Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

EMERGENCY ANIMAL MORTALITY MANAGEMENT

CODE 368

(no)

DEFINITION

A means or method for the management of animal carcasses from catastrophic mortality events.

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- Reduce impacts to surface water and ground water including downstrean drinking water sources
- Reduce the impact of odors
- Decrease the spread of pathogens

CONDITIONS WHERE PRACTICE APPLIES

This standard applies to animal operations where a catastrophic event results in the need to manage animal carcasses.

This standard may not apply to catastrophic mortality resulting from disease. In cases of disease-related catastrophic mortality, this standard is applicable only when the appropriate State or Federal authority (typically the State veterinarian or USDA Animal and Plant Health Inspection Service (APHIS)) approves the use of the methods in this standard.

This standard does not apply when animal carcasses are contaminated with hazardous waste, potentially hazardous or radioactive material.

This standard does not apply to routine animal mortality. For routine animal mortality, use NRCS Conservation Practice Standard (CPS) Animal Mortality Facility (Code 316).

CRITERIA

General Criteria Applicable to All Purposes

Plan, design, and construct this practice to comply with all Federal, State, Tribal, and local regulations. The landowner must obtain all necessary permissions from regulatory agencies or document that no permits are required. The landowner and contractor are responsible for locating all buried utilities in the project area, including drainage tile and other structural measures.

Address biosecurity concerns in all aspects of planning, installation, operation, and maintenance of a catastrophic animal mortality operation. Provide warning signs, fences, refrigeration unit locks, and other devices, as appropriate, to ensure the safety of humans and livestock. Include provisions in the design for closing or removing temporary components of the emergency mortality management operation, where required.

Plan for the maximum size animals that might be dealt with and in conjunction with a complete depopulation schedule for the facility. In lieu of more site-specific data, use the following animal carcass densities.

Table 1. Animal Densities

Animal	Density[1] pounds per cubic foot
Beef cattle	60
Dairy cattle	62
Horse	60
Poultry	60
Sheep	65
Swine	60
[1] Data source: NRAES-54. On-farm Composting Handook, table 7.4.	

Onsite Disposal

Location

Choose the location of onsite mortality management activities using the following criteria:

- The prevailing winds and landscape elements minimize odors and protect visual resources.
- Down-gradient from springs or wells, where possible, or take steps necessary to prevent ground water contamination.
- Above the 100-year floodplain elevation unless site restrictions require location within the floodplain and the management operations located within the floodplain are portable and can be quickly relocated if it becomes necessary (i.e., loading site for transportation to offsite disposal location).
- Where runoff from the 25-year, 24-hour storm can be diverted around the site.
- Where ingress and egress for mortality management will not interfere with other travel patterns on the farm, such as livestock pathways, feed lanes, and other ongoing daily activities.
- Where a minimum of 2 feet between the bottom of the mortality management site and the seasonal high water table can be achieved unless special design features are incorporated that address seepage.
- Follow State regulations for required distances away from streams, lakes, deep wells, residences, drains, and other sensitive features, as applicable.

Refer to applicable soil interpretations found in the “Disaster Recovery Planning” category under “Soil Suitabilities and Limitations for Use” in the Web Soil Survey (https://websoilsurvey.nrcs.usda.gov/app/) as an initial screening tool to identify areas that are likely to be most suitable for this practice. If a suitable location cannot be found on the farm for onsite disposal, use an offsite disposal method.

Use the criteria in NRCS CPS Critical Area Planting (Code 342) to revegetate all areas disturbed by mortality management activities, as applicable.

Burial pit or trench

General

Bury catastrophic mortality onsite or as otherwise directed by State and local regulatory agencies. More than one pit/trench (pit) may be required. When possible, time the burial of catastrophic mortality to minimize the effects of mortality carcass expansion during the early stages of the decay process. Where possible and permitted by State law, leave large animal mortality uncovered or lightly covered until bloating has occurred, or use methods to reduce or vent thoracic and abdominal cavities to eliminate bloating. Retain topsoil to regrade the disposal site after the ground has settled as the decay process is completed.

Remove or render inoperable all field drainage tile (subsurface drains) within the operational area of the burial pit.

Soil suitability

Perform an onsite soils investigation to determine the suitability of the site for a burial pit. Locate burial pits on soils that do not flood and that do not have a water table within 2 feet of the bottom of the burial pit. Avoid areas that have the presence of hard bedrock, bedrock crevices, or highly permeable strata at or directly below the proposed pit bottom. These sites are unacceptable because of the potential pollution of ground water.

