

**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.

Composting of animal mortality shall be in compliance with Arkansas Act 87 of 1963-code 2-33-101, Arkansas Act 150 Of 1985-Code 19-6-448.

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 flood event.

Locate the facility down gradient from springs, wells, ponds, lakes,

seasonal or perennial streams, sinkholes, or rock outcrops where possible or take steps necessary to prevent contamination. Such steps may include setback distances for buffer zones as per practice Waste Recycling (633) or other conservation practices as planned by a person having appropriate job approval authority.

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.

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 3 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 5 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.

Mortality management compost periods will vary depending on species and compost material used.

Primary composting period will range from 3 days for a rotating drum to 2 months for bins.

Secondary composting will require 1 to 2 months.

Curing will require 1 to 2 months depending on material.

Minimum composting time for primary, secondary and curing shall be 4 months for compost to be transported off farm.

An environmental analysis may be used to show that compost is stable and the composting process is complete.

Rotating drums must reach and maintain a 130° F temperature for 3 consecutive days.

For a windrow system the temperature of the compost shall be above 130°F for 15 days with a minimum of 5 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.

All animal mortality composting facilities using bins shall have a minimum of 2 primary bins and 1 secondary bin.

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 Recycling.

Liquid manure that has been properly composted by using a primary, secondary, and curing composting process that results in a finished compost material is exempt from ADEQ Regulations 5 and 6 for permitted land application requirements. An approved composting facility that meets NRCS Standards and Specifications is required.

A Nutrient Management Plan is required and documentation that manure is being properly composted. Composting process may be documented by records showing that system met minimum temperature requirements or by an environmental lab analysis.

Composting Exposed to Weather

Static compost piles exposed to

weather may be used for occasional mortality for large animals (swine, ruminants, and horses).

Compost material (carbon source) may be sawdust, hay, etc. but may not contain manure.

Carcass(es) must be placed on at least a 24-inch thick pad of compost material and be at least 24 inches from the carcass(es) to the edge of the pad.

A layer of compost material 24 inches thick must cover the carcass(es) throughout the composting process.

An appropriate filter area or means for collecting contaminated runoff shall be provided.

This should not be the normal disposal method and should only be used for an occasional carcass such as a dairy cow.

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.

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.

Removing the compost from the first stage and restacking in the second stage mixes and aerates the compost. The compost that was on the edge of the compost pile is mixed with the internal compost material, and subsequently is exposed to temperatures in excess of 130° F in the second stage stack.

The internal temperature of the compost in the first and second stages should be monitored on a daily basis. The compost should be moved from the first stage to the second stage when the internal temperature of the first stage compost begins to decline. This generally occurs after 5 to 7 days.

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.

NRAES-54 On-Farm Composting Handbook

Arkansas FOTG Conservation Practice Standards: 313-Waste Storage Facility, 316-Animal Mortality Facility, 590-Nutrient Management, 633-Waste Recycling

USDA, NRCS. 1992. National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook. Washington, D.C.

Arkansas Composting Job Sheet 317

University of Arkansas CES Swine Composting Fact Sheet.