

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
ANIMAL MORTALITY FACILITY**

(No.)

CODE 316

DEFINITION

An on-farm facility for the treatment or disposal of animal carcasses due to routine mortality.

PURPOSE

This practice supports one or more of the following purposes:

- Reduce impacts to surface and groundwater resources
- Reduce the impact of odors
- Decrease the spread of pathogens

CONDITIONS WHERE PRACTICE APPLIES

This standard applies to livestock and poultry operations where routine animal carcass storage, treatment, or disposal is needed.

This standard does not apply to catastrophic animal mortality. In cases of catastrophic animal mortality, use Indiana (IN) Field Office Technical Guide (FOTG) Standard (368), Emergency Animal Mortality Management.

CRITERIA

General Criteria Applicable to All Purposes

The planning and design of animal mortality facilities or processes must conform to all federal, State and local laws, rules and regulations. This includes provisions for closing and/or removing the facility where required.

Location. Locate the facility so that prevailing winds and landscape elements minimize odors

and protect visual resources, and following the setbacks in Table 1.

Table 1. Setback Distances

Features (known and identifiable at the time of application)	Minimum Setback Distance (feet)
Public Water Supply and Surface Intake Structure	1000
Offsite Residential and Public Buildings	400
Surface Waters of the State and Drainage Inlets (including Water and Sediment Control Basins)	100
Sinkholes (measured from the Superficial Opening or Lowest Point)	100
Water Wells (onsite & offsite)	100
Property Lines and Public Roads	100

Mortality facilities will be constructed out of the 100-year floodplain, unless permitted by the Indiana Department of Natural Resources (IDNR), Division of Water, and the Indiana Department of Environmental Management. Ensure that the location of the animal mortality facility is consistent with the overall site plan for the livestock or poultry operation. Locate the facility for acceptable ingress and egress and where it will not interfere with other travel patterns on the farm.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service State Office, or download it from the Field Office Technical Guide for your State.

Locate the facility down-gradient from springs or wells where possible or take steps necessary to prevent contamination of groundwater supply sources. Investigate hydrogeological conditions.

Locate the facility as close to the source of mortality as practical, considering biosecurity issues and the need to keep the facility out of sight of the general public.

Design. Design animal mortality facilities to handle routine mortality. Mortality that will be exposed to the elements will have a roof and side walls. Design of all structural components integral to the animal mortality facility will meet the structural loads and design criteria as described in IN FOTG Standards (313) Waste Storage Facility, and (367) Roofs and Covers, unless otherwise designated. Use IN FOTG Standard (342) Critical Area Planting to revegetate all areas disturbed by construction.

Include provisions for closing and/or removing the facility where required.

Divert all runoff away from the animal mortality facility.

All mortality facilities will be built 2 feet above the seasonal high water table or provisions will be made to lower the water table below the facility. The structure will be designed to withstand the loads imposed by a high water table. When drainage is planned to lower the water table, drains will be protected against waste entering the drainage system.

Safety. Provide warning signs, fences, refrigeration unit locks, and other devices as appropriate, to ensure the safety of humans and livestock.

Address bio-security concerns in all aspects of planning, installation, and operation and maintenance of an Animal Mortality Facility.

Seepage Control. Where seepage will create a potential water quality problem, provide a liner which meets the requirements of the Agricultural Waste Management Field Handbook (AWMFH), Appendix 10D for clay liner design criteria or other acceptable liner technology.

Temporary Storage. Where the mortality management system depends on periodic or cyclic operation (including, but not limited to, offsite disposal such as rendering), provide a facility with adequate capacity for temporary storage of carcasses until they can be processed or picked up. The temporary storage may be implemented as a pad or bin, a refrigeration unit, or other containment system.

Composters

General. Design and manage facilities for composting animal mortality according to IN FOTG Standard (317) Composting Facility. Dead animals will be completely composted prior to application to fields or offsite transport.

Location. Locate on a base of low - permeability soils, concrete, or other liner material that will not allow contamination of groundwater.