Seepage control

Where seepage will create a potential water quality problem, provide a liner that meets the requirements of the NRCS National Engineering Handbook (NEH) (Title 210), Part 651, Chapter 10, Appendix 10D, "Design and Construction Guidelines for Waste Impoundments Lined with Clay or Amendment-treated Soil," or other acceptable liner technology.

Size and capacity

Size the pits to accommodate the catastrophic mortality using appropriate weight to volume conversions shown in table 1. Construct the pit bottoms to be relatively level. Soil suitability and slope may limit the length of the pit. Separate multiple pits by a minimum of 3 feet of undisturbed or compacted soil. Place a minimum of 2 feet of cover over the mortality. Provide a finished grade for the burial site that is above natural ground elevation to accommodate settling and to reduce ponding from precipitation events. Divert runoff from burial location.

Burial trench safety

Use excavation techniques that are Occupational Safety and Health Administration (OSHA) compliant. For pits that are 4–5 feet deep, provide a step or bench 18 inches wide and 1 foot deep dug around the perimeter of the main pit so that the remaining vertical wall will not exceed 4 feet. For pits greater than 5 feet deep, provide earthen walls that are sloped at 2 horizontal and 1 vertical or flatter. Use barriers to keep vehicular traffic at least 4 feet from the edge of the pit. Keep equipment, animal carcasses, stockpiled soil, and other materials a minimum of 2 feet from the edge of the burial pit.

Composting

If composting mortality is planned, refer to NRCS 210-NEH, Part 637, Chapter 2, "Composting," and Part 651, Chapter 10-651.1007, "Mortality Management" design requirements.

Plan for the needed amount and type of carbonaceous material required to facilitate the composting action.

Protect composting mortality from precipitation as necessary or provide an appropriate filter area or means for collecting contaminated runoff. Cover dead animals in static piles or windrows with a minimum of 18 inches of sawdust, finished compost, or other carbonaceous material to discourage scavenging animals and minimize odors. Do not protect the piles or windrows from precipitation or scavengers by covering with an impervious material as air exchange and oxygen are needed to fuel the composting action.

Incinerators and gasifiers

General

Use type 4 (human and animal remains) incinerators approved for use within the State. Gasification (a high temperature method of vaporizing biomass without direct flame but with oxidation of the fumes in an after-burning chamber) must meet all applicable State air quality and emissions requirements.

Capacity

Base the minimum incinerator or gasifier capacity on the average weight of animals times the number of animals in the event. Refrigeration units may be necessary in conjunction with incinerators and gasifiers to improve the loading cycle and fuel use efficiency of the incineration or gasification unit.

Open-air burning
Open-air burning involves combustion of waste at high temperatures, converting the waste into heat, gaseous emissions, and ash. The gaseous emissions are vented directly into the atmosphere in the human breathing zone without passing through a stack or chimney.

Open-air burning operations are strictly regulated, usually by State and/or local officials. A permit is usually required to perform open-air burning, if it is allowed at all.

Open-air burning includes burning carcasses in open fields and on combustible open heaps, or pyres, or air curtain destructors. Burning must take place as far away as possible from the public. Local conditions and circumstances may determine if this is a feasible disposal option to choose.

On-farm preprocessing may be required prior to open-air burning. Preprocessing could include the grinding of carcasses that can be transported in sealed containers or subjected to fermentation or freezing. However, grinding or shredding of carcasses infected with an infectious disease such as highly pathogenic avian influenza (HPAI) is not recommended because of the risk of aerosolizing the virus.

Use NRCS CPS Critical Area Planting (Code 342) to revegetate all areas disturbed by burning operations.

Temporary mortality storage with refrigeration units
General
Catastrophic mortality may be held in refrigeration units prior to disposal. Because of the large number of dead animals normally encountered in a catastrophic mortality situation, if refrigeration is used, it is likely that multiple units will be needed. Use refrigeration units with a construction compatible with the mechanism to be used to empty the refrigeration unit. Where necessary, provide protection for the refrigeration unit from precipitation and direct sun.

The refrigeration unit design, construction, power source, and unit installation will be in accordance with manufacturer's recommendations. Refrigeration units will be constructed of durable material and leakproof.

