

Wisconsin  
Engineering Standard and Specifications  
for

~~AGRICULTURAL~~ WASTE MANAGEMENT SYSTEM

312-74

Definition

A planned agricultural waste management system to contain and manage liquid and solid wastes including runoff from concentrated waste areas with ultimate disposal in a manner which does not degrade air, soil, or water resources. This practice includes systems for safe disposal of livestock wastes, municipal waste treatment plant effluents and sludges, and agricultural processing wastes through use of soil and plants.

Scope

This standard establishes the minimum acceptable quality for design, installation, and operation of agricultural waste management systems. Systems shall include those components required for complete management of wastes under given site conditions. Such components may include existing practices included in the National Handbook of Conservation Practices, adaptations thereof, and other measures necessary for collection, storage, treatment, utilization, or safe disposal of wastes including treatment and management of disposal areas. They do not include municipal, industrial, commercial, or domestic waste treatment plants or in-plant modifications.

The extent of technical assistance provided shall be within guidelines established in Environmental Memorandum-4 "Guide to SCS Soil and Water Management Activities Affecting the Control of Agricultural Related Pollutants."

Purpose

Agricultural waste management systems are used to manage wastes in rural areas in a manner which prevents or minimizes degradation of air, soil, and water resources and protects public health and safety. Such systems

are planned to preclude discharge of pollutants to surface or ground water and, to the fullest practicable extent, recycle wastes through soil and plants.

### Conditions Where Practice Applies

#### General

This practice applies where there is need for a complete system to manage agricultural wastes or other wastes disposed of through use of soil and plants in agricultural areas, reduce pollution, minimize health hazards, and improve the environment.

#### Federal, State and Local Laws

All federal, state and local laws, rules, and regulations governing waste management, pollution abatement, health and safety shall be strictly adhered to. The owner or operator shall be responsible for securing all required permits and for performing in accordance with such laws and regulations.

The Environmental Protection Agency (EPA) has published required guidelines for feedlot operations equal to or larger than the following sizes by categories.

1,000	slaughter steers and heifers
700	mature dairy cattle (whether milkers or dry)
2,500	swine weighing over 55 pounds
10,000	sheep
55,000	turkeys
100,000	laying hens or broilers when facility has unlimited continuous flow watering systems
30,000	laying hens or broilers when facility has liquid manure handling system
500	horses
5,000	ducks in dry lots or wet lots
1,000	animal units from a combination of slaughter steers and heifers, mature dairy cattle, swine over 55 pounds, and sheep

Responsibility for enforcement of the above guidelines in Wisconsin is under the authority of the Department of Natural Resources.

### Design Criteria

#### General

An agricultural waste management system for a given enterprise shall include those components necessary to properly manage wastes and prevent degradation of air, water, soil and plant resources, and environmental values. A system may consist of a single component such as a diversion to exclude clean water from concentrated waste areas; facilities for safe land application of municipal effluent or sludge, or food processing wastes; disposal of feedlot manure accumulations; or similar facilities if the system provides adequate management of all wastes generated or disposed of at the enterprise.

#### Planning Considerations

In providing a barnyard runoff control system, attention needs to be given to 7 basic steps. To meet the problem in any particular feedlot or barnyard, one or perhaps all seven of these steps may be needed:

1. Making use of structures and practices that will intercept and divert all surface runoff not originating on the yard.
2. Reshaping the lot to provide good surface drainage and providing for adequate size.
3. Collecting, conveying and temporary storage of runoff from the livestock yard itself.
4. Fencing to exclude livestock from streams.
5. Collecting, conveying and temporary storage of slurry and solid wastes from the feedlots and livestock buildings.
6. Collecting, conveying and storage or disposal of liquid wastes from the milking center.
7. Final disposal by land application.

#### Interception and Diversion

In most cases the most practical first step is to divert all water not falling on the lot and thus prevent it from mixing with the livestock yard runoff.

All runoff from areas above the yard should be intercepted by diversions, terraces, or other suitable structures. This runoff should be conveyed between, around, or under lots in open channels or underground conduits.

Placing eaves troughs on buildings may be another important aspect of this first step. Where roofs contribute runoff to the barnyard, eaves troughs and downspouts can lead the water to channels or conduits which discharge outside of the yard.

#### Shaping Barnyard or Feedlot

The second step is to provide adequate surface drainage in the yard itself. This often involves filling and grading. The feedlot should have a positive--but not excessive--grade or slope to the collection channel.

#### Fencing

Fencing should be provided to exclude livestock in barnyards from access to streams. Crossings may need to be constructed to allow passage of livestock across the channel.

#### Collection and Retention of Liquid Runoff

In following through with the third step, a collection channel is usually located immediately below the feedlot to intercept or convey all runoff from the feedlot. In some cases the collection channel may be designed to act as a settling area for manure solids.