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. Base the selection of the composting facility/method on availability of raw material, desired quality of final compost, equipment, labor, time, and land available.

Facility Size. Size the compost facility to accommodate the amount of raw material planned for active composting plus space required for curing. Base the size of the facility on normal mortality loss records for the operation. If this data is 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.

The facility 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. 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.

Use of Finished Compost. Spread finished compost according to IN FOTG Standard (590) Nutrient Management or provide for other acceptable means of disposal.

Size animal mortality composting facilities according to the methods provided in the NEH Part 637, Chapter 2 – Composting (NEH 637.0210 and NEH 637.0211) and NEH Part 651, Chapter 10 – Composting (NEH 651.1007, Mortality Management), or comparable extension publications or state rules.

Refrigeration Units.

General. Use refrigeration units with a construction compatible with the mechanism to be used to empty the refrigeration unit. Provide for protecting the refrigeration unit from precipitation and direct sun as deemed appropriate.

The refrigeration unit design, construction, power source, and unit installation will be in accordance with manufacturer's recommendations. Refrigeration units will be constructed of durable material, be leak proof, and have a life expectancy compatible with other aspects of the waste management system.

Place refrigeration units on a pad of suitable strength to withstand loads imposed by vehicular traffic used to load or remove the box or tray.

Temperature. The refrigeration units will be self-contained units designed to freeze animal carcasses before decomposition occurs. For best results, the temperature of the carcasses to be rendered will be maintained between 22° and 26° F. Carcasses that will be incinerated or gasified should be stored at a few degrees above freezing in order to facilitate burning and to reduce the amount of fuel needed to incinerate or gasify the carcasses.

Capacity. Size the refrigeration units to accommodate the normal maximum volume of mortality to be expected in the interval between emptying. When calculating the volume required, include the expected mortality rate of the animal, the period of time between emptying where mortality is given on a per day

basis, the average weight of the animal, and a conversion factor for weight to volume. For broiler operations use a weight to volume conversion of 45 pounds per cubic foot unless a local volume conversion factor has been documented.

Power Source. An alternative source of power, where available, will be used to maintain the integrity of the freezing process during power outages. Where an alternative power source is not available, provide contingencies for disposal of the animal carcasses in the operation and maintenance plan.

Incinerators and Gasifiers.

General. Use Type 4 (human and animal remains) incinerators that have been approved for use within the state. Gasification, which is a high temperature method of vaporizing the biomass with no direct flame with oxidation of the fumes in an after-burning chamber, will meet all applicable state air quality/emissions requirements.

Capacity. Base the minimum incinerator capacity on the average daily weight of animal mortality and the length of time the incinerator will be operated each day. Size gasifiers to handle the average maximum daily animal mortality during a growing cycle. Refrigeration units can be used in conjunction with gasifiers to improve the loading cycle and fuel use efficiency of the gasification unit.

Ashes. Remove ashes daily or according to manufacturer recommendations. Spread ash according to IN FOTG Standard (590) Nutrient Management or provide for other acceptable means of disposal.

Location. Locate the incinerator/gasifier a minimum of 20 feet from any structure. Place the unit on a concrete pad with the fuel source as distant as practical. If the incinerator is covered with a roof, at least six inches of air space is required between the chimney and any combustible roof parts, or as recommended by the manufacturer.

CONSIDERATIONS

Major considerations in planning animal mortality management are:

- Available equipment and land application area at the operation,
- The management capabilities of the operator,
- The degree of pollution control required by state and local agencies,
- Effect on wildlife and domestic animals,
- The economics of the available alternatives, and
- Effect on neighbors.

For facilities that are organic producers or that sell compost to organic producers, ensure that the treated lumber used in the 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.

Establish traffic patterns to avoid crossing livestock pathways and feed lanes with mortality transport

Consider taking measures to maintain appropriate visual resources, reduce odor, and provide dust control. Vegetative screens and topography should be used to shield the animal mortality facility from public view, to reduce odors, and to minimize visual impact.

