

**NATURAL RESOURCES CONSERVATION SERVICE
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.

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 governing activities in or along streams, floodplains or wetlands as well as pollution abatement, health, safety or utility activities.

Permits may be required from the following agencies as well as others:

1. ***West Virginia Department of Environmental Protection (WV DEP) – Division of Water and Waste Management (DWWM)***
2. ***West Virginia Department of Health (WVDH)***
3. ***West Virginia Department of Agriculture (WVDA), State Code Statue 19-9-34 and Title 61 Legislative Rule Series 1C “Disposal of Poultry Mortality”***
4. ***Local, state and county ordinances***

The owner or operator is responsible for securing all permits or approvals and for performing in accordance with such laws and regulations. NRCS employees do not procure permits, rights, or approvals, or enforce laws and regulations. NRCS may provide the landowner or operator with technical information needed to obtain the required rights (or approvals) to construct, operate, and maintain the practice.

**NRCS, NHCP
September 2010**

**WV, NRCS
September 2012**

*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](#).
Note: Bold italics is information added or changes made by WV.*

All required permits shall be acquired before construction implementation.

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.

Locate outside of floodplains when practical; otherwise protect the facility from inundation or damage from a 25 year - **24 hour** flood event.

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

Locate the compost facility close to the source of manure or litter to minimize labor and reduce handling.

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.

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

When a composting facility is used for disposing of animal mortality, locate it 100 feet from surface waters, drainage ditches and/or wetlands. Locate the composter as far from residences and public roads as possible, but at least 150 feet from the property line. Locate composters with animal manures, litter or animal mortality a minimum of 100 feet from water well(s).

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.

All types of manure can be composted while dead animal carcass composting is usually limited to poultry, swine and cattle nursery stock due to the practical constraints of animal carcass size.

Manure or litter is typically composted using windrows, static pile, and in-vessel methods. Animal carcasses are typically composted using in-vessel, compost bin or static pile method.

Refer to NRCS Conservation Practice Standard Animal Mortality Facility (316) for more information on composting, treatment and disposal of dead animal carcasses.

Meet the structural requirements of conservation practice standard 313, Waste Storage Facility when designing slabs, walls, and support structures. Meet the requirements of conservation practice standard 367, Roofs and Covers 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.

A facility for manure and other agricultural organic waste 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.

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. For a windrow system this requires the temperature of the compost to be above 130°F for 15 days with a minimum of five turnings of the compost.

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 compatible time for secondary composting. For a windrow system the temperature of the compost shall be above 130°F for 15 days with a minimum of five turnings of the compost. 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. Ensure that the final product of the composting process has no visible pieces of soft tissue remaining.

Use of Finished Compost. Land application of finished compost shall be in accordance with conservation practice standard 590, Nutrient Management; or conservation practice standard 633, Waste Utilization.

Criteria Applicable to Prefabricated In-vessel Rotary Drum Composting Facility for Treatment of Animal Carcasses

Locate the facility on a 4" thick concrete pad extending 2' beyond the unit in all directions and according to Conservation Practice Standard Heavy Use Area Protection (561). Install and operate the facility according to the manufacturer's specifications, operation and maintenance plan.

Design each unit according to a specific animal type, size and number of daily animal mortality (poultry, small swine, etc.) based on information provided by the operator's records. The rotating drum(s) must compost 100% of the daily mortality, resulting in a biological stabilized organic material.

For poultry, estimate the size of the unit by multiplying the number of birds times the average grow out weight times the average mortality (%) and divide by the grow out number of days. Example: 150,000 birds x 4# x 3.0 % / 52 days = 346# of daily mortality. Rotary drum composter(s) provide composting in the drum(s) segment.

Determine the number of drums required for composting based on the manufacturer's specifications and recommendations.

At a minimum, turn the material once a day while air is drawn through the unit. Maintain the temperature above 130°F for 10 days or longer prior to dispensing the composted material. Record daily the temperature inside the drum. If either the number of days or temperature is not reached and maintained, re-start the composting process by

- 1. re-distributing the material,**
- 2. adjusting the mix,**
- 3. following the manufacturer's recommendations, or**
- 4. moving the material to a covered composter storage facility.**

Store the final product a minimum of 30 days in an eight by eight foot covered bin or larger, prior to disposal on crops. Test the final product for N, P and K for use in the associated nutrient management plan.

Operate and maintain Rotary Drum Composters according to the detailed operation and maintenance plan, supplied by the manufacturer, to assure full mortality composting and pathogen removal.

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 (**such as wood chips, straw or leaves**) that, when blended with the nitrogenous material, provides a balance of nutrients and porous texture for aeration.

Add bulking materials to the mix as necessary to enhance aeration **and provide structure to the compost mix.**

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.

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, including:

1. Layout and location of livestock facilities, waste collection points, and/or waste transfer.
2. Size, type, **weight, volume** and number of animals or other sources of organic feedstock.
3. **For composters with animal mortality, provide a brief engineering report outlining the criteria for design and basic structural and operation information.**
4. Grading plan showing excavation, fill, and drainage, as appropriate.
5. Size and capacity needed.
6. Design requirements.
7. Safety requirement for operation.
8. A site-specific soils investigation and/or geological investigation shall be provided for design.
9. **Include companion conservation practices such as Heavy Use Area Protection (561), Waste Storage Facility (313), Animal Mortality Facility (316), Pipeline (516), roof Runoff Structure (558), Roofs and Covers (367), etc.**
10. **WV 700 Series Specifications**

11. **Approved WV Engineering Standard Drawings.**

12. **Cost estimate and materials list.**

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.

-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. It may be necessary for the compost to reach 145°F to adequately destroy weed seeds. 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 insure 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.

REFERENCES

USDA, NRCS. 2000. National Engineering Handbook, Part 637, Chapter 2, Composting. Washington, D.C.

Northeast Regional Agricultural Engineering Service, Cooperative Extension "On-Farm

USDA, NRCS National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook (AWMFH)

210-V-NEM Part 505 – Non-NRCS Engineering Services

Northeast Regional Agricultural Engineering Service, Cooperative Extension "On-Farm Composting"

210-VI-EFH Amend. 45, WV5 Preparation of Engineering Plans 210-V-NEM Part 505 – Non-NRCS Engineering Services

Cornell Composting Resources: On Farm Composting Handbook", NRAES-54.

http://compost.css.cornell.edu/OnFarmHandbook/onfarm_TOC.html