

**CATASTROPHIC MORTALITY
AND ASSOCIATED MATERIAL DISPOSAL**

Standard Operating Guideline No. 002

MISSOURI DEPARTMENT OF AGRICULTURE
AGRICULTURAL EMERGENCY RESPONSE ACTIONS
LIVESTOCK DISEASE EMERGENCY



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1.0 SCOPE AND APPLICATION

In the event of a foreign animal disease (FAD) outbreak or other natural or man-made disaster, Missouri livestock and poultry producers could be faced with the task of large-scale mortality disposal and the disposal of other potentially contaminated materials associated with the FAD response and mitigation. It is likely that counties providing emergency response in these events would be called on to support livestock and poultry producers who, for whatever reason, are not prepared to dispose of animals or associated materials on their property. Counties also will need to address the disposal of depopulated animals, which were temporarily held and cared for by the county during a stop animal movement order. See Missouri Department of Agriculture's (MDA) Division of Animal Health Standard Operating Guide (SOG) No. 003, *Temporary Housing and Care for Livestock and Poultry*.

Currently, MDA recommends that all livestock or poultry operations prepare a catastrophic mortality disposal plan. MDA recommends that this plan consider on-site disposal as the primary option. To provide contingency plans for producers that cannot dispose of animals on their property, to deal with potential disposal associated with temporarily housed animals and the potential need to dispose of vast numbers of animals, the MDA has requested that local emergency managers identify acceptable methods of mortality disposal for their counties and several sites that could be used for mortality disposal. All catastrophic disposal planning should follow the plans and considerations outlined in this SOG and the National Animal Health Emergency Management System (NAHEMS) Disposal Guidance (NAHEMS, 2005).

The purpose of this SOG is to provide functional guidance about providing and assisting in catastrophic mortality disposal associated with a FAD outbreak; however, the plans and considerations are applicable to any catastrophic mortality event. In addition, this SOG addresses the disposal of other materials associated with the response and containment of a FAD. This standard operating guideline contains information from and is consistent with NAHEMS guidelines, as of October 2008.



Local emergency management should use this SOG as a template or reference to develop an operational plan for providing and assisting with catastrophic mortality and associated materials disposal. Operation plans should be consistent with the Local Emergency Operations Plan (LEOP). Several sections of this SOG contain general descriptions of the scope of operations necessary to implement a particular component of disposal. In most cases, these sections were made general so local emergency planners could insert or reference more detailed, county-specific operational details. Examples of these sections include Health and Safety, Communication, Public Information, and Mental Health Services.

In the portions of this SOG dealing with the selection of mortality disposal methods and disposal locations, counties should consider the guidance given, select the appropriate method(s) and locations(s), and then modify them as appropriate to account for local conditions and restrictions. Counties should work with MDA and Missouri Department of Natural Resources' (MDNR) Environmental Emergency Response Section to determine appropriate and practical disposal site locations and disposal methods. In the case of identifying specific locations, counties should include detailed contact information for the owners of each selected site, if public lands are not selected. In all cases, counties should make pre-incident arrangements to access the selected areas. In most cases, some type of use contract should be considered (see Appendix A).

Counties implementing any portion of this SOG during a FAD response must consider existing regulations and environmental concerns associated with the materials being disposed and the disposal methods selected. In some cases, existing regulations and guidance may be altered to accommodate the emergency nature of the response and the urgent need to isolate potentially infected materials through disposal. Both MDA and MDNR should be consulted prior to field implementation of any disposal to verify that the methods do not violate regulations. Non-emergency animal disposal rules can be found in *Missouri Revised Statutes, Chapter 269, Disposal of Dead Animals, Section 269.020*.



2.0 SUMMARY OF PROCEDURES

This SOG presents the operational considerations and details associated with a county’s response to a FAD outbreak. The response and containment efforts will likely generate large numbers of livestock or poultry mortalities and also associated materials that will require isolation through disposal or destruction. The operational considerations include identifying methods of disposal and county-managed locations for disposal; suggesting critical personnel and equipment for response; cleaning and disinfection; protecting health and safety; and also determining methods of communication and documentation, providing public information, and mental health support.

