



ANALYTICAL CHEMISTS

APPROVED SAMPLING PROCEDURES FOR NUTRIENT AND GROUNDWATER MONITORING AT EXISTING MILK COW DAIRIES

Monitoring and Reporting Program No. R5-2007-0035 (MRP) requires existing milk cow dairies to conduct nutrient and groundwater monitoring. The MRP does not identify complete sampling procedures to be followed for this monitoring. The sampling and analytical procedures listed below for nutrients (process wastewater, manure, plant tissue, soil, and irrigation water) and groundwater are approved procedures. As noted in General Monitoring Requirements item 2 of the MRP, "When special procedures appear to be necessary at an individual dairy, 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 procedure."

Process Wastewater Sampling and Analysis

1. Process wastewater composite samples shall be collected as follows:
 - a. A representative composite or grab sample of process wastewater shall be prepared. Containers that are reused shall be cleaned between sampling events.
 - b. 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.
2. Laboratory analyses of process wastewater 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 Title 40 Code of Federal Regulations Part 136 (*Guidelines Establishing Test Procedures for the Analysis of Pollutants*) or other test methods approved by the Executive Officer.

Manure Sampling and Analysis

1. Manure composite samples shall be collected as follows:
 - a. Equal-size samples of manure shall be collected from a minimum of three locations around the manure pile. These samples shall be collected from a depth of no less than one foot below the surface of the manure pile.
 - b. The three samples shall be combined and thoroughly mixed to make a single composite sample.

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- c. Sample containers that are reused shall be cleaned between sampling events.
2. Manure analyses 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.

Plant Tissue Sampling and Analysis

1. Samples of harvested silage shall be collected as follows:
 - a. Samples shall be collected within one week of harvest from a minimum of five locations in the silage pile.
 - b. Samples shall be obtained from a minimum depth of one foot below the silage pile surface.
 - c. The five samples shall be combined and thoroughly mixed to make a single composite sample.
2. Harvested plant tissue samples from crops other than silage shall be collected as follows:
 - a. At least 10 equal-size samples (for example, using a two- to three-pound coffee can) of the harvested portion of the crop shall be collected from the storage area. These samples shall be combined and thoroughly mixed in a plastic bag, taking care not to allow drying.
 - b. Mid-season plant tissue samples, if collected, shall be collected following University of California recommendations for the specific plant being tested.
3. Plant tissue analyses 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.

Soil Sampling and Analysis

1. Soil samples from each land application area shall be collected after harvest of a crop and before nutrients are added for the next crop as follows:

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- a. Dischargers with less than 400 acres shall collect a composite sample for every 40 acres of land application area. Dischargers with 400 or more acres shall collect a composite soil sample for every 80 acres.
 - b. Each composite sample shall be composited by:
 - i. Placing equal volumes of soil from each of 10 or more sample sites for each 40 or 80 acre composite area and for each 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.
 - c. Samples from each site shall be split into sections representing the depth intervals to be sampled (see above). All samples from the same depth interval for all sites within each land application area shall be composited for analyses.
 - d. Soil samples shall be collected with soil probes or augers and composited as described below:
 - 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 between sample depth intervals.
2. Analyses of soil 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 2 M potassium chloride extract of soil

3. 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.

Irrigation Water Sampling and Analysis

1. Irrigation water samples shall be collected as follows:
 - a. Samples shall be collected before the addition of process wastewater; and
 - b. Samples from irrigation wells shall be collected after the pump has run for a minimum of 30 minutes or after at least three well volumes have been purged from the well.
2. Laboratory analyses of irrigation water 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 Title 40 Code of Federal Regulations Part 136 (*Guidelines Establishing Test Procedures for the Analysis of Pollutants*) or other test methods approved by the Executive Officer.
3. All nutrient monitoring results shall be included in the Annual Monitoring Report (see Reporting Requirements C.2.n).

Groundwater Sampling and Analysis

1. Groundwater samples from supply wells and subsurface (tile) drainage systems shall be collected as specified on page MRP-7 of the MRP.
2. Groundwater samples from monitoring wells shall be collected as specified in an approved Monitoring Well Installation and Sampling Plan (see Attachment A to Monitoring and Reporting Program No. R5-2007-0035).
3. Laboratory analyses of all groundwater samples (including samples from supply wells, subsurface (tile) drainage systems, and monitoring wells) 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 Title 40 Code of Federal Regulations Part 136 (*Guidelines Establishing Test Procedures for the Analysis of Pollutants*) or other test methods approved by the Executive Officer.

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