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

Temperature
The refrigeration units will be self-contained units designed to freeze animal carcasses before decomposition occurs. Maintain carcasses to be rendered between 22–26°F. Carcasses that will be composted, incinerated, gasified, or burned should be stored a few degrees above freezing 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 volume of mortality. When calculating the volume required, use the number of dead animals, the average weight of the animal, and a conversion factor for weight to volume.

Power Source
Provide an adequate source of power for cooling or freezing carcasses or both.

Offsite Disposal
In some instances, onsite disposal of all or a portion of the mortality may not be practical. In these instances, transportation and disposal by a third party at an offsite facility will be necessary. Tipping fees for offsite services will be required.

Transportation
Truck beds, trailers, dumpsters, etc. used to transport mortality to another location for disposal will be leakproof, tarped, and covered. Farmer and contractor will comply with all requirements established by local and Federal regulatory agencies.

Rendering
Rendering animal mortalities involves conversion of carcasses into three end products—carcass meal, melted fat or tallow, and water—using mechanical processes (e.g., grinding, mixing, pressing, decanting, and separating), thermal processes (e.g., cooking, evaporating, and drying), and chemical processes (e.g., solvent extraction). When the proper processing conditions are achieved the final product is free of pathogenic bacteria and unpleasant odors.

In an outbreak of disease such as foot and mouth disease, transport and travel restrictions may make it impossible for rendering plants to obtain material from traditional sources within a quarantine area. Additionally, animals killed because of a natural disaster, such as a hurricane, might not be accessible before they decompose to the point that they cannot be transported to a rendering facility and must be disposed of onsite.

Use of some pharmaceuticals may eliminate rendering as a option, due to residual of some drugs in the end products. Producers should contact renderer on what to avoid.

Collect and transfer animal mortalities in a hygienically safe manner according to State and local rules and regulations.

Landfill
Use Subtitle D landfill sites for animal carcass disposal. State and local governments will have reviewed approved Subtitle D landfill sites, and the necessary environmental protection measures will be preexisting; therefore, landfills represent a disposal option that generally poses little risk to the environment.

Modern Resource Conservation and Recovery Act Subtitle D landfills are highly regulated operations, engineered and built with technically complex systems specifically designed to protect the environment. The environmental protection systems of a Subtitle D landfill are generally more robust than those small, arid, or remote landfills that meet U.S. Environmental Protection Agency (EPA) criteria for exemption from environmental protection systems. Subtitle D landfills would likely be less prone to failure following high organic loading from the disposal of large quantities of carcass material than those exempt from EPA criteria.

In many States disposal of animal carcasses in Subtitle D landfills is an allowed option. However, it is not necessarily an available option as individual landfill operators generally decide whether to accept carcass material.

Producers should verify with individual landfill operators to determine availability for a particular event and for any requirements to utilize the landfill. Some landfills may require bagging of carcasses for disposal. During an emergency or instance of catastrophic loss, time is often very limited; therefore, landfills offer the advantage of infrastructures for waste disposal that are preexisting and immediately available. Furthermore, the quantity of carcass material that can be disposed of in landfills can be relatively large.

CONSIDERATIONS

Major considerations in planning emergency animal mortality management include—

- Available equipment and land application area at the operation.
- The management capabilities of the operator.
- The emotional impact on the producer caused by the mortality losses.
- The degree of pollution control required by State and local agencies.

- Effects on wildlife and domestic animals.
- The economics of the available alternatives.
- Effects on neighbors (aesthetic, odors, traffic on public roads).

Consider taking measures to maintain appropriate visual resources, reduce odor, and provide dust control. Measures may include use of existing vegetative screens and topography to shield the catastrophic animal mortality disposal from public view, to reduce odors, and to minimize visual impact.

An alternative to prevent bloating of catastrophic mortality includes opening animal thoracic and abdominal cavities and viscera prior to placing the required cover.

Consider using the applicable operating procedures described in USDA Animal and Plant Health Inspection Service “Emergency Carcass Management, Desk Reference Guide.”

State requirements for recordkeeping vary. State or local regulations may require recording items such as burial site location, type and quantity of mortality, burial date, photographs documenting the burial process, and other pertinent details.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for emergency animal mortality management to comply with this standard and that describe the requirements for applying this practice to achieve its intended purpose. As a minimum, include—

- Contact information for State authorities since they may have specific requirements dependent upon cause of death, animal species, and housing.
- Amount, type, and weight of mortality.
- Layout and location of on-farm mortality management activities.
- Number, capacity, and type of on-farm disposal methods.
- Grading plan showing excavation and fill. Include drainage features, as appropriate.
- Soil and foundation findings, interpretations, and reports, as appropriate.
- Requirements for onsite disposal (i.e., composting, burial, etc.) and quantity of materials, as appropriate.
- Structural details of all components, as appropriate.
- Vegetative requirements for preventing erosion, as appropriate.
- Odor management or odor minimization requirement.
- Name, location, and contact information for the selected offsite transportation and disposal facility if offsite disposal, such as rendering or landfilling, will be used.