This SOG will begin with a consideration of the general methods of disposal recommended and some considerations for selecting disposal sites. This information is provided in Sections 2.1, *Identifying Methods for Mortality Disposal*, and 2.2, *Identifying Locations for Mortality Disposal*. Specific information regarding how these tasks should be implemented is presented in Sections 2.3.3, *Methodology – Carcass Disposal*, and Section 2.3.4, *Methodology – Associated Materials Disposal*.

2.1 Identifying Methods for Mortality Disposal

Burial is identified as the preferred disposal method in Missouri; however, ultimate use of this method will depend on local environmental considerations (i.e., depth to groundwater and soil texture) and the specific disease involved. In addition, this SOG discusses the possibility of modifying disposal options or developing unique, effective alternatives. To help local jurisdictions with disposal planning, “Disposal Option Checklists” can be found in Appendix A.

As disposal options are considered, emergency planners should consider the total scope of an emergency response to a catastrophic livestock or poultry mortality event. For example, the selection of incineration as a disposal option could severely impact county resources relative to other response areas, such as traffic control or cleaning and disinfection, being delegated to local firefighters who also would be assigned to the incineration effort. Using these resources to



implement and oversee carcass incineration may redirect limited county resources from other critical response activities, and divert them from their primary role of protecting the community from fire.

MDA and MDNR are prepared to work with local emergency planners to review and recommend potential catastrophic animal mortality disposal methods. County emergency managers are encouraged to work with these agencies to develop their catastrophic animal mortality plans, including pre-approved methods and locations for mortality disposal.

Both NAHEMS and the National Agricultural Biosecurity Center (NABC) have published reference documents providing detailed explanations of the most common catastrophic mortality disposal options. NAHEMS 2005, *Disposal*, was designed to provide guidance in planning. The 2004 NABC document, “*Carcass Disposal: a Comprehensive Review*,” goes beyond guidance for planning, providing a thoroughly detailed examination of mortality disposal methods, and providing operational detail. The most probable mortality disposal methods a local jurisdiction is likely to consider are: burial, landfilling, air-curtain incineration, composting and rendering. A short synopsis of the advantages and disadvantages of each method is provided below. This synopsis is not all-inclusive; rather, it provides an overview and is adapted from both NAHEMS 2005 and NABC 2004.

Burial

The most significant advantage of a mass burial site is the capacity to dispose of a tremendous number (volume) of carcasses in a short amount of time. Generally, burial is considered to be an economical option for catastrophic mortality disposal. There are several factors that could impact the cost effectiveness of burial, such as whether equipment is owned or rented and whether any environmental protection measures must be employed in conjunction with burial.

The relative ease and economic aspect of burial is tied to the facts that, even in rural settings, the needed equipment is widely available and the method does not require sophisticated training or



planning. These aspects combine to allow this method of disposal to be implemented very quickly. If performed on-farm or on-site, burial eliminates the need for transportation of potentially infectious material, which in turn reduces the potential for disease spread or breaches in biosecurity. Burial is more discrete than other methods (e.g., open burning), especially when performed on-site (on-farm) and may therefore be less likely to attract significant attention from the public. These attributes, particularly those of convenience, logistical simplicity, and rapid completion, make burial an ideal method of carcass disposal, where environmental impact is unlikely and where sufficient soil depth exists.

The greatest potential disadvantage associated with this method is its potential to impact the environment, in particular groundwater. This potential disadvantage is related to the site setting (i.e., depth to groundwater, soil type, groundwater usage, etc.) and the quantity of material buried. Catastrophic mortality burial may also require deed restrictions for the location of the burial site, adding a long-term liability component to the activity. In some instances, the disease in question may preclude burial as an option (i.e., bovine spongiform encephalopathy or anthrax). If burial involves transporting carcasses off-site; cost; vector control; and making containers leak-proof, or using containment bags can create additional disadvantages.

