

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

ANIMAL MORTALITY FACILITY

(No.)

CODE 316



- To provide contingencies for normal and catastrophic mortality events.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where animal carcass treatment or disposal must be considered as a component of a waste management system for livestock or poultry operations.

It applies where on-farm carcass treatment and disposal are permitted by Federal, State, and local laws, rules, and regulations. It also applies where a waste management system plan, as described in the National Engineering Handbook (NEH), Part 651, Agricultural Waste Management Field Handbook (AWMFH) has been developed that accounts for the end use of the product from the mortality facility. This practice includes disposal of both normal and catastrophic animal mortality; however, it does not apply to catastrophic mortality resulting from disease.

CRITERIA

General Criteria Applicable to All Purposes

Design the facility to handle normal mortality and/or catastrophic mortality.

DEFINITION

An on-farm facility for the treatment or disposal of livestock and poultry carcasses.

PURPOSE

This practice may be applied as part of a conservation management system to support one or more of the following purposes:

- Decrease non-point source pollution of surface and ground water resources.
- Reduce the impact of odors that result from improperly handled animal mortality.
- Decrease the likelihood of the spread of disease or other pathogens that result from the interaction of animal mortality and predators.

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.

All structural components integral to animal mortality management shall meet the structural loads and design criteria as described in NRCS conservation practice standard 313, Waste Storage Facility, unless otherwise designated.

Where an animal mortality facility can be damaged by surface runoff, divert the runoff away from the facility.

Location. Locate the facility down gradient from a spring or well.

Locate the facility above the 100-year floodplain; however, if site restrictions require location within a floodplain, protect the facility from inundation or damage.

Minimize the impact by odor and other air quality issues from the facility on neighboring residences. Minimize the impact of the facility on surface and ground water resources.

Seepage Control. Where seepage from mortality facilities will create a potential water quality problem and it is deemed necessary to reduce seepage, use AWMFH, Appendix 10D, for clay liner design criteria, or other acceptable liner technology.

Criteria Applicable to All Purposes – Normal Mortality

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.

Composters

General. Design of facilities for composting animal mortality will be done in accordance with conservation practice standard 317, Composting Facility, or the guidance in National Engineering Handbook, Part 637, Chapter 2 – Composting (NEH 637.0211, Dead Animal Composting).

Freezers

General. Freezer units shall be of the chest type with a construction compatible with the mechanism to be used to empty the freezer. Provisions for protecting the freezer unit from precipitation and direct sun shall be made as deemed appropriate.

The freezer unit design, construction, power source, and unit installation shall be in accordance with manufacturer's recommendations. Freezers shall be constructed of durable material with a life expectancy compatible with other aspects of the waste management system. The freezer container shall be leak proof to minimize odor and leachate pollution.

Where needed, the freezer will be placed on a pad of suitable strength to withstand loads imposed by vehicular traffic consistent with equipment used to load or remove the box or tray.

Temperature. The freezers shall be self-contained units designed to freeze animal

carcasses before decomposition occurs. For best results, the temperature of the carcasses shall be maintained between 22° and 26° F.

Capacity. Freezer units shall be sized to accommodate the normal maximum volume of mortality to be expected in the interval between emptying. Volume calculations shall 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 between emptying, and a conversion factor for weight to volume. For broiler operations, use a weight to volume conversion of a minimum of 45 pounds per cubic foot. Capacity calculations shall be supported by a removal schedule supplied by an integrator or approved vendor.

Average mortality shall be based on mortality data over several growing cycles (excluding catastrophic losses). Average mortality used to determine capacity shall be based on mortality data for the period of time prior to removal off site. In the absence of specific landowner mortality data, mortality data shall be based on similar operations in the local area.

Power Source. An alternative source of power, where available, shall be used to maintain the integrity of the freezing process during power outages. Where an alternative power source will not be available, the operation and maintenance plan shall contain contingencies for disposal of the poultry mortality.

