

Composting Facility (No.) 317

DEFINITION

A structure or device to contain and facilitate the controlled aerobic decomposition of manure or other organic material by microorganisms 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 to 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. Composting facilities shall be planned, designed, and installed to meet all federal, state, local, and tribal laws, rules, and regulations. Composting facilities shall conform to the recommendations found in Generally Accepted Agricultural and Management Practices (GAAMPs)

for Manure Management and Utilization, and for Site Selection and Odor Control for New and Expanding Livestock Production Facilities. Refer to the State of Michigan Bodies of Dead Animals (BODA), Act 239 of 1982, as amended (MCL 287.651 to 287.683), for animal mortality composting facilities.

Facilities which offer finished compost for sale must follow Michigan Fertilizer License and Registration requirements.

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 permeable soils, concrete or other liner material that will not allow contamination of ground water. Surface specifications can be determined using criteria found in NRCS conservation practice standard Heavy Use Area Protection (561). For all Soil Management Groups (SMGs) classified somewhat poorly drained (b) or poorly drained (c), on-site investigations will be conducted to determine depth of seasonal water and whether artificial drainage would be required to remove or redirect water that may be flowing laterally. The floor of the composting facility shall be at least two feet above the seasonal high water table. Refer to the NRCS conservation practice standard Waste Storage Facility (313) for procedures to determine seasonal high water table. Do not locate a composting facility over field tile (subsurface drains).

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

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

Direct the surface runoff away from the compost facility. Direct the 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

composting times to meet the operation's 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.

The structural requirements of NRCS conservation practice standard Waste Storage Facility (313) shall be met when designing slabs, walls and support structures.

The requirements of NRCS conservation practice standard Roofs and Covers (367) shall be met 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.

Additional Criteria Applicable to Composting Manure or Other Organic Waste

A facility for manure and other agricultural organic waste that is to be used on a 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 in-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 turns of the compost.

Additional Criteria Applicable to Composting

Animal Mortality

Animal mortality or other animal tissue composting facilities shall be in accordance with the Michigan Animal Tissue Composting Operational Standard. The Bodies of Dead Animals Act (BODA) requires:

Composting methods shall accommodate only normal natural daily mortality under common ownership. More than one species may be composted in the same batch.

Facility Siting. Locate the facility as close to the source of mortality as practical, considering bio-security issues and the need to keep the facility out of sight of the general public. The facility shall be selected and/or graded to direct surface runoff away from the site and prevent leachate from contacting surface waters.

Locate the facility to meet the following minimum separation distances:

Surface waters	200 ft
Any Well	200 ft
Nearest non-farm residence	200 ft

Facility Size. Refer to the Michigan Animal Tissue Composting Operational Standard and the MSU Spartan Animal Tissue Composting Planner spreadsheet for sizing animal mortality facilities.

If mortality rates for the farm are unknown, refer to the Michigan Animal Tissue Composting Operational Standard, Table 1.

For composting bin systems, a minimum of 2 bins are required by BODA.

Mortality Composting Process. The design shall ensure the facility can function in accordance with the following process as required by BODA:

- Dead animals must be added to a compost batch within 24 hours of death.
- The temperature 1 foot within the compost batch must be monitored and recorded once weekly, except twice per week for a rotating drum, continuous flow, in-vessel system.

- Animal tissue additions to a new pile should be concluded in two months or less to facilitate proper management of the compost batches.
- Each batch must attain at least one reading of a temperature greater than 130°F in three different heat cycles of active composting before final utilization as finished compost.
- Maintain active composting as described by BODA:
 - C:N minimum of 15:1 and maximum of 40:1
 - Moisture content range of 40- 60 %
 - Aerating by turning, moving or mixing the compost batch to provide a minimum of 5% oxygen concentration
 - pH range 5.5 – 9.0
 - Temperature range of 130 – 150°F

Use of Finished Compost. Land application of finished compost shall be in accordance with Michigan NRCS conservation practice standard Nutrient Management (590).

CONSIDERATIONS

To reduce offensive odors consider increasing the carbon nitrogen ratio. A carbon nitrogen ratio of 30:1 in the initial mix for manure or other organic waste should result in minimal odor.

Consider minimizing 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. Odors may also be controlled by avoiding anaerobic conditions within the material and covering the compost with a layer of clean organic material (i.e. biofilter).

A chemical neutralizing or other additive agent should be used if structural components do not provide adequate odor protection. Caution on use of high proportions of lime as this will affect the pH of the compost.

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

Consider orienting windrows to prevent ponding of surface runoff.

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

Consider providing roof overhang to minimize blown in rain.

Compost produced for use on land that is certified organic or transitioning to organic certification must meet National Organic Program (NOP) rules. There are prescriptive Operation and Maintenance requirements for organic compost production. 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 of 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, and on the Operation and Maintenance requirements specific to organic compost production.

Consider including a wall on at least one side of the composting structure to facilitate mechanical turning and handling.

Consider the loader bucket size that will be used for turning and handling when determining the bin width.

Consider using a minimum bin length of 8 feet for bins composting large animal carcasses.

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.

Support data documentation requirements are as follows:

- Inventory and evaluation records
 - Conservation Assistance notes or special report
- Survey notes, where applicable
 - Design survey
 - Construction layout survey
 - Construction check survey
- Design records

- Physical data, functional requirements, and site constraints, where applicable
- Soils/subsurface investigation report, where applicable
- Design and quantity calculations
 - Animal mortality and bulk agent storage capacity
 - Estimated daily lbs of mortality
 - Estimated daily lbs bulking agents
 - Anticipated compost batch completion intervals
- Construction drawings/specifications with:
 - Location map
 - “Designed by” and “Checked by” names or initials
 - Approval signature
 - Job class designation
 - Initials from preconstruction conference
 - As-built notes
- Construction inspection records
 - Assistance notes or separate inspection records
 - Construction approval signature
- Record of any variances approved, where applicable
- Record of approvals of in-field changes affecting function and/or job class, where applicable
- Well isolation distance documentation

OPERATION AND MAINTENANCE

An Operation and Maintenance (O&M) plan shall be developed for this practice. The O&M plan shall be consistent with the purposes of the practice, its intended life, safety requirements, and the criteria for the design.

REFERENCES

Baldwin, K. R. and J. T. Greenfield, 2009. Composting on Organic Farms. Organic Production Publication Series, Center for Environmental Farming System, North Carolina Cooperative Extension Service, Raleigh. (Found at: <http://www.cefs.ncsu.edu/resources/organicproductionguide/compostingfinaljan2009.pdf>)

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Rozeboom, D., S. Reamer and J. Sanders, October 11, 2007. Michigan Animal Tissue Compost Operational Standard. (Found at: <https://www.msu.edu/~rozeboom/catrn.html>)

USDA-NRCS National Engineering Handbook, Part 637, Environmental Engineering, Chapter 2, Composting.

USDA-NRCS National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook, Chapter 10, part (f), pages 42-62 Composting.