Burial isolates carcasses while they decompose; however, it may not always represent a consistent means of eliminating disease agents. Unless pH changes within a carcass destroy a disease agent, the slow decomposition of the organic material may allow the disease agent to stay viable within the carcass for years. This concern is tied to the common observation that materials within burial sites may persist for years or even decades. Ultimately, burial must be considered a long-term process. From a practical standpoint, the use of burial may be limited by several factors, including a lack of sites with suitable geological and/or hydrological properties in some regions, and regulatory constraints or exclusions relative to suitable locations. In some cases, the presence of an animal carcass burial site may negatively impact land value or options for future use. In spite of these potential disadvantages, burial sites have the potential to serve as an effective means of carcass disposal in an emergency situation. However, this would require thorough site assessment, planning, and design well in advance of the need.



Landfilling

If a sanitary landfill is reasonably close to a local jurisdiction, and the operator is allowed to and agrees to accept catastrophic mortality carcasses, that landfill may provide a viable option for catastrophic mortality disposal. Perhaps the most significant advantages of landfill disposal are the fact that the infrastructure for disposing of waste already exists, it may be able to accept carcasses and other response related debris and waste, the disposal capacity can be relatively large and the facility is engineered to isolate its contents from the environment. In addition, landfill sites generally employ best management practices and have engineered structures to provide environmental protection. During an emergency, time is often very limited, and therefore landfills offer the advantage of pre-existing and immediately-available infrastructures for waste disposal (including equipment, personnel, procedures and, importantly, containment systems).

Even though disposal by landfill may be an allowed option, and a suitable landfill site may be located in close proximity, landfill operators may not be willing to accept animal carcasses. Additionally, because the development of a landfill site is an extremely lengthy, difficult, and expensive process, landfill owners and planning authorities may not want to sacrifice domestic waste capacity to accommodate carcass material. Those landfill sites that do accept animal carcasses may not be open for access when needed or when convenient. Like burial, landfilling of carcasses represents a means of containment rather than of elimination, and long-term management of the waste is required. However, this long-term commitment will be in effect for landfill sites regardless of whether carcass material is accepted. An additional possible disadvantage associated with landfill disposal is that it will involve transporting carcasses off-site which add; cost; vector control; and making containers leak-proof, or using containment bags as additional disadvantages. It should be noted that this potential for disease spread would be equally associated with other off-site disposal methods.



Air-Curtain Incineration

Air-curtain incineration is the preferred option to open burning. The engineered nature of this method creates higher combustion temperatures and results in a cleaner burn. Proper air curtain incineration occurs at temperatures that will destroy all known pathogens. In addition, incineration will greatly reduce the volume of waste material, converting carcasses and debris to ash. The equipment for air-curtain incineration is mobile, requires minimal training to operate and suitable for combination with debris removal.

Air-curtain incineration can be expensive relative to other disposal methods due to the equipment and fuel costs. Incineration requires an ample and continuous fuel source. The operation and maintenance of the equipment and the burn itself requires some training that most local responders will not have. In addition, carcasses are generally composed of 70 percent water, creating the need for considerable amounts of fuel and dry burning materials. The use of moist wood or debris with lower combustibility will result in a poor air/fuel mixture and produce noxious smoke and incomplete combustion.

Composting

Composting is a common method employed by producers to dispose of daily mortalities, especially poultry and young livestock. The composting process can effectively eliminate carcasses and the disease agents they may carry. The composting of diseased animal carcasses on affected premises is a suitable alternative method of disposal if an appropriate site and the proper supplies (e.g., wood chips, sawdust and biosolids) are available. Most pathogens are rapidly deactivated by temperatures reached early in the composting process. While the primary objective of composting diseased animal carcasses is deactivation of disease organisms, other advantages of composting are the minimal effect on the environment and production of a useful end product.

