

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

WASTE TREATMENT

CODE 629

(No.)

DEFINITION

The use of unique or innovative mechanical, chemical or biological technologies that change the characteristics of manure and agricultural waste.

PURPOSE

To use manure and waste treatment facilities to improve water quality and air quality by:

- Reducing the nutrient content, organic strength, and/or pathogen levels of manure and agricultural waste.
- Reducing odors and gaseous emissions
- Facilitating desirable waste handling and storage
- Producing value added byproducts that facilitate manure and waste utilization.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where there is a need to implement waste treatment technologies that are not within the scope of other NRCS Conservation Practice Standards and that are sufficiently developed for incorporation into a manure or agricultural waste management system. This includes new or unique components or processes.

General Criteria Applicable to All Waste Treatment Purposes.

Laws and Regulations. Ensure that the manure and waste treatment facilities and processes are planned, designed, and constructed to meet all federal, state, local and tribal laws and regulations.

Utilities. Locate all buried utilities in the project area including drainage tile and other structural measures.

Design. The waste treatment technology provider shall complete and supply to the land owner/operator a detailed design of the facility/process clearly identifying the objectives and anticipated outcomes of implementation.

When the planned technology involves a system or process include in the design documentation a process diagram containing, at a minimum, the following information:

1. Volumetric flow rates including influent, effluent, and recycle streams.
2. Waste load projections including volume, mass, and characteristics of the waste important to the waste treatment facility or process.
3. Unit process volumes and hydraulic retention times where appropriate.
4. Air emissions projections from the system.
5. Nutrient fate projections within the system.
6. Process monitoring and control system requirements as described below in the Monitoring section of the criteria.

Byproducts. Implementation of a waste treatment process or operation of a waste treatment facility shall not result in discharge of byproducts harmful to the environment.

Handle and store all byproducts in such a manner as to prevent nuisances to neighbors or to the public at large.

The land application of byproducts to supply plant nutrients must meet the criteria in NRCS Conservation Practice Standard 590, Nutrient Management.

Handle and dispose of any unmarketable or unused byproducts in accordance with all applicable federal, state, and local laws and regulations. A plan for dealing with such byproducts shall be prepared and approved

prior to utilization of the process or installation of the waste treatment facility, and shall include a listing of any permits or permissions required for the execution of the plan.

Recycle the waste treatment byproducts to the extent possible without causing a hazard to the environment.

Safety. Include the design of the process or facility safety features to minimize hazards. Provide guards and shields for moving parts of the equipment used in the treatment process. Fence waste treatment facilities and post warning signs where needed to prevent children and others from entering a hazardous area.

Carry out all treatment processes in accordance with all safety regulations. Wear protective clothing when handling potentially harmful chemicals that may be used in the process. Provide proper ventilation.

New and Innovated Waste Treatment Technologies

It is the responsibility of the technology provider to furnish information from a university or other independent research entity to document the effectiveness of the technology to achieve its intended purpose. Provide independent, verifiable data demonstrating results of the use of the facility or process in other similar situations and locations. If available document the effectiveness of the technology under different climatic factors. Documentation from peer reviewed journals is preferable. Where use of a waste treatment facility or process to improve one resource concern negatively impacts another, impacts and mitigation measures, if required by state or local agencies, are to be documented.

Components. Waste treatment facilities and processes may consist of multiple components. Where criteria for individual components are described in existing NRCS practice standards, use those practice standards and their specific criteria for planning, designing, and installation of that component.

Where components of a facility or process are not described in a current NRCS practice standard, the system provider shall furnish a minimum one year warranty on all

construction, equipment, and applied processes.

Expected System Performance. Clearly document the expected system performance prior to system installation. At a minimum, document all expected system volumetric flow rates, macro-nutrient reductions or changes in form, expected pathogen reductions, gaseous ammonia and hydrogen sulfide emissions reductions (or increases).

Operating Costs. The system provider shall furnish an annual estimate of operating costs and the time, labor, energy, and equipment requirements for each waste treatment component of the waste management system and on the operation cost or savings the waste treatment component will have on the waste management system as a whole. Identify as estimates the operating costs not based on actual data. Adequately document the anticipated operation cost or savings of the waste treatment component on the entire system.

Monitoring. Install as a part of the system equipment needed to properly monitor and control the waste treatment facility or process. Identify the process control parameters to be monitored in the design documentation. Identify parameters considered critical to proper system operation in the Operation and Maintenance (O&M) Plan. Monitor critical equipment status and unit processes.

Additional Criteria for Milking Center Wastewater Treatment

Locate milking center treatment systems outside of floodplains. However, if site restrictions require location within a floodplain, they are to be protected from inundation or damage from a 25-year flood event, or larger if required by laws, rules, and regulations.

Do not locate milking center wastewater treatment systems in areas designated as wetlands.

Setback Distances	
Feature	Setback (feet)
Property line	10
Private well	50
Public well – Type IIb and III	75
Public well – Type I and IIa	200
Surface water	100

Offsite surface water is to be excluded from milking center waste treatment systems.