Incinerators

General. Incinerators shall be dual burning Type 4 (human and animal remains) approved for use within the state.

The owner or operator shall be responsible for securing all required permits, approvals, and registration for the operation of the incinerator in accordance with the Tennessee Department of Environment and Conservation (TDEC), Division of Air Pollution Control (APC) Rules 1200-3-9.04, prior to construction and operation, if applicable. Under certain conditions, the owner or operator of the incinerator is exempted from obtaining construction and operation permits. Exemptions apply to incinerators that have a manufacturer's rated capacity less than 500 pounds per hour or a total burner rated capacity less than 400,000 BTU per hour [APC Rule 1200-3-9-.04(d)(11)].

Emissions. The emission of air contaminants from all incinerators shall comply with all applicable rules and regulations of the Tennessee Air Pollution Control Board [APC Rule 1200-3-9-.04(2)(e)].

Capacity. Minimum incinerator capacity will be based on the average daily weight of animal mortality and the length of time the incinerator will be operated each day. In the absence of specific landowner mortality data, incinerator capacity shall be based on similar operations in the local area. The required minimum incinerator size shall be the smallest size available that will incinerate the required minimum capacity in two or three burns within a 24-hour period of time.

Ashes will be removed from the incinerator on a daily basis or according to

manufacturer's recommendations. Any incineration of dead animals will have a plan for collecting and disposing of the ash material remaining after incineration. The plan shall include an ash collection box or bucket and disposal of the ash on the land or through a community trash disposal system. If land application is used, the ash shall be spread according to Tennessee NRCS conservation practice standard Nutrient Management, Code 590. The predominant nutrient of concern is P2O5. Its annual rate of production in the ash may be estimated by using a factor of 0.01 pounds of P2O5 per pound of mortality incinerated. This factor shall be used until actual nutrient analyses and weight records are available for a specific incinerator installation.

Location. Locate the incinerator a minimum of 20 feet from any structure. Place the incinerator on a reinforced (fiber or steel) concrete pad. Extend the concrete slab a sufficient distance on all sides of the incinerator base to accommodate management of the facility. Place the top of the concrete slab a minimum of 0.5 foot above natural ground. If the incinerator is covered with a roof, at least 6 inches are required between the incinerator chimney and any combustible component of the roof.

Power Source. Electrical components and installation shall meet the requirements of the National Electrical Code (NEC) and State and local codes for outdoor installation. All electric wiring shall be in a conduit. Installation shall be certified in writing by a qualified licensed electrician.

Gas hook-up must be certified in writing by a qualified licensed Liquefied Petroleum contractor to meet applicable National Fire Protection Association

(NFPA) codes, all other National, State and local codes, and in conformance with the manufacturer's recommendations. Fuel storage for diesel-powered units shall be installed in accordance with the manufacturer's recommendations and shall meet all applicable State and local codes, rules, and regulations.

Criteria Applicable to All Purposes – Catastrophic Mortality

General. Processes addressed by this standard shall be limited to burial and composting. Collect catastrophic mortality (greater than 10,000 lbs.) as soon as practical and move the mortality away from the production facility.

Contact the State Veterinarian's office before burial and provide the following information:

- Date Lost
- Grower Name
- County where Located
- Company and Complex Location
- Number of Animals Lost
- Age of Animals
- Name of Person Calling

Location. Locate the facility as far away from neighboring dwellings and the poultry or livestock operation as site conditions permit. Locate the facility on sites with restricted percolation and a minimum of 2 feet between the bottom of the facility and the seasonal high water table, unless special design features are incorporated that address seepage rates and non-encroachment of contaminants into the water table. Use AWMFH, Appendix 10D, for selection of sites where seepage will be restricted with normal construction techniques. Use the following guidelines:

- At least 165 feet from property lines or public use areas.
- At least 300 feet up gradient and 150 feet down gradient from any well.
- At least 100 feet from a water body, stream, or drainage way.
- No closer than 2 feet to bedrock or the seasonal high water table (defined as a zone of saturation at the highest average depth during the wettest season).
- In soils with a permeability of less than 2 in./hr. or with a liner installed in accordance with AWMFH Appendix 10D.