Although composting appears to be simple, it is an exceedingly complex process that requires good management to be successful. Composting requires a source of carbon such as either straw



or wood chips and a bulking agent to increase porosity and oxygen flow. Maintaining the optimal carbon:nitrogen ratio can be challenging, as is maintaining the proper moisture and oxygen levels. Imbalances in any of these factors can slow the composting process and reduce the composting temperatures, not allowing for proper sterilization. Even with proper management complete composting of carcasses may require 30+ days, or more. Composting large animals will require the body cavities to be punctured or the carcasses to be cut into smaller pieces. Both of these actions would raise the potential for the release and spread of contaminated body fluids. Maintenance of the moisture and oxygen levels will require periodic compost pile mixing or turning. This can be a labor intensive endeavor and it could result in the release of disease causing agents. A compost area must be managed to eliminate scavenger access to carcasses. If scavengers get access to diseased carcasses they could spread a disease agent. Finally, composted materials will still need to be tested for the presence of disease agents prior to their removal and use. Like burial, composting may not be an acceptable disposal method for some disease agents (i.e., anthrax, bovine spongiform encephalopathy, etc.).

Rendering

Rendering is an economical method of disposing of carcasses, though satisfactory rendering plants are not always available. It is questionable if a renderer could absorb the additional biomass associated with a catastrophic mortality event. If this is an option being considered by a local jurisdiction, contact should be made with the rendering company to assess the ability to absorb the carcasses associated with a catastrophic event. Below is a list of available renderers in Missouri. The movement of carcasses to the rendering plant poses the additional risk of spreading a disease agent.

Rendering Companies Allowed to Operate in Missouri

Darling International
National Stockyards
East St. Louis, IL
(800) 536-8190

Darling International
947 Clay Hill Rd
Billings, MO 65610
(417) 744-2287

Darling International
685 Adams St
Kansas City, KS 66105
(913) 321-9328



Halfway Packing
Company
4427 South 222nd Rd
Halfway, MO 65663
(417) 445-2346

Millstadt Rendering
Company
3151 Cloverleaf School
Road
Belleville, IL 62223
(618) 538-5312

National By-Products
601 South 18th Street
Des Moines, MO 50317
(515) 265-0381

National By-Products
Bellevue, NE
(800) 432-9085

2.2 Identifying Locations for Mortality Disposal

Once the method(s) of disposal is determined, counties should identify locations where the disposal will occur. Often the selection of disposal methods and locations will occur concurrently. In some cases, due to limited possibilities for locating disposal sites, a county may identify these areas before identifying the disposal method(s). In these cases, the disposal method would be tailored to the possible disposal sites. If private lands are considered for mortality disposal, the county should obtain written use agreements from the landowners. An example of such an agreement is provided in Appendix B.

At sites where on-site disposal is not possible or practical, disposal of euthanized animals will be carried out at another location. This will require the movement of carcasses off-site for disposal. Cases that could necessitate off-site disposal include, but are not limited to: disposal of animals involved in laboratory research, conditions where there is not adequate land area, sites with shallow water tables, and sites in close proximity to large human populations. If locations requiring emergency mortality disposal are adjacent to each other, consideration should be given to a shared or common disposal area.

The following list presents considerations for selecting an emergency mortality disposal site:

- Public health or environmental protection laws, including fire codes and other regulations. Local authorities must be consulted as to the need for permits as well as for general advice and recommendations.



- Number and type of animals that could be disposed of at the site.
- The amount and type of non-animal material that will need to be disposed.
- Any potential hazard the material may pose to humans or animals.
- Potential disposal areas should be located within the borders of a quarantine area, in the event of a FAD outbreak.
- The proximity of private lands and human or animal housing areas to potential disposal sites should be considered.
- Isolation from public areas is desirable.
- Areas should allow protection from scavenging animals.
- These areas should not be located in sensitive environments (i.e., wetlands, highly erodible land, etc.).
- If incineration is selected, sites should be isolated from public view.
- The distance between the proposed disposal site and local ground water or surface water. The potential ground water and surface water impact must be considered.
- Average weather conditions, including prevailing wind direction, especially in the event that incineration is considered.
- Availability of the type of supplies and equipment necessary for the disposal method selected (e.g., fuel for incineration, carbon sources for composting, or citric acid for the treatment of milk and dairy products and dairy wastewater prior to disposal, etc.).
- The permeability of the subsoil, amount or rocks in the soil and drainage characteristics of the site.
- Availability of utilities, such as electric (overhead lines), water, sewer, telephone, etc.
- The location of underground or overhead utilities (e.g., septic tanks and equipment for water, gas, electricity, telephone and sewage).
- Roads or open areas that can provide large trucks and other vehicles with access to the disposal site.
- If access control is difficult, it may be desirable to post guards at some disposal areas.
- Subsequent use of the disposal area.