Pretreatment is required for milking center waste treatment systems. Pretreatment tanks are to provide at least 4 times the daily wastewater volume. Two tanks are to be used. Pretreatment tanks are to be water tight in accordance with ASTM C1227.

Human waste is to be excluded.

Bark Bed Filter Mound.

This treatment system is limited to a daily milking center wastewater production of 1,500 gallons per day or less.

A subsurface investigation is required at the proposed site to a depth of at least 3 feet. The soils investigation must include;

- Documentation of any restrictions to infiltration such as surface compaction or a restrictive soil layer less than 2 feet below the surface.
- USDA soil classification and correlated hydraulic loading rates
- Determine the seasonal high water table. A minimum of 2 feet below the bark filter mound must not be saturated.

The Design hydraulic loading rate are to be based on the most restrictive soil in the upper 2 feet of the soil profile.

Hydraulic Loading Rates	
Soil Texture	Loading Rate (gpd/ft ²)
Coarse sand, medium sand, and loamy sand	0.32
Fine sand, sandy loam or loam	0.16
Silt loam, silt, or clay loam	0.12

- The ground surface slope below the mound must be 2 percent or less

Gravel Contactor Treatment Cells

This treatment system is limited to;

- 180 dairy cows milkhouse wastewater (limited amount of manure in the waste stream) or

- 90 dairy cows milking center wastewater (with varying quantities of manure in the waste stream)

A subsurface investigation is required at the proposed site to determine the seasonal high water table below the treatment cells.

2 feet separation from the seasonal high water table is required.

Additional treatment or recycling of the wastewater is required at the outlet of this treatment system.

CONSIDERATIONS

Location. Locate the waste treatment facility as near the source of manure or other waste as practicable and as far from neighboring dwellings or public areas as possible. For proper location also consider slope, distance of manure and other waste transmission, vehicle access, wind direction, proximity of streams and flood plains, and visibility.

In determining the location of the facility, consider elevation and distance from various components to take advantage of gravity flow where possible.

Waste Characteristics. Waste treatment may require specific total solids and nutrient contents of the waste stream. Pretreatment options such as dilution or settling could be used to adjust the solids content before entering the waste treatment facility or process.

Visual Screening. Evaluate the visual impact of the waste treatment facility or process within the overall landscape context. Look at implementing screening with vegetative plantings, landforms, or other measures to alleviate a negative impact or enhance the view.

Traffic Patterns. Consider the following factors regarding traffic patterns and vehicular access for normal farm operations and for construction when locating a site;

- Minimize locations where the pipes will go below roadways and other traffic areas that are kept open all winter.
- Vehicular access will be needed for construction and maintenance. Pretreatment tanks are to be pumped out annually.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for waste treatment facilities in accordance with the criteria of this standard and good engineering practice.

As a minimum, provide the following in the plans and specifications:

1. Layout and installation details of livestock facilities, waste collection points, waste transfer components, waste treatment and storage facilities, including supporting documentation.
2. Location of all inflow and discharge pipelines, pipeline materials, diameter and slope.
3. Details of support systems for all components of the treatment facility.
4. Fencing and signage as appropriate for safety purposes.
5. Required tests to determine the effectiveness of the waste treatment as appropriate.
6. Other plans to manage the system including a nutrient management plan for proper land application of byproducts.

OPERATION AND MAINTENANCE

Develop and review an O&M plan with the owner/operator prior to construction of an innovative waste treatment facility or implementation of an innovative waste treatment process. Ensure the O&M plan is consistent with the proper operation of all system components and contains requirements including but not limited to:

- Recommended loading rates of the waste treatment facility or process for hydraulic and critical pollutant parameters.
- Proper operating procedures for the waste treatment facility or process, including the amount and timing of any chemicals added.
- Operation and maintenance manuals for pumps, blowers, instrumentation and control devices, and other equipment used as components of the waste treatment facility or process.
- Description of the planned startup procedures, normal operation, safety issues, and normal maintenance items. This includes procedures for the planned replacement of components with less than a ten year service life.
- Alternative operation procedures in the event of equipment failure.
- Troubleshooting guide
- Monitoring and reporting plan designed to demonstrate system performance on an ongoing basis
- The service life of each component as identified by the manufacture of service provider. The minimum service life for the waste treatment facility or process is ten years. Where components have less than a ten year service life, clearly identify their planned replacement schedule.

REFERENCES

ASTM C1227, Standard Specification for Precast Concrete Septic Tanks.

Design Guide: Michigan Filter Mound for Treating Milking Center Wastewater. Michigan Livestock Wastewater Treatment Workgroup. 2016

Design Guide: Michigan Gravel Contactor for Treating Milking Center Wastewater. Michigan Livestock Wastewater Treatment Workgroup. 2016

Schmidt, D.R., K.A. Janni, S.H. Christopherson, 2008. Milk House Wastewater Design Guide. M1207. University of Minnesota-Extension.

Dairy Practices Council (DPC-15), Guideline for Milking Center Wastewater, NRAES-115 1998