United States Department of Agriculture

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

ANIMAL MORTALITY FACILITY

CODE 316

(no)

DEFINITION

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

PURPOSE

This practice may be applied to achieve one or more of the following purposes:

- reduce pollution impacts to surface water and groundwater resources
- reduce the impact of odors
- decrease the spread of pathogens
- to provide contingencies for normal (routine) mortality

CONDITIONS WHERE PRACTICE APPLIES

This standard applies to livestock and poultry operations where routine animal carcass storage, treatment, or disposal is needed. It also applies where a waste management system plan as described in the National Engineering Handbook (NEH), Part 651, and Agricultural Waste Management Field Handbook (AWMFH) has been developed that accounts for the end use of the product from the mortality facility.

This standard does not apply to catastrophic animal mortality. In cases of catastrophic animal mortality, use Alabama NRCS Conservation Practice Standard (CPS) Code 368, Emergency Animal Mortality Management.

This standard does not apply to normal/routine poultry disposal by burial trench/pit. As of July 2000, the Alabama Department of Agriculture and Industries (ADAI) required all existing burial pits and trenches be filled-in and permanently closed and prohibited the use of existing and future poultry disposal pits/trenches for the burial of daily (routine) poultry mortality.

CRITERIA

General Criteria Applicable to All Purposes

Include the facility in the waste management system plan for the operation.

Use Alabama NRCS CPS Code 342, Critical Area Planting, to re-vegetate all areas disturbed by construction. Include provisions for closing and/or removing the facility where required.

Laws and Regulations

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 include the implementation of 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).

Poultry mortality must be composted, incinerated, placed in a freezer, or otherwise properly managed according to ADAI and ADEM requirements within 24 hours of death.

Structural Design
All structural components of the facility shall meet the structural and foundational requirements of Alabama NRCS CPS Code 313, Waste Storage Facility. This includes but is not limited to the design of slabs, walls, and support structures.

Where roof structures are designed and constructed for the facility (e.g. composters), use Alabama NRCS CPS Code 367, Roofs and Covers for animal mortality storage facility covers and roofs.

Cultural Resources
Ground disturbing activities such as excavation and site preparation for animal mortality facilities have the potential to adversely affect cultural resources. A Cultural Resources review form shall be completed and sent to the Cultural Resources Specialist (CRS) for comment or possible survey prior to ground disturbing activities.

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

Address biosecurity concerns in all aspects of planning, installation, operation, and maintenance of an animal mortality facility.

Utilities and Permits
The landowner/contractor is responsible for locating all buried utilities in the project area, including drainage tile and other structural measures. Alabama line location center (Alabama One-Call) is available for assistance at 811 or 1-800-292-8525.

Location
The facility shall be located such that it meets the following requirements:

- Minimum buffer distance requirements are met from water(s), wells, property lines, and public or private facilities as defined in the ADEM Administrative Code, Chapter 335-6-7, as amended and detailed within *ADEM/NRCS Buffer Distance Summary for Animal Feeding Operations.*
- Odors are minimized, and visual resources are protected through use of landscape elements and prevailing winds.
- Sited above the 100-year floodplain elevation unless site restrictions require location within the floodplain. If located in the floodplain, protect the facility from inundation or damage from a 25-year 24-hour flood event.
- Located down-gradient from springs or wells where possible or take steps necessary to prevent contamination of groundwater supply sources. Investigate hydrogeological conditions.
- Located to be consistent with the overall site plan for the livestock or poultry operation.
- Located to provide acceptable ingress and egress and not interfere with on-farm travel patterns (livestock pathways, feed lanes, etc.).
- Located 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.

- Located and constructed/graded to ensure that surface runoff is directed away from the facility and contaminated runoff from the facility is directed to an appropriate storage or treatment facility for further management.
- Located a sufficient height above the normal ground surface to prevent surface water from ponding and posing a problem in the loading or unloading of the facility.
- A minimum of 165 feet should separate the facility from the nearest property line for an existing AFO producing dry wastes. For other AFO guidelines see the *ADEM/NRCS Buffer Distance Summary for Animal Feeding Operations*.

