

USDA
NATURAL RESOURCES
CONSERVATION SERVICE

DELAWARE CONSERVATION
PRACTICE STANDARD

COMPOSTING FACILITY

CODE 317
(Reported by No.)

DEFINITION

This is a treatment component of an agricultural management system for the biological stabilization of organic material.

PURPOSES

To reduce the pollution potential of organic agricultural wastes to surface and ground water.

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; and,
- A composting facility can be constructed, operated and maintained without polluting air and/or water resources.

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.

When composting in unroofed windrows, maximize solar warming by aligning piles north to south configured with moderate side slopes.

Locate compost facilities so prevailing winds and landscape elements such as building arrangement, landforms, and vegetation minimize odors and protect the visual resource.

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

Do not locate piles (windrows) across the slope to prevent ponding and sogginess.

Protect compost facilities from the wind. Wind protection may help prevent excess drying of the compost and allow for better heat buildup in cold weather.

This practice has the potential to affect National Register listed cultural resources or eligible (significant) cultural resources. These may include archeological, historic, or traditional cultural properties. Care should be taken to avoid adverse impacts to these resources. Follow NRCS state policy for considering cultural resources during planning.

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

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

minimize the occurrence of equipment hazards and biological agents during the composting process.

Roofs. All composting facilities in which animal carcasses are being composted shall have a roof or some other type of cover to prevent excess moisture from causing runoff and leaching problems.

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.

Compost Mix. Develop a compost mix that encourages aerobic microbial decomposition and avoids nuisance odors. Table 1 presents the recommended compost recipe for composting poultry mortalities. Figure 1 shows the recommended layering for dead bird composting.

Table 1		
Ingredient (Parts)	Volumes (Parts)	Weights
Straw	1	0.1
Poultry	1	1
Manure	2.0	1.5
Water*	.5	.75

*More or less water may be necessary

Carbon-Nitrogen Ratio. The initial compost mix shall result in a Carbon to Nitrogen ratio between 30:1 and 40:1. 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 carbon to nitrogen ratio (C: N) 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.

Care shall be taken to prevent excess moisture from accumulating in the compost. Facility covers or roofs 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.

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

Facility Size. Size the compost facility to accommodate the amount of raw material planned for active composting plus space required for curing.

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

Sizing of facilities for composting dead animals shall be based on normal mortality loss records for the operation. Or, if not available, locally established mortality 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 composting 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 of finished compost shall be in accordance with Conservation Practice Standards 590, Nutrient Management, and 633, Waste Utilization.

Vegetation. Disturbed areas shall be established with vegetation or otherwise stabilized as soon as practical after construction. Seedbed preparation, seeding, fertilizing, and mulching shall conform to NRCS Conservation Practice Standard 342, Critical Area Planting.

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.

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.

