with federal regulations, the revised Order will require concentrated animal feeding operations (CAFOs) that land apply raw (uncomposted) manure, litter, or process wastewater to development and implement nutrient management plans (NMPs) by February 27, 2009. The National Pollutant Discharge Elimination System (NPDES) regulations at 40 CFR 122.42(e)(1) establish minimum elements that each CAFO's NMP must address. The effluent limitations guidelines at 40 CFR 412.4(c)(1) include more specific NMP requirements that apply to certain CAFOs. The table below outlines the types of requirements likely to be included in the revised Order for CAFOs in the Colorado River Basin Region.[1]

NMP Element	Permit Requirement[1]
Site-specific conservation practices	Identify site specific conservation practices to be implemented, including as appropriate buffers or equivalent practices to control and minimize pollutant runoff and discharge to waters of the United States.
Manure and soil testing	Identify protocols for testing manure, litter, and process wastewater for nitrogen and phosphorus annually. Dischargers who land apply manure, litter, or process wastewater must identify protocols for testing soil for phosphorus every five years. The permit will include Technical Standards for testing and analysis.
Land application	As applicable, establish protocols to land apply manure, litter, or process wastewater in accordance with site specific nutrient management practices that ensure appropriate agricultural utilization of the nutrients. Land application protocols must be developed in accordance with Technical Standards to be included in the permit.
Records and documentation	Identify specific records that will be maintained to document the development, implementation, and management of the NMP and compliance with the minimum practices.

The technical standards for nutrient management establish specific limits on the maximum application rates for manure, litter, and process wastewater. The technical standards are provided below.

[1] *The requirements and permit information outlined in this handout are tentative; final requirements will be included in the final adopted Order. Please contact the Regional Board with specific questions or concerns about the requirements described here.*

TECHNICAL STANDARDS FOR NUTRIENT MANAGEMENT[1]

Dischargers that land apply manure, litter, or process wastewater must comply with the following technical standards for nutrient management.

Sampling Requirements

The Discharger shall use sample containers and sample handling, storage, and preservation methods that are accepted or recommended by the selected analytical laboratory or, as appropriate, in accordance with approved USEPA analytical methods. The following sampling procedures are standards currently recognized by the Regional Water Board. When special procedures appear to be necessary at an individual facility, the Discharger may request approval of alternative sampling procedures for nutrient management. The Executive Officer will review such requests and if adequate justification is provided, may approve the requested alternative sampling procedures.

Soil Sampling and Analysis

1. At least once every 5 years, commencing with the first full calendar year regulated by the Order, the Discharger shall collect and analyze representative soil samples from all land application areas under the Discharger's control where process wastewater and/or manure is applied. Soil samples shall be collected following harvest of a crop and before nutrients are added for the following crop.

2. Soil samples shall be collected as follows:

    a. Composite samples shall be collected from each land application area receiving manure and/or process wastewater. Samples shall be composited by:

        i. Placing equal volumes of soil from each of 10 or more sample sites for each land application area and sample depth, in a clean plastic bucket. Moist soils may be air dried until they can be mixed easily.

        ii. Thoroughly mixing the sample and placing at least one pint of the composite sample in a clean plastic container to be shipped to the laboratory. The laboratory should be consulted for the exact amount of sample and the sample container needed.

    b. At a minimum, composite samples shall be collected from a depth of 0 to 48 inches. Samples from each site shall be split into four sections representing depth intervals 0 to 12 inches, 12 to 24 inches, 24 to 36 inches, and 36 to 48 inches. All samples from the same depth interval for all sites within each land application area shall be composited for analyses.

    c. Soil samples shall be collected with soil probes or augers from a minimum of 10 sites in each land application area and composited as described below.

[1] *The requirements and permit information outlined in this handout are tentative; final requirements will be included in the final adopted Order. Please contact the Regional Board with specific questions or concerns about the requirements described here.*

i. At least three of the 10 samples shall be from the upper third of the land application area.

ii. In fields where soil texture, crop yield, or other soil-related factors vary, at least 10 samples shall be collected from each different area and composites from each area shall be analyzed separately.

iii. Sample locations in each land application area shall be recorded on a sketch for future sampling consistency.

iv. Soil probes or augers shall be cleaned thoroughly between selected sample depth intervals with a non-residual detergent such as Alconox.

Manure Sampling

Manure samples shall be collected as follows:

1. At least 10 equal-size samples of manure shall be collected from various portions of the manure pile, with most samples from the center. No more than two samples shall be collected from the surface and two from the bottom.

2. The 10 samples shall be placed in a container and mixed well before a subsample is placed in a clean container provided by or approved by the analytical laboratory that will receive the samples.

3. Sample containers that are reused shall be washed with soap and thoroughly rinsed with clean (tap) water.

Process Wastewater Sampling

Process wastewater composite samples shall be collected as follows:

1. A representative composite sample of process wastewater shall be prepared based on a minimum of three time-series samples collected during a discharge event that are representative of the beginning, middle, and end of the process wastewater discharge. These samples shall be combined in a single container, mixed, and poured into a clean container provided by or approved by the laboratory that will receive the samples. Containers that are reused shall be washed with soap and thoroughly rinsed with clean (tap) water.

2. The samples shall be collected at a point that is prior to any dilution or blending with irrigation water and shall be representative of the process wastewater applied to the land application area.

<u>Analytical Requirements</u>

1. Analyses of soil samples shall be conducted by: methods utilized by the North American Proficiency Testing (NAPT) Program or accepted by the University of California; and laboratories participating in the NAPT Program or other programs whose tests are

accepted by the University of California. This shall include analysis for nitrate-nitrogen and ammonium-nitrogen utilizing the 1M potassium chloride extract of soil.