Seepage Control
Where seepage will create a potential water quality problem, provide a liner which meets the requirements of the National Engineering Handbook (NEH), Part 651, 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.

Power Source
Electrical components and installations for all types of animal mortality facilities 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 shall be met.

Additional Criteria Applicable to Composters

General
Design of facilities for composting where animal mortality is not utilized in the compost shall conform to Alabama NRCS CPS Code 317, Composting Facility, and/or the guidance in National Engineering Handbook (NEH) Part 637, Chapter 2, Composting.

Location
The facility shall be located such that it meets the following requirements:

- Locate on a base of low -permeability soils, concrete, or other liner material that will not allow contamination of groundwater.
- The floor of the composting facility shall be at least 2 feet above the seasonal high-water table unless special design features are incorporated that address non-encroachment of the water table by contaminants.
- 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 the type of composting facility and composting method based on the landowner’s goals, kind of organic waste solids, planned quality of finished compost, operator’s equipment, labor, time, land available for the facility footprint, and resource concerns.

Facility structural elements such as permanent bins, concrete slabs, and roofs shall meet the requirements of Alabama NRCS conservation practice standard Waste Storage Facility, Code 313.

Production swine and poultry in-vessel composters shall have 4-inch minimum thickness concrete pad under the primary and secondary bins.

Facility Size
Size the compost facility to accommodate the amount of raw material planned for active composting plus space required for curing (secondary phase). 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/volume during the primary composting process 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.

Size the animal mortality composting facility using one of the methods provided in the NEH, Part 637, Chapter 2, Composting; and NEH, Part 651, Chapter 10, Section 651.1007, Mortality Management; or comparable State rules. Dimensions selected for elements of the compost facility shall accommodate equipment used for loading, unloading, and aeration. Design the composting facility to accommodate the amount of organic waste feedstock generated for active composting and compost curing, along with the needed volume of additional bulking material or carbon source to achieve the composting action. Active composting includes both the primary and secondary stages of composting. Space for both the active composting and compost curing are required for making a stable finished compost product. Select facility dimensions to accommodate all stages of composting with space for turning, handling and processing.

Foundation
Design the facility to prevent the contamination of groundwater resources. Evaluate the site soils for depth to water table, permeability, texture, and bearing strength based on the design load and the frequency of use. For the design of a stable surface treatment where appropriate, use criteria in CPS Heavy Use Area Protection (Code 561). Guidance on restricting seepage through foundation and subgrade material can be found in NEH-651, Agricultural Waste Management Field Handbook (AWMFH), Appendix 10D.

Roofs and Roof Runoff
When roof structures are to be designed and constructed, design the roof using Alabama CPS Roofs and Covers (Code 367). Use Alabama CPS Roof Runoff Structure (Code 558) when designing the collection, control and conveyance of runoff from a roof. Use Alabama CPS Underground Outlet (Code 620) when designing pipe outlets where erosion may be a concern.

Runoff
Divert surface runoff from outside drainage areas around the compost facility. Collect runoff from the compost facility and utilize or dispose of it properly. Properly manage movement of organic material, soluble substances, and substances attached to solids carried by runoff.

Compost Mix
Develop a compost mix that encourages aerobic microbial decomposition and avoids nuisance odors.

Select carbonaceous material that, when blended with the nitrogenous material, will result in the desired pH. The blended material should have a pH at or slightly below neutral for best odor control. Where odors do not present a problem, a pH of 8 to 9 is acceptable, but strong ammonia and amine related odors may be present during the first 2 weeks.