Composting of any mortality will be hindered if the carcasses are allowed to freeze. Dead animals or birds should be placed in the compost mix as quickly as practical or kept in a dry, non-freezing environment until added to the compost mix. Composting frozen carcasses will lengthen the amount of time needed for composting to occur and will likely require added management to ensure that proper composting temperatures are reached.

To reduce offensive odors increase the carbon 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.

A chemical neutralizing or other additive agent should be used if structural components do not provide adequate odor reduction.

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.

PLANS AND SPECIFICATIONS

Plans and specifications will describe the requirements for applying this practice. At a minimum, include the following:

- A plan view showing the location and extent of the practice.
- Description of facility.
- Size, type and number of animals that will be the feedstock.
- Pertinent elevations of the facility, if applicable.
- Soil and foundation findings, interpretations, and reports.
- Location of electrical lines, gas lines, water supply and other utilities
- Requirements for burial
- Quality of materials.
- Drainage/grading plan, if needed.
- Structural details of all components.
- Temporary erosion control measures during construction.
- Vegetative requirements.
- Safety requirements for the facility.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan containing the items listed below will be developed with the operator, and will become a part of the overall waste management system plan. Safety considerations will be prominently displayed in the plan. As a minimum, include the following information in the O&M plan:

1. Method and procedures of mortality disposal for normal losses
2. Odor management or minimization requirements.
3. Safety measures and procedures.
4. Biosecurity concerns.

5. Contact(s) and phone numbers of person(s) to contact in case of catastrophic losses.
6. Records of date, average weight, and number of deaths.
7. Periodic inspections of the compost facility when it is empty.
8. Prompt repair or replacement of damaged components.
9. Site references and/or manufacturer or installer for trouble shooting.

Additional O&M for Composters

1. Include a recipe of ingredient quantities which gives the layering/mixing sequence.
2. **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 C:N ratio can be used if nitrogen mobilization is not a concern.
3. **Carbon Source.** Store a dependable source of carbon with a high C: N ratio to mix with nitrogen-rich waste materials.
4. **Bulking Materials.** Add bulking materials to the mix as necessary to enhance aeration. The bulking material may be the carbon 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.
5. **Compost Mix.** Develop a compost mix that encourages aerobic microbial decomposition and avoids nuisance odors.
6. **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.
7. **Temperature of Compost Mix.** Closely monitor temperatures above 165°F. Take action immediately to cool piles that have reached temperatures above 185°F. If the

pile is too hot, turn it to aerate the pile and release heat build-up.

8. **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.
9. Leachate runoff must be prevented or treated onsite.
10. **Monitoring.** The operation and maintenance plan will 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 mortality 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. Include the method, procedure, and record-keeping requirements for proper utilization of compost.

Additional O&M for Incinerators and Gasifiers

1. Use incinerators and gasifiers only for the disposal of animal carcasses.
2. Operate units properly to maximize equipment life and minimize emission problems.
3. Load the units according to the manufacturer's recommendations.
4. Remove ashes frequently to maximize combustion and prevent damage to equipment. Include methods for collecting and disposing of the ash material remaining after incineration.
5. Inspect the units periodically to ensure that all components are operating as planned and in accordance with the manufacturer's recommendations.

Additional O&M for Refrigeration units

1. Operate refrigeration units properly to maximize equipment life and minimize potential problems.
2. Load the refrigeration unit according to manufacturer's recommendations and do not exceed the design capacity.
3. Use refrigeration units only for the dead animals associated with the planned operation.
4. Inspect the refrigeration unit periodically for leaks, structural integrity and temperature.

REFERENCES

Nutsch, A., J. McClaskey, and J. Kastner, Eds., 2004. Carcass disposal: a comprehensive review, National Agricultural Biosecurity Center, Kansas State University, Manhattan, Kansas.

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

USDA, NRCS. 2000. National Engineering Handbook, Part 637, Chapter 2, Composting, Washington, D.C.