The temporary storage of the runoff can be provided in two or more ponds. The first pond is the settling pond or basin, and the second is the retention pond.

#### Collection and Storage of Solids

The storage for slurry or solid wastes must be planned according to the management system. Proper consideration must be given to containment or control of liquids draining from the solids. The method to be used for removing the wastes will also affect the type of structure.

#### Collection, Storage and/or Disposal of Milking Center Liquids

A complete management system includes proper disposal of liquids from milkrooms and milking centers. These liquids can be conveyed to the pond or tank for liquid manure for storage until spread onto the land. When this is done, pumps are recommended for emptying the manure storage facilities. Milk is a strong pollutant and will not decompose well under anaerobic conditions.

#### Final Disposal

Final disposal of the wastes is usually by land application through irrigation or hauling. This system requires the use of sprinkler, gravity irrigation, or field spreading equipment to transfer liquid from the storage facilities to the land.

Sufficient land area with suitable soils must be available to spread wastes each year as required without causing adverse soil or plant conditions.

Adequate storage must be provided within the system to allow spreading during favorable weather and at compatible times with crop management and available labor.

### Site Planning

Proper planning of the barnyard or feedlot is of vital importance in the overall waste management system. The following are considered to be important factors, but are not intended to be a complete list of items requiring careful consideration:

1. Location
  - a. The feedlot site should be located on an area that will drain freely. Preferred land slopes are 3-6 percent for unpaved lot, 2-4 percent for paved lots. Slopes over 6 percent may cause an erosion problem. Depressions or low spots should be avoided in feedlots. Drainage land grading may be required to overcome these deficiencies of feedlot sites. Steeper slopes will normally dry faster.
  - b. Feedlots should be located at an elevation that will permit gravity discharge of waste material to waste holding retention ponds to reduce pumping costs.
  - c. The waste holding ponds will be constructed on soils that are relatively impermeable or that are capable of being treated to achieve impermeability.
  - d. Suitable soils shall be available in the area for disposal of the liquid and solid feedlot wastes.
2. The feedlot area depends on the number and kind of animals and type of surfacing used on the lot.

For unsurfaced lots, areas of as much as 400 square feet per head may be required; while in hard surfaced lots, 55 square feet may be adequate. The area in loose housing sheds or free stall barns may be included as a part of the lot size in computing space requirements.

3. Special Considerations with Dairy Herds. In dairy operations, barnyard plans must take into account the sanitation requirements of the milk market involved. Cattle must not have access to manure piles and good fly control measures must be observed. Barnyard plans must take into account the type of housing, the number and type of cattle, the method of feeding, the method of manure handling, and possible future expansion of the operation.

In addition to the physical features of the site, soil surveys and topographic mapping are necessary prior to detailed planning of the site. The soil survey should extend to lands proposed for waste disposal by irrigation.

#### System Components

Components of complete agricultural waste management systems may include but are not limited to the following:

- Debris Basins or Other Settling Facilities
- Dikes
- Disposal Lagoons, Aerated Lagoons, Oxidation Ditches
- Diversion, Terraces
- Drainage Field Ditches, Drainage Land Grading
- Grassed Waterways or Outlets
- Holding Ponds
- Agricultural Waste Storage Facilities
- Irrigation Pipelines
- Irrigation Systems (Waste Water)
- Land Spreading (Waste Solids and Slurries)
- Pond Sealing or Lining
- Pumping Plants for Water Control
- Subsurface Drains
- Waterspreading (Waste Water)

Design criteria for individual component shall be in accordance with standards contained in the Technical Guide. Criteria for design of needed components not included in the Technical Guide shall be consistent with sound engineering principles and such that the components will safely achieve their intended purposes.

#### Sequence of Installation

System components shall be planned and installed in such a sequence that each will function as intended without hazard to others, the overall system, or safety of animals or man. Single components shall not be installed until an overall waste management system has been determined.

Safety

Safety features and devices shall be included in agricultural waste management systems as appropriate to protect animals and humans from drowning, dangerous gases, and other hazards.

Operation and Maintenance

A written operational plan shall be prepared for use by the owner/operator. This plan should provide guidelines for inspection, operation, and maintenance of individual system components. Emphasis should be placed on maintenance of required liquid levels, solids removal and safety. Timing, rates, and volumes of land application of wastes compatible with weather, stage of crop growth, soils, and available land area should receive particular attention.

The owner/operator shall be responsible for operation and maintenance of the system in a safe and orderly manner in accordance with state and local regulatory requirements.

Plans and Specifications

Plans and specifications for agricultural waste management systems shall be in keeping with this standard and standards for individual system components. They shall describe the requirements for soil and plant management and proper installation, operation, and maintenance of the system to achieve its intended purpose.