Carbon Nitrogen Ratio
Calculate the amounts of the various ingredients to establish the desired carbon nitrogen ratio (C:N) of the mix to be composted. The initial compost mix shall result in a C:N ratio between 25:1 and 40:1. Compost with a greater carbon to nitrogen ratio can be used if nitrogen immobilization is not a concern or if composting organic materials that decompose at a high rate (or are highly unstable) with associated high odor production. Where more than two ingredients are to be blended, the two main ingredients are to be used in the analysis for the desired C:N and mixed accordingly. Adding up to 50 percent by weight of other

ingredients to improve workability and air movement is permissible as long as the C:N of the added ingredient does not exceed the target C:N of the compost.

Carbon Source
A dependable source of carbonaceous material with a high 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
Provision shall be made for maintaining adequate moisture in the compost mix throughout the compost period within the range of 40 to 65 percent (wet weight basis). The composting process may become inhibited when moisture falls below approximately 40 percent. Water used for moisture control must be free of deleterious substances.

Mortality composting shall be done under a cover to prevent excess moisture from accumulating in the compost and contamination of runoff by the composting material.

Orient and design the facility to enable the management of the compost moisture content. A water source is needed for adding moisture in dry conditions. Minimize blown-in precipitation on covered facilities by providing a roof overhang or orient the open side of the facility away from the prevailing wind direction.

Mortality Composting
When composting the carcasses of animal mortalities, all body parts must be covered with least 6 in. of carbonaceous material at all times. This applies to any stage of any composting process, except rotary drum composters. For rotary drum composters, follow the criteria given herein.

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. These temperature and time criteria 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.

Pile Configuration
Compost piles for windrowed and static piles should be triangular to parabolic in cross-sectional form with a base width to height ratio of about 2 to 1. Increased surface area favorably affects evaporation and natural aeration and increases the area exposed to infiltration.

Composting 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 may involve primary and secondary composting as required to achieve these characteristics.

Visual inspection and temperature measurements will provide needed evaluation of compost status. If raw body parts remain after a composting cycle, the material should be turned, covered with at least 6 in. of the carbonaceous material, and allowed to undergo another composting cycle. Test the finished compost as appropriate to assure that the required stabilization has been reached.

Storage
Provide properly designed storage facilities sized for the appropriate storage period. Protect composted material from the weather by roofs or other suitable covers. Structures must meet the requirements of Alabama NRCS conservation practice standard Waste Storage Facility, Code 313.

Maintenance
The compost/mortality material may need to be re-covered with additional litter as the compost pile settles. Temperature monitoring is required to ensure adequate temperatures of 130° to 150° F have occurred and been maintained. 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.

Use of Finished Compost
Spread finished compost according to Alabama NRCS CPS Code 590, Nutrient Management; Comprehensive Nutrient Management Plan (CNMP); or provide for other acceptable means of disposal.

Additional Criteria for Poultry

Process
The composting process uses a simple mixture of dry poultry manure, poultry carcasses, wheat straw, and water. (Other carbon sources such as peanut hulls, cotton seed hulls, etc., may be used in place of straw. Poultry manure cake has also been found to be an acceptable material in lieu of dry poultry manure and wheat straw.) The components of the mixture must be added according to guidelines to ensure proper growth of the bacteria and fungi needed for decomposition. Litter used for composting should be managed to ensure adequate bacterial counts and temperatures are present. Guidance for operation and maintenance (O&M) of poultry compost facilities can be found in Alabama NRCS guide sheet Composting Poultry Mortality, AL 316.

Design
For meat-producing poultry (broilers, Cornish hens, etc.) the volume required for each stage of multiple stage composting units is:

Figure 1

$$\frac{Nb \times M \times Wb \times VF}{Nd} = \text{Vol (CF)}$$

Where:	Nb	=	number of birds in flock
	M	=	mortality rate as a decimal
	Wb	=	weight of birds at maturity
	VF=		volume factor (2.5 for two-stage composters, 3.75 for single-stage and mini-composters)
	Nd	=	number of days of flock life

This formula gives reasonable results for a flock life up to 75 days. For a flock life over 75 days, provide primary bin volume for at least 30 days of mortality each with a minimum of two primary bins. Provide secondary volume as needed for the storage period required. The resource engineer should be contacted for guidance in these situations.