MDA and MDNR are prepared to work with local emergency planners to review and recommend potential catastrophic animal mortality disposal methods and locations. County emergency managers are encouraged to work with these agencies to develop their catastrophic animal mortality plans, including pre-approved methods for the disposal of mortalities.



Additional disposal strategies, including off-site disposal and temporary carcass storage, may be necessary under certain circumstances (NAHEMS, 2005). In some cases, for example, a strategy of off-site disposal may be necessitated by climate (e.g., accessibility concerns), high animal population densities, or the presence of wild animals (e.g., coyotes or feral pigs) that can spread disease. In other cases, carcasses or materials may need to be stored temporarily until conditions are more amenable to disposal activities (e.g., until the threat of a disease agent is reduced or until disposal locations are more accessible).

2.3 Mortality Disposal

The following information identifies the personnel, equipment and other supporting services that may be necessary to properly dispose of animal mortalities in an emergency situation.

2.3.1 Personnel

Two types of personnel are needed to implement a mortality disposal action. Specially trained workers will be needed to operate the heavy machinery and general laborers will be needed to support the heavy machinery operators. Some members of a mortality disposal crew will require training in equipment and personal cleaning and disinfection.

Possible organizations that could be used for support include: private contractors (heavy machinery operators), fire department, county roads, public works department, Missouri Department of Transportation (MoDOT), Missouri National Guard, and the Missouri Department of Conservation. Counties also can access citizen corps or other volunteer organizations, as appropriate. If these groups are utilized, the county attorney should evaluate the volunteers' liability relative to assisting the county with the response to a livestock or poultry emergency. Every effort should be made to limit or remove associated liabilities for volunteers.



Personnel will be assigned to mortality disposal sites for shifts with lengths determined by the Planning and Operations Sections. In most cases, these workers will need to be provided food, water and sanitary facilities.

2.3.2 Equipment

The following list of equipment could be used for mortality disposal:

- Heavy machinery:
 - Excavators and backhoes
 - Bulldozers
 - Front-end loaders
 - Forklifts
 - Tractors/trailers
 - Dump trucks
 - Fire truck (incineration)
 - Roll-offs
 - Cranes
 - Chains, hooks, shovels and cargo nets
- Lighting: Lighting should provide general area illumination for personnel. With any lighting system, it will be necessary to provide electricity, either with batteries, generators or drop service from power lines. The use of a drop service will require coordination with the local power company.
- Communications: Each mortality disposal team leader should be provided a means of communication with Incident Command (IC). Generally, this will consist of portable radios tied into the IC's frequency. Selection of radios should include consideration of local topographic and cultural interferences that could negatively impact transmission and reception. If line-of-sight or distance becomes a limiting factor, the use of portable antennas or repeater towers may be necessary. In some cases, pagers, cellular phones, citizen band radios, or other devices will be appropriate. Whichever system is chosen, it must be compatible with other systems used in the Unified Command (UC), and it must have the bandwidth or capacity to function effectively during an emergency.
- Biosecurity: Portable showers, sprayers, boot washes, personnel protective equipment (PPE) such as disposable coveralls and other associated biosecurity aids should be provided to each mortality disposal team. Since team members will be working in the most contaminated environments, they should implement some level of cleaning and disinfection of personnel and equipment even between disposal sites, but especially when leaving one site and exiting the quarantine area. (See MDA SOG No. 004, *Cleaning and Disinfection.*)