2. Analyses of phosphorus in soil samples shall be performed using the method recommended by the University of California or the bicarbonate-P or Olsen_P test.

3. Analyses of manure shall be conducted by: methods utilized by the Manure Analyses Proficiency (MAP) Testing Program or accepted by the University of California; and laboratories participating in the MAP Testing Program or other programs whose tests are accepted by the University of California.

4. Analyses of process wastewater samples shall be conducted by a laboratory certified for such analyses by the California Department of Health Services. These laboratory analyses shall be conducted in accordance with the Part 136 (Guidelines Establishing Test Procedures for the Analysis of Pollutants) or other test methods approved by the EO.

Crop Nutrient Requirements

1. 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, tissue, and manure/organic by-products tests. For new crops or varieties, industry yield recommendations may be used until documented yield information is available.

2. Each crop's nutrient requirements for nitrogen and phosphorus shall be determined based on recommendations from the University of California, Western Fertilizer Handbook (9th Edition), or from historic crop nutrient removal.

Available Nutrients

1. A nutrient budget for nitrogen shall be developed that considers all potential sources of nutrients including, but not limited to animal manure and organic byproducts, waste water, commercial fertilizer, crop residues, legume credits, and irrigation water. A nutrient budget for phosphorus is required for fields rated "Medium" or higher risk using the Phosphorus Index.

2. Nutrient values of soil, manure, process wastewater, and irrigation water shall be determined based on laboratory analysis. "Book values" for manure and process wastewater may be used for planning of first year application(s) during initial development of the NMP if necessary. Acceptable book values are those values recognized by American Society of Agricultural and Biological Engineers (ASABE), the NRCS, and/or the University of California that accurately estimate the nutrient content of the material. The nutrient content of commercial fertilizers shall be derived from the published values certified by the California Department of Food and Agriculture.

3. Nutrient credit from previous legume crops shall be determined by methods acceptable to the University of California Cooperative Extension, the Natural Resources

Conservation Service (NRCS), or a specialist certified in developing nutrient management plans.

Nutrient Application Rates

General

1. NMPs shall specify the form, source, amount, timing, and method of application of nutrients on each field to minimize nitrogen and/or phosphorus movement to surface and/or ground waters to the extent necessary to meet the provisions of the Order.

2. Where crop material is not removed from the field, waste applications are not allowed. For example, if a pasture is not grazed or mowed (and cuttings removed from the field), waste shall not be applied to the pasture.

3. Manure and/or process wastewater will be applied to the field for use by the first crop covered by the NMP only to the extent that soil tests indicate a need for nitrogen application.

4. Nutrient application rates shall not attempt to approach a site's maximum ability to contain one or more nutrients through soil adsorption. Excess applications or applications that cause soil imbalances should be avoided. Excess manure nutrients generated by the Discharger must be handled by export to a good steward of the manure, or the development of alternative uses.

5. Planned rates of nutrient application shall be determined based on soil test results, nutrient credits, manure and process wastewater analysis, crop requirements and growth stage, seasonal and climatic conditions, and use and timing of irrigation water. Actual applications of nitrogen to any crop shall be limited to the amounts specified below.

Nitrogen

1. Total nitrogen applications to a field prior to and during the growing of a crop shall not exceed 1.0 times the total nitrogen removed from the field through the harvest and removal of the previous crop. Additional applications of nitrogen are allowable if the following conditions are met:

    a. Plant tissue testing has been conducted and it indicates that additional nitrogen is required to obtain a crop yield typical for the soils and other local conditions;

    b. The amount of additional nitrogen applied is based on the plant tissue testing and is consistent with University of California Cooperative Extension written guidelines or written recommendations from a professional agronomist;

    c. The form, timing, and method of application make the nitrogen immediately available to the crop; and

    d. Records are maintained documenting the need for additional applications.

2. At no time will application rates result in total nitrogen applied to the land application area exceeding 1.65 times the total nitrogen removed from the field through the harvest and removal of the previous crop.

Phosphorus

1. The California Phosphorus Index, located in Section I of the NRCS Field Office Technical Guide, shall be used to evaluate the risk of phosphorus transport. Phosphorus applications shall be made to each field based on the Phosphorus Index Risk Rating as follows:

    a. Low Risk: If the field is found to be in the Low Risk category, manure or process wastewater may be applied based on the nitrogen requirement of the crop and the nitrogen content of the manure or process wastewater.

    b. Medium Risk: If the field is found to be in the Medium Risk category, manure or process wastewater may be applied based on the nitrogen requirement of the crop and the nitrogen content of the manure or process wastewater. Fields in the Medium Risk category should be periodically reviewed using the Phosphorus Index since they may move into the High Risk category when no management changes are made. A phosphorus budget must be developed for Medium and higher risk fields.

    c. High Risk: If the field is found to be in the High Risk category then manure or process wastewater may be applied at a phosphorus-based rate for crop removal. A phosphorus budget must be developed for Medium and higher risk fields. The Discharger must develop a conservation plan that will lower the risk category to at least Medium when implemented. After implementation of the conservation plan has lowered the risk level, the actions required at the lower risk levels will apply.

    d. Very High: If the field is in the Very High Risk category no manure, process wastewater or other organic sources of phosphorus may be applied. A phosphorus budget must be developed for Medium and higher risk fields. The Discharger must develop a conservation plan that will lower the risk category to at least High when implemented. After implementation of the conservation plan has lowered the risk level, the actions required at the lower risk levels will apply.

2. 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.

    - be consistent with the P Index risk category of the field.