Single-staged composters and mini-composters may be used only for flocks of up to 45,000 roasters, 60,000 broilers, or 120,000 Cornish hens without approval of the state conservation engineer. Single-stage composters and mini-composters will not be used for any birds of 5 lbs. or more.

The total volume is divided by the volume of an individual composting bin to determine the number of bins required.

No. of bins = Total 1st stage volume / Volume of single bin

Bins for multiple stage composting are typically 5 ft. high, 5 ft. deep, and 10 ft. across the front. However, depth and width may be adjusted to accommodate the equipment on hand. The volume required in the second stage will be equal to the first stage, as minimum. In north Alabama, the second stage should have at least twice the first stage volume to provide winter storage, unless additional storage is otherwise provided.

Mini-composters are to be 4 feet x 4 feet x 4 feet. Each bin of the mini-composter shall be built with ½ in. space between each horizontal board. Commercially supplied single-stage units may be up to 5 ft. in one horizontal dimension.

Alabama engineering form, AL-ENG-25F, provides details on the methodology used in sizing facilities and may be used for other types of poultry.

Additional Criteria for Swine

Process

Composting of swine involves larger carcasses and bones which are harder to degrade than poultry. Composting times will be longer and the compost mix more critical to give good results. Guidance for operation and maintenance for an in-vessel swine compost facility can be found in Alabama NRCS guide sheet Composting Swine Mortality, AL 316A. The suggested recipes in the guide sheet shall be carefully followed until it is determined that the process is working well. All composting operations should be prepared to dispose of catastrophic mortality according to Alabama NRCS guide sheet Emergency Disposal of Dead Animals, AL 368.

Design

To allow for catastrophic mortality, additional capacity should be allowed. The following design parameters are suggested as the minimum requirements with carefully managed bins:

- One cubic foot of primary composter should accommodate about 5 to 8 lbs. of swine carcass at any given time. Nursery pigs and small feeder pigs can be loaded into a bin at 7 to 8 lbs. per cubic foot. Heavy feeders and sows should be loaded into primary bins at about 5 lbs. per cubic foot.
- The secondary bin size should not be less than the primary volume, and should be twice the primary volume for winter storage in north Alabama, unless additional storage is otherwise provided.
- Properly managed primary bins loaded with small pigs and lightweight feeder carcasses can be turned into the secondary bin in 60 days or less after the last carcass is placed in the bin. Allowing 90 days per cycle for filling and composting, each bin can be filled 4 times per year with the lighter carcasses.
- Heavy feeders and sows may have to stay more than 60 days in the primary bin. Allowing 120 days per cycle for filling and composting, each bin can be filled no more than 3 times per year.
- Volume recommendation - Provide 1 cu.ft. of primary composter bin space per 30 lbs. of annual mortality for pigs up to about 100 lbs. - stacked 5 ft. deep. This equals 1 sq.ft. of primary bin floor space per 150 lbs. of annual mortality.
- Volume recommendation - Provide 1 cu.ft. of primary composter bin space per 20 lbs. of annual mortality for pigs heavier than 100 lbs. - stacked 5 ft. deep. This equals 1 sq.ft. of primary bin floor space per 100 lbs. of annual mortality.
- Average bin size = 10 ft. x 6 ft. x 5 ft. deep = 60 sq.ft. or 300 cubic feet. Properly managed, this should handle about 2,250 lbs. of lightweight carcasses per compost cycle or 9,000 lbs. per year (4 cycles). For heavier feeders, sows, boars, or gilts, it may handle only 1,500 lbs. per cycle or 4,500 lbs. per year (3 cycles).