Burial Pit

General. Catastrophic mortality resulting from natural conditions such as temperature extremes shall be buried on site or as otherwise directed by State and local regulatory agencies. Burial of catastrophic mortality shall be timed to minimize the effects of mortality expansion during early stages of the decay process. Where possible and permitted by State law, mortality shall remain uncovered or lightly covered until bloating has occurred, or methods employed to reduce or eliminate bloating. Topsoil shall be retained to re-grade the disposal site after the ground has settled as the decay process is completed. Stockpiled soil shall be no closer than 20 feet from the edge of the burial pit.

Site Approval. Contact the local NRCS office for an on-site assessment to establish a pre-approved burial site. In the event of a catastrophic loss, notify the State Veterinarian for approval to use the burial site for disposal.

Burial Procedure. For small animals (poultry, nursery pigs, etc.) place carcasses in a layer no thicker than one foot and cover each layer with at least one foot of soil. Carcasses of large animals (hogs, cattle, etc.) shall be placed in a one-carcass-thick layer and covered with a minimum of two feet of soil. For deep soils (where bedrock is not a concern), carcasses and soil can be placed in alternating layers to a total depth of eight feet. This layering process is critical to prevent problems caused by bloating of the carcasses. The burial site shall be mounded with a covering of at least two feet of soil, and surface water shall be diverted from the mound. The site shall be vegetated immediately after completion to prevent erosion of the soil covering according to Tennessee NRCS conservation practice standard Critical Area Planting, Code 342.

Size and Capacity. Pits shall be sized to accommodate catastrophic mortality using appropriate weight to volume conversions. Capacity shall be in accordance with criteria acceptable to State and local regulatory agencies. The burial pit shall be a minimum of 4 feet wide with length necessary to accommodate mortality. Depth shall accommodate a minimum of 2 feet of cover over the mortality. Pit bottoms shall be relatively level. Lengths may be limited by soil suitability and slope. If more than one pit is required, they shall be separated by a minimum of 3 feet of undisturbed or compacted soil.

The burial site shall be of sufficient volume to contain the mortality with a minimum of 2 feet of soil cover. The burial site shall be finish graded to slightly above natural ground elevation to accommodate settling.

Structural Loading and Design

Vehicular traffic shall not be allowed within 4 feet of the pit edge.

For pits that are 4 to 5 feet deep, a step or bench 18 inches wide and 1 foot deep will be dug around the perimeter of the main pit so the remaining vertical wall will not exceed 4 feet. For pits greater than 5 feet deep, the earthen wall shall be sloped back at 1 1/2 horizontal and 1 vertical or flatter.

Composting

General. An alternative to burial is composting in windrows, bins made with large hay bales or static piles. Emergency disposal by composting shall be done under a roof structure, and may be done on a compacted soil foundation, if the soil has a permeability of less than 2.0 inches per hour. If the soil is unsuitable, a concrete pad or liner shall be installed under the composting area. Suitable bulking materials include chicken litter, sawdust, peanut hulls, straw, small wood chips, etc.

Composting mortality shall be protected from precipitation as necessary or provisions made for collecting contaminated runoff. Static piles or windrows covered with sawdust, finished compost, or other benign material will not need further protection.

Maximizing carcass contact with the bulking material will improve composting efficiency. Water will need to be added during the carcass and bulking material layering process when using dry bulking material. Begin the composting process by placing 12 inches of bulking material on the foundation surface. After the layering process is complete, cover the last layer with a minimum of 1 foot of bulking material.