- Personnel Protective Equipment (PPE): water, hard hat, safety glasses or face shield, rubber boots, rain suit (jacket and coveralls), cotton overalls or disposable coveralls, disposable synthetic impermeable under gloves (nitrile, latex, etc.), disposable synthetic impermeable over gloves (nitrile, rubber, etc.), heavy-duty over gloves (cotton or leather), boot tray or bucket, one to two gallon hand-operated pressure sprayer, short-handled scrubbing brushes and heavy duty plastic garbage bags.
- Cleaning equipment: vacuum cleaner, water, low-pressure sprayer, power or fuel for sprayer, plastic sheeting (> 2 mil thick), long-handled scrubbing brushes, sponges, buckets (pet wash), towels (disposable or cotton), heavy duty plastic garbage bags, berming material (e.g., 4x4s, sand, sand tubes, sand bags, etc.), framing materials to build containment structures, sump pump and power supply, and drums or plastic totes to contain spent cleaning and disinfection fluids.
- Disinfectants: The choice of disinfectants will depend on the particular disease being addressed. State or federal veterinarians could be consulted during the local response planning process to identify specific disinfectants that could be used. Disinfectants can range from dilute solutions of common household products, such as bleach or vinegar to commercially available disinfectants. Broad-spectrum disinfectants, such as Virkon® may be an alternative to identifying and stockpiling multiple types of disease-specific disinfectants. In the Australian Veterinary Emergency Plan (Agriculture and Resource Management Council of Australia and New Zealand, 2000), many FADs are reviewed and disease-specific disinfectants are presented. The National Biosecurity Center has a disinfectant and animal disease database that can be accessed at <http://www.biosecuritycenter.org/disinfect.php>. This database allows an animal disease to be entered and all appropriate disinfectants are listed for that disease.

2.3.3 Methodology – Carcass Disposal

Specific methodologies for catastrophic mortality disposal by landfilling, burial, incineration, composting and rendering are reviewed in Section 2.1, *Identifying Methods of Mortality Disposal*.

In cases where conventional on-site disposal methods (e.g., burial or incineration) are deemed unfeasible, plans should be made for the safe, efficient transfer of carcasses and material to another site for disposal. Examples of situations in which off-site disposal may be considered include the following (from NAHEMS, 2005):

- Infectious material from laboratories in need of disposal and on-site disposal facilities are limited or unavailable.



- On-site constraints, such as insufficient space, unsuitable soil, a high water table or seasonal conditions, make on-site disposal unfeasible.
- All on-site locations are too close to areas of human habitation.
- Carcasses can be landfilled or rendered off-site more efficiently than they can be disposed of on the premises.

When transporting contaminated material from affected premises to off-site locations, special procedures must be followed to prevent the spread of disease agents. Such procedures include the following (NAHEMS, 2005):

- Prior to loading, carcasses should be sprayed thoroughly with a disinfectant appropriate for the pathogen of concern.
- Infected material should be transported in a large-capacity vehicle (e.g., truck or dumpster) that is leak-proof or that has been made leak-proof by caulking the spaces around the tailgate and any other points of access via the side walls.
- The truck box or dumpster must be lined with a tough (3 mil. or more) disposable polyethylene plastic sheet and sealed at the top. The plastic sheet must be large enough to cover the carcasses and to be secured to the sides and ends of the box or dumpster. A layer of absorbent material (e.g., wood shavings or sawdust) should be placed on top of the plastic liner to prevent punctures.
- The bottom of the container must have a layer of wood shavings, sawdust, hay or straw that is at least 1 foot (~30 cm) thick to absorb fluids.
- The handling of carcasses should be kept to a minimum.
- Carcasses must be loaded into the truck box or dumpster carefully to avoid tearing the plastic lining.
- Every effort should be made to avoid puncturing the body cavity of carcasses as they are handled and loaded into the container. This will minimize the release of body fluids.
- In loading the vehicle, ample space must be left for the expansion of carcasses. At least 2 feet (~61 cm) of space – depending on the air temperature and the distance to be traveled – should be left between the carcasses and the top, sides and ends of the truck box or dumpster. *To minimize leakage, carcasses should not be opened before loading.*
- After the carcasses are loaded, they should be sprayed with an appropriate disinfectant.
- After the carcasses have been sprayed with disinfectant, they should be covered with the plastic sheet, which should be attached to the sides and end of the truck box or dumpster in such a manner as to prevent leakage (double-sided tape may be used).
- The top of the plastic sheet must be sprayed with a disinfectant.