Growing-Finishing Unit
Assumptions:

Mortality Averages 3%

Growout from 40 lbs. to 240 lbs. per hog

2.75 batches per year (17 weeks in, 2 weeks out)

Average death loss per batch:

2,625 lbs. of carcass per 625 animals finished

4,200 lbs. of carcass per 1000 animals finished

Average death loss per year:

7,220 lbs. of carcass per 625 head capacity

11,550 lbs. of carcass per 1000 head capacity

Number of standard size primary bins:

2 bins minimum, regardless of facility size

1.6 bin per 625 head capacity

2.6 bins per 1000 head capacity

Middle or P2 Unit
Assumptions:

Mortality averages 3%

Growout from 10 lb. to 60 lb. per hog

7 batches per year (6 weeks in, 2 weeks out)

Average death loss per batch:

1,680 lbs. of carcass per 1600 animals finished

Average death loss per year:

11,760 lbs. of carcass per 1600 head capacity

Number of standard size primary bins:

2 bins minimum, regardless of facility size

1.3 bins per 1,600 head capacity

Farrowing Unit
Assumptions:

Sow and boar mortality averages 3%

Average weight all sows, boars, and gilts = 375 lbs.

19 live pigs born per sow/gilt per year

2 dead pigs born per sow/gilt per year

Pig mortality averages 3%

Pig weight = 3 to 40 lbs.

Average death loss per year per 100 sows:

1200 lbs. sows, boars, gilts

600 lbs. fetus

1200 lbs. pigs

Number of standard size primary bins:

2 bins minimum, regardless of facility size

1 bin per 150 sow capacity

Additional Criteria for Rotary Drum Composting

Process
Rotary drum composting 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 and add oxygen to the existing ingredients. This results in a faster composting process than with other methods. Due to the short cycle time required when used for production poultry, it is critical that the compost mix be managed for optimum temperatures.

Design
Rotary drum design capacity will be determined by the drum manufacturer. It will be based on the average number of mortalities per day at their mature weight. This design capacity may be used to select the size, length, and number of rotary drum units required. Actual volume requirements for a specific flock can vary greatly from this design volume. 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 in. of carbonaceous or bulking material. The material shall be protected from rain, and will then finish the composting process as a static pile.

Operation
The rotary drum composter shall be operated and maintained in accordance with the manufacturer's instructions. Mortalities and an approximately equal volume of carbonaceous material are added and the drum rotated until the contents are thoroughly mixed. The drum shall not be filled above approximately 75% of its total height at the inlet door in order to insure a thorough and complete mixing and movement of the contents when the drum is rotated. The moisture content and temperature of the compost should be monitored daily during the composting period. Appropriate steps should be taken as needed to maintain the moisture content and temperature at the required levels.

Additional Requirements
The state veterinarian will issue a permit for the use of a rotary drum composter in Alabama, and the following are required during its operation:

- A daily worksheet shall be kept showing date, age of birds, number of dead birds added, pounds of dead birds added, temperature inside composter as well as outside temperature,
- If using a batch type composting drum, after the flock is sold final mortality shall be placed in composter and rotated each day for three days, and then it shall rest for three days. If the internal temperatures have been sufficient (above 130°F), compost can then be spread, and

- The rotary drum composter itself must be maintained under a suitable shelter and on a minimum 4 in. thick concrete pad extending 4 ft. in front and back of the unit.

For horizontal flow rotary drums, the state veterinarian requires the following:

- A daily worksheet shall be kept showing date, age of birds, number of dead birds added, pounds of dead birds added, temperature inside composter as well as outside temperature.
- The rotary drum composter itself must be maintained under a suitable shelter and on a minimum 4 in. thick concrete pad according to the manufacturer's recommendations.
- The state veterinarian will inspect the composting process during the first operating period, and then inspect the compost produced when the first batch is completed.
- A secondary storage area, under roof and on a 4" concrete pad, shall be provided to allow the compost to season for at least 30 days before land application, and for storage when land application is not allowed.
- A forced air ventilation system will be provided for the composting operation.
- A screen will be provided at the outlet of the drum to separate any pieces of carcass that need to be composted again.

