

**NATURAL RESOURCES CONSERVATION SERVICE  
VIRGINIA CONSERVATION PRACTICE STANDARD**

**COMPOSTING FACILITY**

(No.)

CODE 317

**DEFINITION**

A structure or device to contain and facilitate the controlled aerobic decomposition of manure or other organic material by micro-organisms into a biologically stable organic material that is suitable for use as a soil amendment.

**PURPOSE**

To reduce the pollution potential and improve the handling characteristics of organic waste solids; and produce a soil amendment that adds organic matter and beneficial organisms, provides slow-release plant-available nutrients, and improves soil condition.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies where:

Organic waste material is generated by agricultural production or processing;

The facility is a component of a planned waste management system;

The facility can be constructed, operated and maintained without polluting air and/or water resources; and

The compost can be applied to the land or marketed to the public. A permit is required if the compost is not applied on the farm where it was generated.

**CRITERIA**

**General Criteria Applicable to All Purposes**

**Laws and Regulations.** Install and operate

the facility in compliance with all federal, state and local laws, rules and regulations. Virginia Engineering Design Note 5 – *Summary of Virginia DEQ Regulations on Mortality and Composting* contains a summary of state regulations.

**Safety.** Incorporate safety and personal protection features and practices into the facility and its operation as appropriate to minimize the occurrence of equipment and biosecurity hazards during the composting process.

**Facility Siting.** Locate on a base of low permeability soils, concrete, or other liner material that will not allow contamination of ground water. The floor of the composting facility shall be at least two feet above the seasonal high water table.

Facilities that compost only vegetative matter shall be located out of the 25-year floodplain when practical; otherwise protect the facility from inundation or damage from a 25-year flood event. Locate composting facilities for animal mortality, animal waste, vegetative material with animal waste, or similar materials outside of the floodplain in accordance with Virginia Engineering Design Note 2 - *Separation Distances for Waste Storage Facilities*.

Composting facilities shall be located as near as practical to the source of the organic material. Virginia Engineering Design Note 2 - *Separation Distances for Animal Waste Facilities* lists the specific separation distances that must be used when installing a composting facility for animal waste or for animal mortality, including animal parts. Facilities that compost only vegetative material must meet local ordinances.

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [Field Office Technical Guide](#).

Locate the composting facility so that prevailing winds and landscape elements minimize odors and protect visual resources.

Direct surface runoff away from the compost facility. Direct contaminated runoff from the composting operation to an appropriate storage or treatment facility for further management or recirculate within the composting facility.

Locate the composting facility so that water is available to the facility during dry periods to ensure proper moisture and acceptable curing times to meet the management goals.

**Facility Type.** Select the type of composting facility or method based on the type and availability of raw material, the desired quality of finished compost, equipment, labor, time and land available.

Meet the structural requirements of Virginia NRCS Conservation Practice Standard *Waste Storage Facility (Code 313)* when designing slabs, walls, and support structures. Meet the requirements of Virginia NRCS Conservation Practice Standard *Roofs and Covers (Code 367)* when designing roofs.

**Facility Size.** Size the composting facilities to accommodate the amount of raw material planned for active composting, with a capacity consistent with the composting processes that will be used to produce the desired compost product, and with sufficient finishing time as required to achieve the desired characteristics. Space for compost storage may be included in the finishing space or in a separate facility. Select dimensions to accommodate handling and processing.

Size animal mortality composting facilities according to the methods provided in the National Engineering Handbook Part 637, Chapter 2 – Composting (NEH 637.0213, Dead Animal Composting), National Engineering Handbook Part 651, Agricultural Waste Management Field Handbook, Chapter 10 Mortality Management (NEH 651.1007), NRCS or comparable extension publication. Base the size of dead animal composting facilities on normal mortality loss records for the operation. If these data are not available, use locally established mortality rates for the type of operation.

**Compost Time.** A facility for manure and other agricultural organic waste (not including

animal mortality) that is to be used on the farm shall have the capacity to produce compost that can be safely stored without undesirable odors. This requires the temperature of the compost to be maintained above 104 °F for five days with at least four hours above 130 °F during that time period. It may be necessary for the compost to reach 145 °F to adequately destroy weed seeds.

A facility to produce compost for use off the farm or for sale shall have the capacity to significantly reduce pathogens. For a static pile or within vessel facility, this requires the temperature of the compost to be maintained above 130 °F for three days. The total compost period shall include time for the initial primary stage of composting and time for secondary stage composting. A permit is required for off-farm use.

If the facility is to be used to compost animal carcasses, it shall have the capacity to maintain the compost temperature greater than 130 °F for at least 5 days as an average throughout the compost mass followed by a comparable time for secondary composting. Temperatures must exceed 130 °F for three consecutive days within this time period.

For a windrow system, the temperature of the compost shall be above 130 °F for 15 days. Temperatures must exceed 130 °F for three consecutive days within this time period.

**Surface Runoff Control.** For uncovered sites, surface water control features shall be based on the 25-year, 24-hour storm event.

**Use of Finished Compost.** Land application of finished compost shall be in accordance with Virginia NRCS Conservation Practice Standards *Nutrient Management (Code 590)* or *Waste Recycling (Code 633)*.

Poultry litter and finished compost may be stored in the same location but, due to the potential for spontaneous combustion, shall not be mixed together if there is a significant difference in moisture content.

