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 agricultural 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 composting facility to comply with all Federal, state, and local laws and regulations.

Impact to cultural resources, wetlands and Federal and state protected species shall be evaluated and avoided or minimized to the extent practicable during planning, design and implementation of this conservation practice in accordance with established National and Florida policy, General Manual (GM) Title 420-Part 401; Title 450-Part401, Title 190-Parts 410.22 and 410.26, National Planning Procedures Handbook (NPPH) Florida Supplements to Parts 600.1 and 600.6, National Cultural Resources Procedures Handbook (NCRPH), National Food Security Act Manual (NFSAM), and the National Environmental Compliance Handbook (NECH).

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. Design the bottom elevation of the composting facility to be a minimum of two feet above the seasonal high water table. Design the composting facility floor with concrete, appropriate liner, or on soils with an acceptable permeability that does not allow materials to contaminate the ground water, and meets all applicable regulations.

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

Locate composting facilities as near the source of organic waste as practical.

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

Divert surface runoff away from the compost facility.

Divert contaminated runoff from the compost operations to an appropriate storage or treatment facility for further management and/or treatment.

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 composting facility or method based on the availability of raw material, the desired quality of final compost, equipment, labor time, and land available. Design the composting method (passive composting piles, windrow, passively aerated windrows, aerated static pile and in-vessel systems) to meet the requirements of the AWMFH Chapter 10 and NEH Part 637, Chapter 2, Composting.

Design the slabs, walls, and support structures of the facility to meet Florida NRCS conservation practice standard Waste Storage Facility, Code 313. Design the roofs and covers to meet the requirements of Florida NRCS conservation practice standard Roofs and Covers, Code 367

Facility size. Design the composting facility to provide storage for 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. Base the minimum storage period on the timing required for the composting process and environmentally safe waste utilization considering the climate, crops, soil, and equipment.

Design a facility for manure and other agricultural organic waste that is to be used on the farm to 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^{o}F for five days with at least four hours above 130^{o}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^{o}F for three days. Include in the total compost period 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^{o}F for 15 days with a minimum of five turnings of the compost.

If the facility is to be used to compost animal carcasses, design 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^{o}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), 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.

Protect composted material from the weather by roofs or other suitable covers.

Use of finished compost. Land apply finished compost in accordance with Florida NRCS conservation practice standards Nutrient Management, Code 590, and Waste Recycling, Code 633.

Composting Facility – In-Vessel

Rotary drum composting is a type of in-vessel composting which uses a drum partially filled with composting material that can be rotated by mechanical means. As organic material is added to the drum, the drum is rotated to mix the new ingredients. This results in a faster composting process than with other methods. Design the in-vessel composter to be rotated by mechanical means. Due to short cycle time

required when used for production poultry, it is critical that the compost mix be managed for optimum temperatures. This may require keeping a pile of material "hot" for use in the drum. This may be accomplished by mixing various carbonaceous and bulking materials at the proper moisture in a pile outside the drum so that it preheats to 130° F or more before being added to the drum composter.

a. Design. Size the rotary drum in accordance with the manufacturer's recommendation.

   Manufacturers of these types of rotary drum composters shall provide adequate documentation that the equipment operates in accordance with this conservation practice standard.

   A secondary stage composting is required. Design the secondary stage to be bins, windrows, or aerated static piles. Plan for a percentage of the primary stage compost to be recycled back into the in-vessel composter also with any bones that have not been fully processed. Use manufacturer's recommendation for this percentage. Size the secondary stage based on the daily production volume of primary stage compost to be moved into secondary processing.

   In case of larger than normal losses, excess material may be removed from the rotary drum, stockpiled on a concrete pad, and covered with at least 6 inches of carbonaceous or bulking material. Protect the material from rain, and then finish the composting process as a static pile.

   Maintain the rotary drum composter either under a suitable shelter or on a concrete pad with a minimum thickness of 4 inches thick concrete. Extend the pad 4 feet in front and 2 feet in back and sides of the unit.

b. Operation. Operate and maintain the rotary drum composter in accordance with the manufacturer's instructions. Monitor the moisture content and temperature of the compost daily during the composting period. Take appropriate steps as needed to maintain the moisture content and temperature at the required levels.

Other animals and food processing wastes from agricultural operations can successfully be composted. Refer to NEH, Part 637, Chapter 2, Composting, for guidance and design criteria.

CONSIDERATIONS

To reduce offensive odors, increase the carbon to 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.

Evaluate site paving needs in terms of effects of equipment operation on trafficability, soil compaction, and potential for contamination from compost and petrol products.

Minimize the effects of odors by adding buffer area, vegetative screens, and natural landscape features can help. Consider locating the facility in such a manner as to not interfere with vehicle traffic.

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 sufficient 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. The engineering plans and specifications will include as a minimum the following items.

- Location of facility.
- A plan view of composting facility layout including location of livestock facilities, waste collection points and/or waste

transfer, if applicable, access road to facility, setback distances from water bodies streams, sensitive areas, property line, etc.

- Location and source of water supply.
- Dimensions of the composting facility.
- Structural details of all components.
- Size and type of and number of animals or volume of material the facility is designed to accommodate.
- References to components supplied by others (*e.g.* truss design) including load and design requirements.
- Special safety requirements.
- Drainage and grading plan as needed.
- Location of utilities and notification requirements.

OPERATION AND MAINTENANCE

Develop an operation and maintenance (O&M) plan that is consistent with the purposes of this standard, its intended life, safety requirements, and the criteria for its design. Include in the O&M plan recipe ingredients and sequence that they are layered and mixed, maximum and minimum temperature for operation, land application rates, moisture level, management of odors, testing, monitoring temperatures, etc. Make adjustments to the recipe as needed throughout the composting period to ensure proper composting processes. Record any changes in the recipe.

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^{o}F to adequately destroy weed seeds. Monitor and record the compost temperature on a daily basis. By recording temperatures daily, a normal pattern of temperature development can be established. Closely monitor temperatures above 165^{o}F. Take action immediately to cool piles that have reached temperatures above 185^{o}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: State in the O&M 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.

Inspect the compost facility regularly when the facility is empty. Replace deteriorated wooden materials or hardware. Patch concrete floors and curbs as necessary to assure water tightness. Examine roof structures for structural integrity and repair as needed. Inspect exposed metal components for corrosion. Wire-brush and paint corroded metal as necessary.

Recordkeeping is an important function of composting. Record date, average weight, and number of deaths, daily compost temperature, climate condition, compost condition, date tuned, and any inspection on the composting facility.

REFERENCES

AWMFH
ASTM D 1760-96
Florida NRCS Conservation Practice Standards,
- Nutrient Management, Code 590
- Roofs and Covers, Code 367
- Waste Recycling, Code 633
- Waste Storage Facility, Code 313

General Manual
- Title 420-Part 401
- Title 450-Part401
- Title 190-Parts410.22 and 410.26

National Cultural Resources Procedures Handbook
"National Design Specification for Wood Construction," National Forest Products Association
NEH, Part 637, Chapter 2, Composting
National Environmental Compliance Handbook
National Food Security Act Manual
National Planning Procedures Handbook
Florida Supplements to Parts 600.1 and 600.6