The state veterinarian's office may be contacted to obtain the permit application form and worksheets.

Additional Criteria for Other Animals and Food Processing Wastes

Other animals and food processing wastes from agricultural operations can successfully be composted. Guidance from the state environmental engineer on design criteria shall be used in the design.

Additional Criteria Applicable to Incinerators and Gasifiers

General

Use a Type 4 (human and animal remains) (as defined by the Incinerator Institute of America) incinerator that has been approved for use by ADEM. ADEM's approved incinerator list for both the incinerator model and fuel type are listed at the following website: (http://www.adem.state.al.us/DeptForms/Form52.pdf).

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, gasifiers shall meet all applicable state air quality/emissions requirements.

Capacity

Size the incinerator/gasifier to handle the average number of mortalities per day at their mature weight and length of time the incinerator will be operated each day.

Refrigeration units may be used in conjunction with the incinerator/gasifier to improve the loading cycle and fuel use efficiency of the incineration/gasification unit.

The recommended incinerator size will be the smallest size that will handle the required maximum capacity based on the length of time the incinerator is planned to be operated each day. 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.

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

If detailed records are available, the following formula can be used to determine the maximum daily capacity for a specific operation:

Figure 2

$$\text{Maximum Daily Capacity} = \frac{\text{B X MW X AM}}{\text{L}}$$

Where:

B = Number of animals per confinement cycle

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

AM = Average mortality for the life of the animals in the confinement cycle as decimal (i.e. 0.05)

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

Example 1 (Using Formula Method)

Given: 37,500 roasters, 6.5 lb. market weight, 8% average mortality, 57-day flock life

$$\text{Maximum Daily Capacity} = \frac{37{,}500 \text{ X } 6.5 \text{ X } 0.08}{57} = 342 \text{ lbs/day}$$

Incinerator Capacity: Minimum 342 lbs per loading capacity or plan to load more than once a day.

Incinerator Capacity: Minimum 342 lbs per loading capacity or plan to load more than once a day.

Ashes

Remove ashes daily or according to manufacturer recommendations. Any incineration of mortality 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, spread ash according to Alabama NRCS CPS Code 590, Nutrient Management; the CNMP; or provide for other acceptable means of disposal.

Location

Incinerators/gasifiers shall be located such that they meet the following requirements:

- Locate the incinerator/gasifier a minimum of 20 feet from anystructure.
- 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.
- Place the incinerator/gasifier on a concrete pad with the fuel source as distant as practical.
- If the incinerator/gasifier is covered with a roof, provide a minimum air space between the chimney and any combustible roof part of at least 6 inches, or as recommended by the manufacturer, whichever is greater.

Liquid Fuel

Gas connection must be certified in writing by a qualified state licensed Liquefied Petroleum Contractor to meet National Fire Protection Association (NFPA) Code 54 and 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 greater, a Spill Prevention, Control and Countermeasures (SPCC) Plan shall be prepared by a PE.

<u>Additional Criteria Applicable to Refrigeration Units</u>

General

Refrigeration units used shall be compatible with the emptying mechanism. Protect the refrigeration unit from precipitation and direct sun as deemed appropriate.

Unit design, construction, power source, and installation shall be in accordance with manufacturer's recommendations and all applicable building and electrical codes. (See the **Power Source** section under **General Criteria Applicable to All Purposes** for detailed electrical components installation). Refrigeration units shall be constructed of durable material, be leak proof, and have has a life expectancy compatible with other aspects of the waste management system.

Foundation
Freezers 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.

