NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

ANIMAL MORTALITY FACILITY

(No.)
Code 316

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 groundwater 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
- 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.

CRITERIA

General Criteria Applicable to All Purposes

Federal, State, and Local Laws. All planned activities shall comply with all federal, state, and local laws and regulations. The Alabama Department of Environmental Management (ADEM) Rules require owners/operators of animal feeding operations (AFO's) and associated waste management systems to fully implement and regularly maintain effective best management practices (BMP's) that meet or exceed NRCS technical standards and guidelines to prevent discharges and to ensure groundwater and surface water quality.

All construction activities must implement adequate construction BMP's. In addition, to comply with the National Pollutant Discharge Elimination System (NPDES) rules, all construction activities involving one acre or more of land disturbance shall have and follow a construction best management practices plan (CBMPP) prepared by a qualified credentialed professional (QCP) until construction is complete and all disturbed areas are stabilized. All construction activities related to waste contact or containment, including design, installation, modification, and closure are to be certified by a professional engineer licensed in the state of Alabama (PE).

The State Veterinarian requires that animal mortalities be removed from production areas and incorporated into the disposal process within 24 hours of dying.

Cultural Resources. Ground disturbing activities such as excavation and site preparation for animal mortality facilities have the potential to affect significant cultural resources. A cultural resources review shall be completed prior to ground disturbing activities to assure that existing cultural resources will not be adversely impacted.

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

Location. The location shall minimize the impact of the facility on odor and other air quality issues affecting neighboring residences, as well as

minimizing the impact of the facility on surface and ground water resources. The facility, where practical, shall be generally down gradient from a spring or well.

The animal mortality facility shall be located outside the 100 year floodplain; however if site restrictions require location within a floodplain, the facility shall be protected from inundation or damage from a 100-year storm event.

Animal mortality facilities shall be located to meet the minimum buffer distance requirements from water(s), wells, property lines, and public or private facilities as defined in the ADEM Administrative Code, Chapter 335-6-7, as amended.

The location of the animal mortality facility shall be consistent with the overall site plan for the livestock or poultry operation.

The animal mortality facility shall be located a sufficient height above normal ground to prevent surface water from ponding and posing a problem in the loading or unloading of the facility. The site shall be graded to drain or divert all overland runoff from the structure and surrounding work area in a manner not to cause pollution and erosion

Seepage Control. Where seepage from mortality facilities will create a potential water quality problem and a liner is deemed necessary to reduce seepage, the requirements of AWMFH Appendix 10D for permeability shall be met.

Power Source. Electrical components and installations shall meet the requirements of the National Electrical Code (NEC) and state and local codes for outdoor installation. All exposed electrical wiring shall be in a conduit. Installation shall be certified in writing by a qualified licensed electrician. Wherever installation could be classified as a hazardous location, specific conformance to NEC Article 500 will be met.

Criteria Applicable to All Purposes – Normal Mortality

The facility shall be located as close to the source of mortality as practical, considering biosecurity issues and the need to keep the facility shielded from the public view.

Composters

General. Design of facilities for composting animal mortality shall conform to Alabama NRCS conservation practice standard, Composting Facility, Code 317, or the guidance in National Engineering Handbook (NEH) Part 637, Chapter 2 - 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. The freezers shall be self-contained units designed to freeze animal carcasses before decomposition occurs. 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 leakproof to minimize odor and leachate pollution.

To provide for structure stability and safety, the freezer shall be located on a firm foundation of suitable strength to withstand loads imposed with vehicular traffic consistent with equipment used to load or remove the box or tray. The foundation shall consist of an earthen, gravel, timber, or concrete pad as recommended by the manufacturer

Location. Freezers shall be located near all-weather roads to facilitate the loading and transporting of carcasses from the farm. Where needed, all-weather roads shall be constructed to facilitate the equipment used in the removal of carcasses from the freezers. All-weather roads shall meet the requirements of Alabama NRCS conservation practice standard Access Road, Code 560.

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 be based on the expected daily mortality rate of the animals, the period of time between emptying, 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 factor of 45 pounds per cubic foot, unless a

different factor can be supported by sufficient documentation. Capacity calculations shall be supported by a removal schedule supplied by an integrator or approved vendor.

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 (O&M) plan shall contain contingencies for disposal of the mortalities prior to thawing with the exception that burial will not be allowed for non-catastrophic losses.

Disposal Pit

General. Disposal pits for normal mortalities are not allowed in Alabama by order of the State Veterinarian. Burial of animals is not permitted for day-to-day mortalities. Burial shall be used only for catastrophic losses or occasionally to dispose of a large animal. Catastrophic losses shall be buried according to all requirements of the Burial Pit section of this standard. Occasional large animal mortalities shall be buried according to the Location and Burial Procedure requirements of the Burial Pit section of this standard.

