

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

COMPOSTING FACILITY

(No.)
Code 317

DEFINITION

A facility to process raw manure, organic matter or raw organic by-products into biologically stable organic material.

PURPOSE

- To reduce the pollution potential of organic agricultural wastes to surface and ground water.
- For nutrient sequestering or breaking down.

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.
- A composting facility can be constructed, operated and maintained without polluting air and/or water resources.
- There is a need to improve air quality by reducing the emissions of odorous gases.
- The facility is operated as a component of an agricultural management system.
- For potting-soil mixtures.

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. Safety – The user shall consider OSHA requirements for the safety of laborers during and after the construction, installation, operation and maintenance of the system.

Should the structure be provided with covers or barriers such as gates, fences, or other exclusion means shall be in accordance with Conservation Practice Standard Use Exclusion (472).

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.

Locate compost facilities so prevailing winds and landscape elements such as building arrangement, landforms and vegetation minimize odors and protect the visual resource. Windbreaks shall be established according to Conservation Standard Windbreak/Shelterbelt Establishment (380).

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

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

Diversions must be designed and applied according to Conservation Standard Diversion (362). Consider the Interim Conservation Standard Infiltration Ditch (753) to collect liquid by-products from small operations or those limited by topography.

Compost Mix. Prepare 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. See Table 10-6 in the NEH, Part 651, AWMFH for typical C:N ratios of common composting amendments. Compost with a greater carbon to nitrogen ratio can be used if nitrogen immobilization is not a concern.

Carbon Source. A dependable source of carbonaceous material with a high C:N ratio 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. The composting method (passive composting piles, windrows, passively aerated windrows, aerated static pile and in-vessel systems) shall meet the requirements of the NEH, Part 651, Agricultural Waste Management Field Handbook (AWMFH), Chapter 10 and NEH, Part 637, Chapter 2, Composting.

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

Facility Size. Size the compost facility to accommodate the amount of raw material planned for active composting plus space required for curing. Composted material shall be protected from the weather by roofs or other suitable covers.

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

Sizing of facilities for composting coffee by-products shall be based on expected yields. Facilities for dead animals shall be based on normal mortality loss records for the operation. If this data is not available, locally established 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 com-

posting 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 or use of finished compost shall be in accordance with Conservation Standard Nutrient Management (590) and Conservation Standard Waste Utilization (633) or, container grown mixtures and seedling needs.

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.

A chemical neutralizing 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.

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.

SPECIAL CONSIDERATIONS

The facility must be maintained and operated following the specifications. Machinery operation must comply with safety rules and regulations established by OSHA. A wrong operation or fault in following safety instructions by the operator may cause or produce adverse results. NRCS is not responsible for these or any damage to third persons or operators for any negligent or deficient operation no matter if the operator is owner, an employee or an authorized agent by the owner.

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. Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation. For detailed information on composting refer to the National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook, Chapter 10 (pages 10-42, 10-62).

Plans and design drawings should include but not be limited to:

1. Location of facility.
2. A plan view of composting facility layout including access road to facility, setbacks distances from water bodies streams, property line, etc.
3. Amount of materials required for construction (concrete, steel reinforcement, etc.) and earth cuts and fills.
4. Dimensions and volumetric capacity of the composting facility.
5. Structural details of all components.
6. Foundation requirements.
7. Special safety requirements.
8. Drainage/grading plan as needed.
9. Other materials or requirements.

Drawings must show sufficient details, so that the structures will be constructed as designed.

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

Northeast Regional Agricultural Engineering Service, Cooperative Extension "On-Farm Composting Handbook," NRAES-54.

NRCS National Engineering Handbook (NEH):

Part 651, Agricultural Waste Management Field Handbook (AWMFH), Chapter 10.

Part 637, Environmental Engineering, Chapter 2, Composting.

Caribbean Area NRCS Conservation Practice Standards:

Diversion, Code 362

Infiltration Ditches, Code 753

Nutrient Management, Code 590

Use Exclusion, Code 472

Waste Storage Facility, Code 313

Waste Utilization, Code 633

Windbreak/Shelterbelt Establishment, Code 380