Temperature
The refrigeration units will be self-contained units designed to freeze animal carcasses before decomposition occurs. Carcasses to be rendered should be maintained between 22° and 26° F. Carcasses that will be composted, incinerated, or gasified should be stored a few degrees above freezing in order to facilitate burning and to reduce the composting time or 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 daily mortality rate of the animal, the period of time between emptying, the average weight of the animal, and a conversion factor for weight to volume. Use a weight to volume conversion of 45 pounds per cubic foot unless a local volume conversion factor has been documented.

Power Source
Provide an alternative source of power, where available, to maintain the integrity of the freezing process during power outages. Where an alternative power source is not available, identify the contingencies for disposal of the animal carcasses in the Operation and Maintenance plan.

Safety
In addition to general safety requirements, use refrigeration locks where necessary. Post highly visible waterproof warning signs, such as "INEDIBLE" or similar signs on the facility to identify the use of the freezer.

CONSIDERATIONS

Major considerations in planning animal mortality management are:

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

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

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.

Poultry operations often experience higher rates of mortality as the birds reach maturity, especially during hot weather. Mortality management facilities should be sized to accommodate periods of maximum normal mortalities.

Additional Considerations for Composting

Initial planning of site suitability should include referring to the web Soil Survey's soil interpretations for "composting facility" http://websoilsurvey.nrcs.usda.gov/.

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, nonfreezing 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.

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

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.

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 roof overhang.

Additional Considerations to Incinerators and Gasifiers

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.

Incinerator roof covering materials should be constructed of non-combustible materials.

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

PLANS AND SPECIFICATIONS

Prepare plans and specifications for animal mortality facilities that describe the requirements for applying the practice according to this standard. As a minimum the plans and specifications shall include:

- 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

The Operation and Maintenance (O&M) Plan developed for the animal mortality facility will become part of the overall CNMP. The plan should document needed actions to ensure that the practice performs adequately throughout the expected life.

As a minimum, include the following information in the O&M plan:

- Method and procedures of mortality disposal for normal losses
- Odor management or minimization requirements
- Biosecurity protocols
- Safety measures and procedures
- Periodic inspections
- Need for prompt repair or replacement of damaged components
- Site references and/or manufacturer or installer for trouble shooting

Additional O&M for Composters

Compost Recipe. Include a recipe of ingredients which gives the ingredient quantities and layering/mixing sequence.

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.

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.

Compost Mix. Develop a compost mix that encourages aerobic microbial decomposition and avoids nuisance odors.

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 increasing the roof overhang or increasing wall height of the facility.

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.

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.

Concrete Pad and Roof. 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 the roof structures for structural integrity and repair as needed. Inspect exposed metal components for corrosion. Wire-brush and paint corroded metal as necessary.

Monitoring. The operation and maintenance plan shall 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

Use the incinerator and gasifier only for the disposal of animal carcasses.

Operate the unit properly to maximize equipment life and minimize emission problems. Load the unit according to the manufacturer's recommendations.

Remove ashes frequently to maximize combustion and prevent damage to equipment. Include methods for collecting and disposing of the ash material remaining after incineration.

Inspect the unit periodically to ensure that all components are operating as planned and in accordance with the manufacturer's recommendations.

Additional O&M for Refrigeration Units

Operate the refrigeration unit properly to maximize equipment life and minimize potential problems.

Load the refrigeration unit according to manufacturer's recommendations and do not exceed the design capacity.

Use the refrigeration unit only for the dead animals associated with the planned operation.

Inspect the refrigeration unit periodically for leaks, structural integrity, and temperature.

Check the refrigeration unit periodically to ensure the proper temperature is maintained within the specified range

REFERENCES

ADEM Administrative Code, Chapter 335-6-7, as amended

ADEM/NRCS Buffer Distance Summary for Animal Feeding Operations

ADEM's approved Incinerator List

Alabama Poultry Waste Management-Waste Utilization and Facility Design Workbook

ASTM C1227-00b Standard Specification for Pre-Cast Septic Tanks

National Electric Code

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

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