## CONSIDERATIONS

To reduce offensive odors increase the carbon nitrogen ratio. A carbon nitrogen ration of 30:1 in the initial mix should have minimal 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.

A chemical neutralizing or other additive agent should be used if structural components do not provide adequate odor reduction.

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

Orient windrows to prevent ponding of surface runoff.

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

Minimize blown in rain by providing roof overhang.

For facilities that are organic producers or that sell compost to organic producers, ensure that the treated lumber used in the stacking facility meets the requirements for organic production. It may be best to have the producer consult with the organic certifier as to the use and acceptability of treated lumber for litter and compost storage.

Evaluate site paving needs in terms of effects of equipment operation on traffic, soil compaction, and potential for contamination from compost and petroleum products.

Buffer area, vegetative screens, and natural landscape features can help minimize the effects of odors. The facility should be located in such a manner as to not interfere with vehicle traffic.

## PLANS AND SPECIFICATIONS

Prepare plans and specifications in accordance with the criteria of this standard and describe the requirements for applying the practice to achieve its intended use.

Record all required information in an engineer field book, on a plan sheet or design computation sheet, or in another appropriate location.

## DESIGN DATA

1. Completed Environmental Evaluation and subsequent requirements.
2. Record the soil and foundation findings, interpretations, and reports. Include

information used to determine high water table.

3. Survey and plot data: profile, cross-sections, topography, as needed.
4. Design computations, including purpose of practice and references used.
  - a. Size, type and number of animals or other sources of organic feedstock.
  - b. Waste storage volume calculations for a storage period in agreement with a current Nutrient Management Plan.
  - c. Detailed plans showing structural details such as member materials and sizes, dimensions, strength or grade, construction notes or details, design limitations, etc.
  - d. Loading conditions and structural design computations unless a standard detail drawing is used that meets NRCS requirements and site conditions.
  - e. Certification by NRCS or SWCD personnel with appropriate Engineering Job Approval Authority or by a PE registered in Virginia that the design meets all applicable Standards.
  - f. Provisions for providing separation from the water table.
5. Plan view of site with existing and planned features, including relationship to wells, streams, drainage ways, neighbors, adjacent buildings, traffic patterns, livestock facilities, waste collection points, and/or waste transfer, etc.
6. Grading plan showing excavation, fill, and drainage, as appropriate.
7. Standard Cover Sheet (VA-SO-100A).
8. Materials and quantities needed. Identify borrow material and/or spoil area, as needed.
9. Vegetation and/or ground cover requirements.
10. Identification of needed Erosion & Sediment Control measures.
11. Supplemental practices required.

12. Virginia Conservation Practice Specifications (700 Series).
13. Nutrient Management Plan or Waste Utilization Plan.
14. A completed Agricultural Waste Management System Plan for the owner's total livestock operation that addresses types and numbers of animals.
15. Operation and Maintenance Plan.
16. Special safety requirements.

#### CHECK DATA

1. As-built survey.
2. As-built plans including dimensions, types and quantities of materials installed, and variations from design. Include justification for variations.
3. NRCS or PE storage facility certification.
4. Certification of components provided by others in accordance to NRCS Engineering Policy, such as the truss certificate.
5. Locations of appurtenant practices.
6. Adequacy of vegetation and/or ground cover.
7. Complete as-built section of Cover Sheet.

#### 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 the sequence that they are to be layered and mixed shall be given in the plan.

**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 (C:N) ratio between 25:1 and 40:1. Compost with a lesser carbon to nitrogen ratio can be used if nitrogen mobilization is not a concern.

**Carbon Source.** Store a dependable source of carbonaceous material with a high C:N ratio 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. Make provision for the salvage of any non-biodegradable material used in the composting process.

**Moisture Level.** Maintain adequate moisture in the compost mix throughout the compost period within the range of 40 to 65 percent (wet basis). Prevent excess moisture from accumulating in the compost in high precipitation climatic regions. This may require the facility to be covered.

**Temperature of Compost Mix.** Manage the compost to attain and then maintain the internal temperature for the duration required to meet management goals. Closely monitor temperatures above 165° F. Take action immediately to cool piles that have reached temperatures above 185° F.

**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.

**Monitoring:** The operation and maintenance plan shall state that composting is a biological process that needs monitoring and management throughout the composting period to ensure proper composting processes. The operation may need to undergo some trial and error in the start-up of a new composting facility. Manage the compost piles for temperature, odors, moisture, and oxygen, as appropriate. Test the finished compost as appropriate to assure that the required decomposition has been reached.

The compost facility should be inspected regularly when the facility is empty. Replace deteriorated wooden materials or hardware. Patch concrete floors and curbs as necessary to assure water tightness. Roof structures should be examined for structural integrity and repaired as needed. Exposed metal components should be inspected for corrosion. Corroded metal should be wire brushed and painted as necessary.

**REFERENCES**

National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook 637, Chapter 2, Composting. Washington, D.C.

USDA-Natural Resources Conservation Service. National Engineering Handbook – Part 650, Engineering Field Handbook.

USDA-Natural Resources Conservation Service. Virginia Electronic Field Office Technical Guide (eFOTG), Section IV. [On-line]. Available at: <http://www/nrcs.usda.gov/technical/eFOTG>

USDA- Natural Resources Conservation Service. Virginia 700 Series Construction Specifications. [On-line]. Available at: <http://www/nrcs.usda.gov/technical/eFOTG>

USDA is an equal opportunity provider and employer.