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Windrows. Windrow composting is best suited for small animal carcasses and may require specialized equipment to turn the compost for subsequent stages. Place carcasses in a one-carcass-thick layer and cover with an equal thickness of bulking material. Add additional layers to a total depth of about 3 feet above ground.

Hay Bale Bins. Place the bales end-to-end to form walls for three-sided enclosures. Excessively large bins shall be avoided. A layout of two to three bales deep and three bales wide is the suggested size. The carcasses shall be placed in a one-carcass-thick layer and shall be covered with an equal depth of bulking material. Fill the bins with alternating layers of carcasses and bulking material.

Static Piles. Fill the pile with alternating layers of carcasses and bulking material. The carcass layers shall be one carcass thick and shall be covered with an equal depth of bulking material.

CONSIDERATIONS

Major considerations in planning animal mortality management are:

- Available equipment at the operation.
- The management capabilities of the operator.
- The degree of pollution control required by State and local agencies.
- The economics of the available alternatives.
- Effect on neighbors.

Consideration should be given to prevailing wind direction and neighbors when siting animal mortality disposal facilities. A minimum of 900 feet should separate the facility from the nearest

neighboring residence, and the facility should be 200 feet from a well, spring, or water course.

Runoff from the livestock or poultry facility or from outside areas should be diverted away from the animal mortality disposal facility.

Composting of poultry mortality will be hindered if the bird carcasses are allowed to freeze. Birds should be kept in a dry, non-freezing environment until added to the compost mix.

Facility sizes for composting large animal carcasses should reflect the longer compost periods required.

The following table lists factors that could be used in determining minimum daily weight of animal mortality when sizing incinerators:

Type of Animal	Daily Loss Factor (pounds/day/animal)
Chicken:	
Broilers	0.0024
Laying Hens	0.0014
Breeding Hens	0.0019
Breeder, Male	0.0082
Turkey:	
Hen	0.0081
Tom, Light	0.0193
Tom, Feather Production	0.0286
Swine:	
Suckling Pigs (Per Sow)	0.0400

Poultry operations often experience higher rates of mortality as the birds reach maturity. The capacity of incinerators should be sized to ensure the mortality of the large birds can be handled within the time frame allowed for incineration.

An alternative to prevent bloating of catastrophic mortality die-off could include opening animal thoracic and

abdominal cavities and viscera prior to placing required cover.

Incineration produces varying quantities of ash that will need to be properly handled.

Vegetative screens and topography can be used to shield the animal disposal facility from public view and to minimize visual impact.

State requirements for record keeping vary. Items such as burial site location, type and quantity of mortality, burial date, and other pertinent details should be noted at the time of burial.

Operators should maintain a list of current phone numbers for State and local officials to aid in notification if disease-related catastrophic mortality occurs.

Safety devices such as fencing, warning signs, and freezer locks may be necessary at certain sites.

Bio-security concerns should be addressed in all aspects of planning, installation, and operation and maintenance of an Animal Mortality Facility.

Ground disturbing activities such as excavation and site preparation for disposal facilities have the potential to affect significant cultural resources.

OPERATION AND MAINTENANCE

Operation and Maintenance (O & M) for All Animal Mortality Facilities

An operation and maintenance plan applicable to this practice including, but not limited to, the items listed below will be developed with the operator and will become a part of the overall waste

management system plan. The requirements in the individual operation and maintenance plan shall be consistent with the practice purposes, intended life, and design criteria. Safety considerations shall be prominently displayed in the plan.

The O & M plan includes, but is not limited to the following:

- Method and procedures of mortality disposal for normal losses.
- Method and procedures of mortality disposal for catastrophic losses.
- Contact(s) and phone numbers of person(s) to contact in case of catastrophic losses.
- Records of date, average weight, and number of deaths.

O & M Applicable to All Normal Mortality

Animal mortality facilities will normally be operated or used on a daily basis. At each operation or use, the facility shall be inspected to note any maintenance needs or indicators of operation problems.

