

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

COMPOSTING FACILITY

(No.)

CODE 317

DEFINITION

This is a treatment component of an agricultural management system for the biological stabilization of organic material.

PURPOSES

To reduce the pollution potential of organic agricultural wastes to surface and ground water.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Organic waste material is generated by agricultural production or processing;
- A composting facility is a component of a planned agricultural waste management system; and,
- A composting facility can be constructed, operated and maintained without polluting air and/or water resources.

CRITERIA

General Criteria Applicable To All Purposes

Laws and Regulations. The installation and operation of the composting facility shall comply with all federal, state, and local laws, rules, and regulations.

Safety. Safety and personal protection features and practices shall be incorporated into the facility and its operation as appropriate to minimize the occurrence of equipment

hazards and biological agents during the composting process.

Facility Siting. The bottom elevation of the composting facility shall be above the seasonal high water table and on soils with an acceptable permeability that does not allow materials to contaminate the ground water, and meets all applicable regulations, or the facility shall be installed on concrete slabs or other appropriate liners.

Ideally, compost facilities should be located outside of floodplains. However, if site restrictions require location within a floodplain, they shall be protected from inundation or damage from a 25-year flood event, or larger.

By regulation in Colorado, waste storage facilities for existing Concentrated Animal Feeding Operations (CAFOs) must be protected from the 100 year flood event, and new CAFOs shall not locate waste storage facilities within the 100 year floodplain.

Locate compost facilities so prevailing winds and landscape elements such as building arrangement, landforms, and vegetation minimize odors and protect the visual resource.

Direct surface runoff away from the compost facility. Direct contaminated runoff from compost facilities to an appropriate storage or treatment facility for further management.

Compost Mix. Develop a compost mix that encourages aerobic microbial decomposition and avoids nuisance odors.

Carbon-Nitrogen Ratio. The initial compost mix shall result in a Carbon to Nitrogen ratio between 25:1 and 40:1. Compost with a greater carbon to nitrogen ratio can be used if

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

nitrogen immobilization is not a concern.

Carbon Source. A dependable source of carbonaceous material with a high carbon to nitrogen ratio (C: N) shall be stored and available to mix with nitrogen rich waste materials.

Bulking Materials. Add bulking materials to the mix as necessary to enhance aeration.

The bulking material may be the carbonaceous material used in the mix or a non-biodegradable material that is salvaged at the end of the compost period. If a non-biodegradable material is used, provision shall be made for its salvage.

Moisture Level. Provision may be made for maintaining adequate moisture in the compost mix throughout the compost period within the range of 40 to 65 percent (wet basis).

In high precipitation climatic regions, care shall be taken to prevent excess moisture from accumulating in the compost. Facility covers may be required to provide for a suitable product

Temperature of Compost Mix. Manage the compost to attain and then maintain the internal temperature for the duration required to meet management goals.

When the management goal is to reduce pathogens, the compost shall attain a temperature greater than 130°F for at least 5 days as an average throughout the compost mass.

This temperature and time criterion may be achieved during either primary or secondary composting stages or as the cumulative time of greater than 130°F in both stages.

Turning/Aeration. The frequency of turning/aeration shall be appropriate for the composting method used, and to attain the desired amount of moisture removal and temperature control while maintaining aerobic degradation.

Facility Type. Selection of the composting facility/method shall be based on the availability of raw material, the desired quality of final compost, equipment, labor, time, and land available.

Facility structural elements such as permanent bins, concrete slabs, and roofs shall meet the requirements of Conservation Practice Standard 313, Waste Storage Facility.

Facility Size. Size the compost facility to accommodate the amount of raw material planned for active composting plus space required for curing.

Dimensions selected for elements of the compost facility shall accommodate equipment used for loading, unloading, and aeration.

Sizing of facilities for composting dead animals shall be based on normal mortality loss records for the operation. Or, if not available, locally established mortality rates for the type of operation shall be used.

Compost Period. Continue the composting process long enough for the compost mix to reach the stability level where it can be safely stored without undesirable odors. It shall also possess the desired characteristics for its use, such as lack of noxious odor, desired moisture content, level of decomposition of original components and texture. The compost period shall involve primary and secondary composting as required to achieve these characteristics.

Test the finished compost as appropriate to assure that the required stabilization has been reached.

Use of Finished Compost. Land application of finished compost shall be in accordance with Conservation Practice Standards 590, Nutrient Management, and 633, Waste Utilization.

CONSIDERATIONS

Develop an initial compost mix with a Carbon to Nitrogen ratio of at least 30:1 to reduce most offensive odors.

Minimize odors and nitrogen loss by selecting carbonaceous material that, when blended with the nitrogenous material; provides a balance of nutrients and porous texture for aeration.

Maximize solar warming by aligning piles north to south configured with moderate side slopes.

In humid areas, do not locate piles (windrows) across the slope to prevent ponding and sogginess.

Protect compost facilities from the wind in cold climates. Wind protection may help prevent excess drying of the compost in dry climates.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

OPERATION AND MAINTENANCE

Develop an operation and maintenance plan that is consistent with the purposes of this practice, and the life of the composting facility. Recipe ingredients and sequence that they are layered and mixed shall be given in the plan.

Safety requirements for operation of the composting facility shall be provided.

Manage the compost piles for temperature, odors, moisture, and oxygen, as appropriate. Make adjustments throughout the composting period to insure proper composting processes.

Closely monitor temperatures above 165°F. Take action immediately to cool piles that have reached temperatures above 185°F.

The operation and maintenance plan shall state that composting is a biological process. It requires a combination of art and science for success. Hence, the operation may need to undergo some trial and error in the start-up of a new composting facility.

REFERENCES

Colorado Department of Public Health and Environment, Water Quality Control Commission, REGULATION NO. 81, CONFINED ANIMAL FEEDING OPERATIONS CONTROL REGULATION, (5 CCR 1002-81). <http://www.cdphe.state.co.us/ap/81reg.pdf>

Colorado Department of Public Health and Environment, WQCD & APCD, REGULATIONS NO. 2 & 61, HOUSED COMMERCIAL SWINE FEEDING OPERATIONS. http://www.cdphe.state.co.us/ap/hog_hom.html

Colorado Department of Public Health and Environment, Water Quality Control Commission, BIOSOLIDS REGULATION 4.9.0, (5 CCR 1002-19).

Midwest Plan Service. 1993. Livestock Waste Facilities Handbook, 3rd Ed. MWPS, Department of Agricultural and Biosystems Engineering, Iowa State University, Ames, IA.

Rynk, Robert, et.al. 1992. On-Farm Composting Handbook (NARES-54). Northeast Regional Agricultural Engineering Service, Cornell University. Ithaca, NY.

USDA Natural Resources Conservation Service, 1992. Agricultural Waste Management Field Handbook., USDA NRCS, Washington, D.C.

USDA Natural Resources Conservation Service. 2000. National Engineering Handbook, Part 637-Environmental Engineering, Chapter 2, Composting. USDA NRCS, Washington, D.C.