OPERATION AND MAINTENANCE

Prepare an operation and maintenance plan specific to the facilities installed for use by the landowner or operator responsible for operation and maintenance. The plan should provide specific instructions for operating and maintaining facilities to ensure they function properly. At a minimum, address—

- Specific instructions for proper operation and maintenance of each component of this practice. Detail the level of inspection and repairs needed to maintain the effectiveness and useful life of the practice.
- Safety considerations.
- Biosecurity concerns in all aspects of installation, operation, and maintenance.
- Contact(s) and phone numbers of person(s) to contact for catastrophic losses (figure 1).
- Maintaining recordkeeping of number, average weight, cause, and date of animal deaths.
- Method and procedures of catastrophic mortality disposal.

- Periodic inspections of disposal sites, as appropriate.
- Prompt repair or replacement of damaged components, as appropriate.
- Site references and/or manufacturer or installer for trouble shooting mechanical equipment, as appropriate.

Additional Operation and Maintenance for Burial

- Inspect after significant storm events and at least twice a year to identify maintenance needs.
- Inspect burial site for settlement and cracks in soil cover. Maintain at least 2 feet of soil cover as final cover over carcasses. Add soil and regrade the carcass burial site as decay and settlement occur.
- Regrade area if runoff is flowing onto the location of the burial site.
- Promptly repair and revegetate bare spots and eroded areas. Apply fertilizer and lime as appropriate to maintain vigorous vegetation.
- Inspect for damage from rodents or burrowing animals. Repair any damage and take appropriate corrective actions to prevent further damage.
- In areas where animal encroachment is excessive, install a barrier (temporary fence) around the burial site to protect against scavengers such as bears, coyotes, etc., or add additional cover.
- When the site can be returned to use, remove and properly dispose of fencing materials, if used. Level the land to original grade.

Additional Operation and Maintenance for Composting

- Identify operational information and equipment that will need to be readily available.
- Locate, as soon as practical, a source for carbonaceous material sufficient to provide for the catastrophic event.
- Include a recipe of ingredients that gives the layering or mixing sequence.
- Provide maximum and minimum temperatures for operation, land application rates, moisture level, management of odors, testing, etc.
- Become familiar with composting methods and procedures as soon as practical.
- Instructions for monitoring temperature and moisture, and how to adjust as necessary to ensure that the compost operation is proceeding as planned.
- Instructions for turning the pile as appropriate.
- In areas where animal encroachment is excessive, install a barrier (temporary fence) around the burial site to protect against scavengers such as bears, coyotes, etc., or add additional cover.
- When the site can be returned to use—
  - Remove and properly dispose of fencing materials, if used.
  - Collect any bones remaining on the soil surface and disposed of them properly.
  - Level the land to original grade.
- Instructions for properly utilizing the finished compost.

Additional Operation and Maintenance for Incinerators and Gasifiers

- Operate units properly to maximize efficiency of disposal and minimize emission problems.
- Load the units 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. Plan for ash weight of up to 20 percent of carcass weight.

Additional Operation and Maintenance for Refrigeration Units

- Load the refrigeration unit according to manufacturer's recommendations and do not exceed the

design capacity.

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

Figure 1. Emergency Mortality Response Contacts and Farm Information

EMERGENCY MORTALITY RESPONSE
Emergency Contacts and Farm Information

Plan Date:	
Farm Name:	
Owner/Operator:	
County:	
Physical Address of Facility:	
Directions to Facility:	
Emergency Contacts	
Local Veterinarian:	
On-Call Veterinarian:	
Integrator	
Other:	
Local Emergency Number:	
List of Agencies to notify within 24 hours	
State Animal Health Agency:	
State Veterinarian:	
Federal Area Veterinarian in Charge:	
Heavy Equipment Contractor	
for handling carcasses:	
for excavating burial pits:	
Composting Material Supplier:	
Incinerator:	
Landfill:	
Rendering Facility:	
Other (specify):	

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