Incinerators

General. Incinerators shall be Type 4 (human and animal remains only, not for household garbage or refuse from production houses) and be on ADEM's approved incinerator list (http://www.adem.state.al.us/AirDivision/Air%20Forms/appropro.htm) for disposal of dead animals for both the incinerator model and type of fuel.

The incinerator shall be installed on a minimum 4 inch thick concrete pad extending from the base of the incinerator a minimum of 2 feet in all directions. If the incinerator is covered with a roof, at least six inches are required between the incinerator chimney and any combustible roof parts.

Capacity. Minimum incinerator capacity shall be based on the average daily weight of animal mortality and the length of time the incinerator will be operated each day.

The required minimum incinerator capacity will be determined using the following table or formula methods:

Type Animal	Daily Loss Factor (lb/day/animal)
Chickens:	
Broiler (4.2 lbs)	0.0050
Laying Hens (4.5 lbs)	0.0014
Breeding Hens (7.5 lbs)	0.0019
Breeder, Male (11 lbs)	0.0082
`Turkeys:	
Hen (14 lbs)	0.0081
Tom, Light (24 lbs)	0.0193
Tom, Feather (30 lbs)	0.0286
Production	
Swine: Suckling Pigs (5 lbs)	0.04 (per sow)

If detailed records are available, the following formula can be used to determine the Daily Loss Factor for a specific operation:

$$\frac{MW \times AM}{L} = \text{Daily Loss Factor}$$

Where:

MW = Mature weight of the animal (i.e. - 4.2 lbs)

AM = Average mortality for the life of the animals, as a decimal (i.e. - 0.05)

L = Life of the animals in days (i.e. - 42 Days)

Example 1 (using formula):

Given: 36,000 roasters
6.5 lb market weight
8% average mortality
65 day flock life

$$\text{Daily Loss Factor} = \frac{6.5 \times 0.08}{65} = 0.008 \text{ lb/day/bird}$$

Average daily weight of dead birds:
36,000 x 0.008 = 288 lbs/day

Incinerator capacity:
Minimum 288 lbs per loading capacity

Example 2 (using table value):

Size of swine unit: 500 sows (total on farm)

Average daily weight of dead suckling pigs:
500 x 0.04 = 20 lbs/day

Incinerator capacity:
Minimum 20 lbs per loading capacity

The recommended incinerator size will be the smallest size available that will handle the required minimum capacity. More than one incinerator may be required for larger operations. Heavy mortalities at the end of a cycle may require loading the incinerator more than once a day.

Ashes shall be removed from the incinerator on a daily basis or according to manufacturer 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 Alabama NRCS conservation practice standard Nutrient Management, Code 590. The predominant nutrient of concern is P_2O_5, and its annual rate of production in the ash may be estimated by using a factor of 0.01 pounds of P_2O_5 per pound of mortality incinerated. This factor shall be used until actual nutrient analyses and weight records are available for a specific incinerator installation.

Example 3: (P2O5 annual production)

Given: 100,000 broilers
4.2 lb market weight, 2.1 lb average weight
5% average mortality
6 flocks per year
0.01 lb P_2O_5 per lb of mortality

P_2O_5 production:
100,000 x 2.1 x 0.05 x 6 x 0.01 = 630 lbs P_2O_5/year

Liquid Fuel. Gas connection must be certified in writing by a qualified state licensed Liquified Petroleum Contractor to meet National Fire Protection Association (NFPA) Code 54 & 58; all other state, national, and local codes; and in accordance with the manufacturer's recommendations. Other fuel sources must meet all state and local codes for transmission of flammable or volatile fuels. For diesel-fired incinerators with fuel stored in a container of 55 gallon capacity or more, a Spill Prevention, Control, and Countermeasures (SPCC) Plan shall be prepared by a PE.

Criteria Applicable to All Purposes – Catastrophic Mortality

General. Disposal by rendering or using an ADEM approved landfill are preferred methods, however, processes addressed by this standard shall be limited to burial and composting. Catastrophic mortality shall be collected as soon as practical and moved from the production facility.

Burial Pit

General. Catastrophic mortality may be buried on-site, if soil conditions permit, or as otherwise directed by state and local regulatory agencies. 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.