- After the top of the plastic sheet has been sprayed with disinfectant, a heavy tarp must be put over the entire container and secured.
- While the carcasses are being transported, speeds must be kept to a minimum to decrease the risk of spread of the disease agent en route to the disposal site.
- The vehicle operator must observe biosecurity measures upon entering and leaving the premises. Upon leaving the premises, the vehicle must be cleaned and disinfected.
- After the carcasses are unloaded, the vehicles must be cleaned and disinfected before they leave the disposal site.
- Vehicles used for transporting carcasses from an infected premise to an off-site disposal location should not be moved to an unaffected premise during the course of the outbreak.

For biosecurity reasons, carcass transport vehicles must be accompanied by one or more persons trained in biosecurity, as designated by the IC. Personnel transporting the carcasses should have sufficient disinfectant to clean up small spills of contaminated material that may be released during transport. These topics are addressed in detail in MDA SOG No. 004, *Cleaning and Disinfection*.

All vehicles, personnel and equipment must be cleaned and disinfected before they leave an infected premise and again after infected materials have been unloaded at the disposal site. Appropriate cleaning and disinfection (C&D) procedures must be followed for all personnel, vehicles and equipment (See MDA SOG No. 004, *Cleaning and Disinfection*).

If prompt carcass disposal is not possible, carcasses and other items awaiting disposal should be secured to prevent unauthorized access and potential disease spread to susceptible species. Disease transmission can occur via humans, domestic pets, wild animals, birds, fomites (inanimate objects or materials on which disease-producing agents may be conveyed), and other disease vectors, such as insects and rodents. Possible options for temporary storage include (NAHEMS, 2005) piling carcasses in a closed building; piling the carcasses outdoors, spraying them thoroughly with an appropriate disinfectant for the pathogen, and covering them securely with a tarpaulin; and using earth-moving equipment to arrange the carcasses in one or more piles and then cover them with at least three feet (~1 m) of soil. Control measures for insects and other fomites and vectors also should be considered for all of these options. A security guard on



duty might prevent unwanted dissemination of carcasses and parts. Methods should be put in place to discourage scavengers from entering the temporary storage areas.

Disposal sites should be inspected regularly after closure to detect seepage, disturbance or other problems. MDA and MDNR will determine disposal area closure requirements. If problems are noted, appropriate action should be taken (e.g., the building of storm water diversions, ditches or covering exposed materials). The overall objective is to allow the site to return as much as possible to its original contour and condition.

Where burial is used, the soil covering will probably need to be replenished periodically during the first year as the carcasses decompose and the soil settles. Settlement depressions should be avoided because they can collect surface water and increase percolation through the burial site and into groundwater.

Before permitting the restocking of the premises, the disposal site should be re-inspected to detect any possible biological or physical risk to people or animals. Additional inspections should occur as necessary for several months following site closure. Inspection criteria will be determined by MDA and will depend on the specific disease involved. Because the burial site is a potentially contaminated area, a security fence that excludes people and animals should be maintained for at least a year.

2.4 Associated Material Disposal

The following information identifies the personnel, equipment and other supporting services that may be necessary to properly dispose of materials associated with a FAD response and containment activity, other than the mortalities themselves.



