

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.

**Permits.** *The producer will be responsible for securing all the necessary permits to install the required structures and for properly managing the unit on a daily basis.*

**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 100-year flood event.

Locate 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.

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.

*Composters should be located a minimum of 500' from any public well and 150' from any private well. If the local groundwater district has more stringent requirements, those shall be followed. Abandoned wells shall be capped in accordance with state law. Requests for variances from the well buffer distances must be submitted for approval by the State Conservation Engineer.*

*Composters should be located a minimum of 50 feet from the property line.*

*The composting area should be accessible by an all-weather road that is maintained for use during adverse weather periods.*

**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 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.

**Electrical Components.** *Follow the requirements of the National Electrical Code (NEC) based on the location and type of installation for all electrical components, including wiring, boxes, connectors, etc. Local electrical requirements may exceed those set by NEC.*

#### **ADDITIONAL CRITERIA FOR IN-VESSEL COMPOSTERS**

*In-vessel composters that have been reviewed by NRCS and are included in Technical Note No. 210-EEN-01 (dated July 2013) or more recent updates are approved for use (this document is located on the NRCS eDirectives website). Other in-vessel composters shall be approved by the State Conservation Engineer prior to installation.*

*Power supply should be appropriately placed and protected to reduce the potential for accidental contact from machinery and personnel. If the power supply is located in an area that is reasonably accessible by machinery, it shall be protected by bollards or other appropriate measures.*

#### **CONSIDERATIONS**

To reduce offensive odors increase the carbon nitrogen ratio. A carbon nitrogen ratio 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.

## **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:

- Layout and location of livestock facilities, waste collection points, and/or waste transfer
- Size, type and number of animals or other sources of organic feedstock
- Grading plan showing excavation, fill, and drainage, as appropriate
- Size and capacity needed
- Design requirements
- Safety requirement for operation

## **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. 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.

**Temperature monitoring for stock piles:** *A 36-inch probe-type thermometer with rigid protective covering for the probe should be used to monitor temperature within the pile on a daily basis. It may be possible for the temperature to rise above the normal range and create conditions suitable for spontaneous combustion. This can be avoided if (1) temperatures are monitored daily and any unusual extremes are detected early and (2) the pile kept at normal depths that do not create conditions typically found in manure stacks which spontaneously combust. If temperatures exceed the 160 F., the material should be removed from the bin, spread on the ground in an area away from buildings, and saturated with water to prevent spontaneous combustion. If temperatures of 130 o F. are not achieved during the composting process, the resulting compost shall be incorporated immediately after land application.*

**Inspections:** *Compost structures should be inspected at least twice each year when the facility is empty. Replace deteriorated wooden parts 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. Areas in the composting structure for storage of straw and manure used in the compost layering should be readily accessible from the access road entrance.*

**REFERENCES**

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

APPROVAL AND CERTIFICATION

**COMPOSTING FACILITY**

(No.)

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PRACTICE STANDARD APPROVED:

/s/ JOHN W. MUELLER

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State Conservation Engineer

October 31, 2014

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Date