The State Veterinarian's office shall be contacted before burial and the following information provided:

- date lost
- grower name
- county where located
- company and complex location
- number of birds lost
- age of birds
- name of person calling

Location. The facility shall be located as far from neighboring dwellings and the poultry or livestock operation as site conditions permit. Locate on sites that will meet the following requirements:

- at least 165 feet from property lines or public use areas
- at least 300 feet up gradient from any well
- at least 150 feet down gradient from any well
- at least 100 feet from a water body, stream, or drainageway
- 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

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 2 feet wide with length necessary to accommodate mortality. The

maximum size of the burial excavation shall be 0.1 acre (about 4,400 sq. ft.). Multiple pits may be needed. 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 three feet of undisturbed or compacted soil.

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 Alabama NRCS conservation practice standard Critical Area Planting, Code 342.

Structural Loading and Design. Vehicular traffic shall not be allowed within four feet of the pit edge.

For pits that are four to five feet deep, a step or bench 18 inches wide and one foot deep will be dug around the perimeter of the main pit so the remaining vertical wall will not exceed four feet. For pits greater than five feet deep, the earthen wall shall be sloped at 1.5 horizontal to 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. 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 one foot of bulking material.

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 three 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.

Maintenance. The compost may need to be re-covered after a day or two as the compost pile settles. Temperature monitoring is recommended to ensure adequate temperatures of 130° to 150°F have occurred.

The composting process will work best when the moisture content of the mix is 50% to 60% by weight (similar to a damp sponge with no free water present). Water may need to be added when compost is turned.

As the temperature reaches a peak between 130° and 150°F and begins to decline, turn the compost and allow it to undergo a second composting stage. Any animal parts exposed in this process shall be covered with additional bulking material. Allow two additional months before land applying this material. If raw animal parts exist after the second composting stage, a third compost cycle will be required.

The compost shall be land-applied according to Alabama NRCS conservation practice standard Nutrient Management, Code 590.

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
- the effect on neighbors

Consideration should be given to prevailing wind direction and neighbors when siting animal mortality facilities. A minimum of 165 feet should separate the facility from the nearest property line for an existing AFO producing dry wastes. For other AFO situations see the ADEM/NRCS Buffer Distance Summary for Animal Feeding Operations. Other siting considerations are:

- at least 100 feet from any drainageway
- at least 200 feet from any natural water course
- at least 100 feet from any up gradient well or 300 feet from any down gradient well
- at least 20 feet from any building to prevent spontaneous combustion
- as far from the fuel source as practical

Uncontaminated runoff from the livestock or poultry production facility or from outside areas should be diverted from the animal mortality facility.

For best results, the temperature of the carcasses in freezers should be maintained between 22° and 26° F.

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 being added to the compost mix.

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

For biosecurity reasons, freezers should be located at least 150 feet from the nearest production house, and vehicles used to transport frozen carcasses from the farm should not pass between the freezer and the nearest production house.

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

If the incinerator is covered with a roof, the roof should be constructed of non-combustible materials.

An alternative to prevent bloating of catastrophic mortalities could include opening animal thoracic and abdominal cavities and viscera prior to placing required cover.

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

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

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

Biosecurity concerns should be addressed in all aspects of planning, installation, and O&M of an animal mortality facility.

Consideration should be given to the use of an afterburner to further reduce odors and fumes if an incinerator is to be installed in a sensitive area.

Incinerators should be operated in such a manner as necessary to prevent the emission of objectionable odors.

OPERATION AND MAINTENANCE

An O&M plan applicable to this practice that includes, but is 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 O&M plan shall be consistent with the practice purposes, intended life, and design criteria. Safety considerations shall be prominently displayed in the plan.

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.

Catastrophic Mortality. Possible locations for catastrophic animal mortality facilities should be

located during the planning process to be utilized as needed.

Burial of catastrophic mortality shall be timed to minimize the effects of mortality expansion during early stages of the decay process. Some topsoil should be retained to re-grade the disposal site if the ground settles during the decay process.

Where composting is used for catastrophic mortality disposal, the O&M 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.

REFERENCES

ADEM Administrative Code, Chapter 335-6-7, as amended
ADEM/NRCS Buffer Distance Summary for Animal Feeding Operations
National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook (AWMFH)
Alabama NRCS Conservation Practice Standards:
- Access Road, Code 560
- Compost Facility, Code 317
- Critical Area Planting, Code 342
- Nutrient Management, Code 590
- Waste Storage Facility, Code 313

Alabama Poultry Waste Management – Waste Utilization and Facility Design Workbook
ASTM C1227-00b Standard Specification for Pre-cast Septic Tanks
National Electric Code
National Engineering Handbook Part 637, Chapter 2 - Composting
National Fire Protection Association Code
NRCS Cultural Resources Handbook
NRCS National Handbook of Conservation Practices
ADEM's Approved Incinerator List