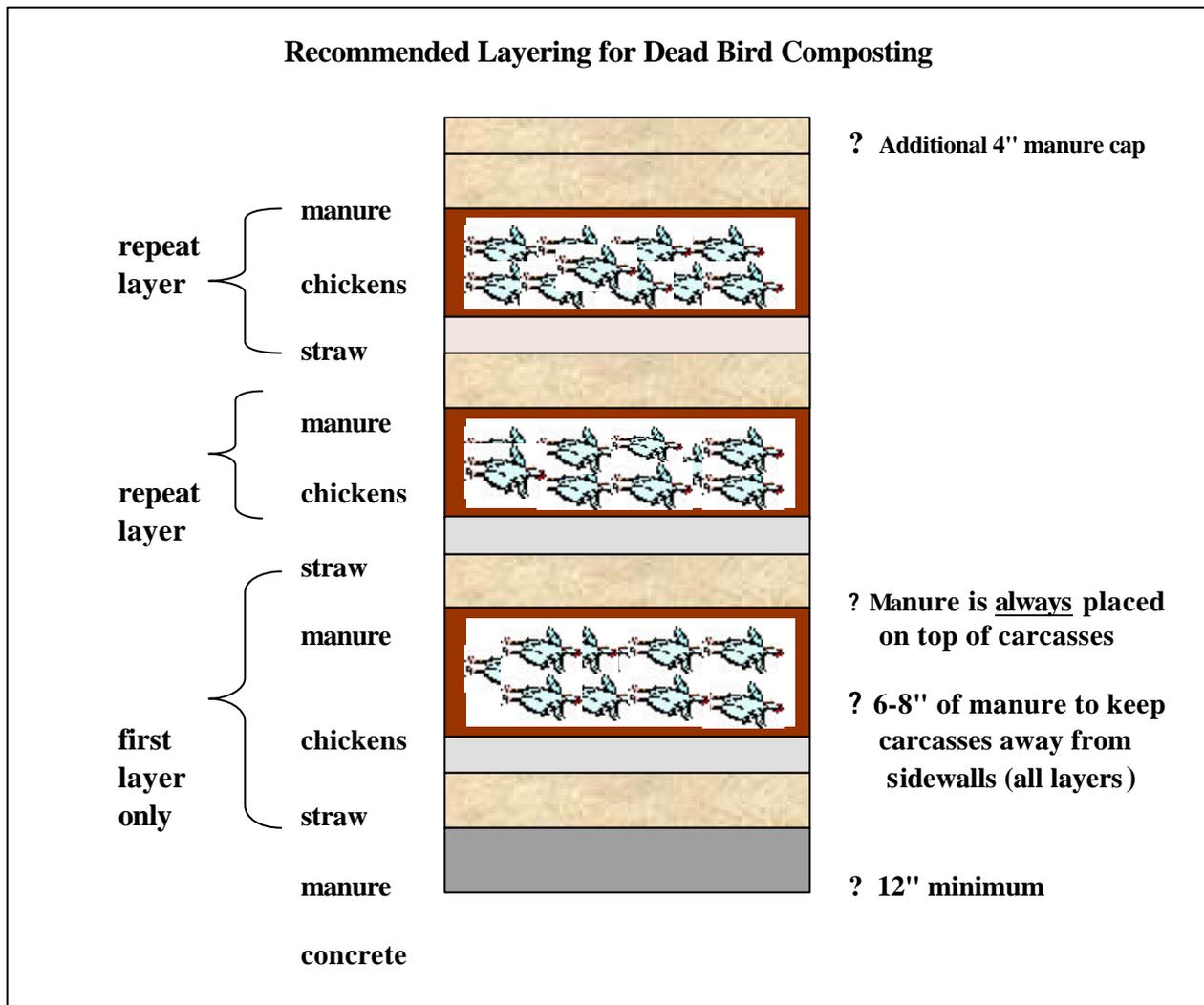
Manage the compost piles for temperature, odors, moisture, and oxygen, as appropriate. Make adjustments throughout the composting period to insure proper composting processes.

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.

SUPPORTING DATA FOR DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:



Planning Information, Field Data and Survey Notes

1. Field location of the compost facility. Also note the location of the compost facility on the conservation map.
2. Description of the objectives of the practice, including the desired functions which the compost facility is expected to provide.
3. Soils investigation logs and notes, as appropriate for site conditions and the proposed design.
4. Topographic survey of the site, as appropriate for site conditions and the proposed design.

Design Data

1. Location map with the site identified.
2. Soil survey map with the site identified.
3. Computations establishing the design capacity of the compost facility.
4. Details of grading/drainage plan as needed.
5. A set of plans and specifications for the compost facility, as appropriate.

Construction Check Data/As Built Plans

1. Check notes recorded during and after completion of construction showing as-built conditions of the practice.
2. Red line the construction plans to indicate the construction's conformance to the design.
3. Sign and date check-notes and plans by someone with appropriate approval authority. Include statement that practice meets or exceeds plans and NRCS practice standards.

REFERENCES

1. NRCS National Engineering Handbook (NEH) Part 637 Environmental Engineering, Chapter 2, "Composting".
2. NRCS National Engineering Handbook (NEH) Part 651 Agricultural Waste Management Field Handbook (AWMFH), Chapter 10, "Component Design".
3. Rynk, R. (Ed.) (1992) On-Farm Composting Handbook. NRAES-54. Ithaca NY: Northeast Regional Agricultural Engineering Service.
4. Dougherty, M. (Ed.) (1999) Field Guide To On-Farm Composting. NRAES-114. Ithaca NY: Northeast Regional Agricultural Engineering Service.