Additional O & M for Incinerators

Incinerators shall only be used for the cremation of dead animals.

Incinerators must be operated properly to maximize equipment life and minimize emission problems. Any operator of an incinerator shall be trained and licensed by the manufacturer's representative or an equivalent organization using a State-approved training program. A licensed operator must be on site when the incinerator is in operation.

The incinerator must be loaded according to the manufacturer's recommendations. Ashes should be removed frequently to

maximize combustion and prevent damage to equipment. Plans shall include methods for collecting and disposing of the ash material remaining after incineration. The plan shall include an ash collection box or bucket and disposal of the ash on the land or through a community trash disposal system.

The incinerator must be inspected periodically to ensure that all components are operating as planned and in accordance with the manufacturer's recommendations.

Additional O & M for Freezers

Freezers must be operated properly to maximize equipment life and minimize potential problems. Temperatures should be monitored regularly to ensure proper freezing of carcasses.

The freezer must be loaded according to manufacturer's recommendations and not exceed the design capacity.

Freezers shall be used only for the freezing of dead animals associated with the planned operation.

The freezer must be inspected periodically (e.g., after each transfer of the carcasses to trucks for transport off site) to ensure that all components are operating as planned and in accordance with the manufacturer's recommendations. The inspection shall check for leaks and structural integrity of the freezer unit and proper freezing temperature.

The O & M plan includes, but is not limited to the following:

- Name and telephone number of the vendor responsible for removing animal carcasses from the freezers to off-farm facilities.

- Schedule for removing animal carcasses from the freezer(s).
- Capacity of freezer.
- Maximum loading capacity of freezer(s).
- Freezer operating temperature.

Additional O & M for Composters

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.

The O & M plan shall include 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, etc. Make adjustments throughout the composting period to ensure proper composting processes.

The composting facility should be inspected regularly when the facility is empty. Replace deteriorated wooden materials or hardware. Patch concrete floors and curbs as necessary to assure water tightness. Roof structures should be examined for structural integrity and repaired as needed. Exposed metal components should be inspected for corrosion. Corroded metal should be wire brushed and painted as necessary.

Closely monitor temperatures above 165°F. Take action immediately to cool piles that have reached temperatures above 185°F.

O & M Applicable to All Catastrophic Mortality

Potential locations for catastrophic animal mortality facilities shall be located during the planning process. Record keeping of number, average weight, cause, and date of animal deaths will be maintained.

Additional O & M for Burial Pit

Size of burial pits shall be specified. Number and depth of cover of burial pits shall be recorded. Burial of catastrophic mortality shall be timed to minimize the effects of mortality expansion during early stages of the decay process. Where possible and permitted by State law, mortality shall remain uncovered or lightly covered until bloating has occurred. Some topsoil shall be retained to re-grade the disposal site after the ground has settled as the decay process is largely completed.

Additional O & M for Composting

Where composting is used for catastrophic mortality disposal, the operation and maintenance plan shall identify the most likely compost medium, possible compost recipes, operational information, and equipment that will need to be readily available.

PLANS AND SPECIFICATIONS

Plans and specifications for animal mortality facilities shall be in keeping with this standard and shall describe the requirements for applying this practice to achieve its intended purpose.

- Location of the facility.
- Pertinent elevations of the facility.
- Location of electrical lines, gas lines, and requirements for burial and quality of materials.
- Standard details when concrete or timber is used for the facility foundation.
- Number and capacity calculations.
- Where a roof structure is used to protect the facility, include design data and building dimensions.

REFERENCES

NRCS Agricultural Waste Management Field Handbook (AWMFH).

NRCS National Engineering Handbook, Part 637, Chapter 2, Composting.

NRCS General Manual, Part 420, 401 – Cultural Resources.

NRCS National Handbook of Conservation Practices.

Tennessee Department of Environment and Conservation (TDEC), Division of Air Pollution Control (APC) Rules 1200-3-9.04.