2.4.1 Personnel

Two types of personnel are needed to implement disposal of associated materials. Specially trained workers will be needed to deal with on-farm materials, such as manure, dairy wastes and other associated materials addressed in Section 2.4.3. In most cases, producers or farm operators will provide this expertise. General laborers will be needed to support the producers, farm operators or other trained responders. Some members of an associated material disposal crew will require training in equipment and personal cleaning and disinfection.

Possible organizations that could be used for support include: producers, private contractors (heavy machinery operators), fire department, county roads, public works department, MoDOT, Missouri National Guard, and the Missouri Department of Conservation. Counties also can access citizen corps or other volunteer organizations, as appropriate. If these groups are utilized, the county attorney should evaluate the volunteers' liability relative to assisting the county with the response to a livestock or poultry emergency. Every effort should be made to limit or remove associated liabilities for volunteers.

Personnel will be assigned to associated material disposal sites on an as-needed basis and generally a single assignment will not span an entire day. Actual task-times will be determined by the Planning and Operations Sections.

2.4.2 Equipment

The following list of equipment could be used for associated material disposal:

- Containers: Large volume polyethylene tote, metal or plastic 55-gallon drums, cardboard or plastic 30-gallon drums for PPE disposal, 30- to 85-gallon trash bags (≥ 5 mil. thick).
- Lighting: Lighting should provide general area illumination for personnel. With any lighting system, it will be necessary to provide electricity, either with batteries, generators or drop service from power lines. The use of a drop service will require coordination with the local power company.



- **Communications:** Each disposal team leader should be provided a means of communication with IC. Generally, this will consist of portable radios tied into the IC's frequency. Selection of radios should include consideration of local topographic and cultural interferences that could negatively impact transmission and reception. If line-of-sight or distance becomes a limiting factor, the use of portable antennas or repeater towers may be necessary. In some cases, pagers, cellular phones, citizen band radios or other devices will be appropriate. Whichever system is chosen, it must be compatible with other systems used in the UC, and it must have the bandwidth or capacity to function effectively during an emergency.
- Biosecurity:** Portable showers, sprayers, boot washes, personnel protective equipment, and other associated biosecurity aids should be provided to each disposal team. Since they will be working in potentially contaminated environments, they should implement some level of cleaning and disinfection of personnel and equipment even between disposal sites, but especially when leaving one site and exiting the quarantine area. (See MDA SOG No. 004, *Cleaning and Disinfection*.)
- Personnel Protective Equipment (PPE):** water, hard hat, safety glasses or face shield, rubber boots, rain suit (jacket and coveralls), cotton overalls or disposable coveralls, disposable synthetic impermeable under gloves (nitrile, latex, etc.), disposable synthetic impermeable over gloves (nitrile, rubber, etc.), heavy-duty over gloves (cotton or leather), boot tray or bucket, one to two gallon hand-operated pressure sprayer, short-handled scrubbing brushes and heavy duty plastic garbage bags.
- Cleaning equipment:** vacuum cleaner, water, low-pressure sprayer, power or fuel for sprayer, plastic sheeting (> 2 mil thick), long-handled scrubbing brushes, sponges, buckets (pet wash), towels (disposable or cotton), heavy duty plastic garbage bags, berming material (e.g., 4x4s, sand, sand tubes, sand bags, etc.), framing materials to build containment structures, sump pump and power supply, and drums or plastic totes to contain spent cleaning and disinfection fluids.
- **Disinfectants:** The choice of disinfectants will depend on the particular disease being addressed. State or federal veterinarians could be consulted during the local response planning process to identify specific disinfectants that could be used. Disinfectants can range from dilute solutions of common household products, such as bleach or vinegar, to commercially available disinfectants. Broad-spectrum disinfectants such as Virkon® may be an alternative to identifying and stockpiling multiple types of disease-specific disinfectants. In the Australian Veterinary Emergency Plan (Agriculture and Resource Management Council of Australia and New Zealand, 2000), many FADs are reviewed and disease-specific disinfectants are presented. The National Biosecurity Center has a disinfectant and animal disease database that can be accessed at <http://www.biosecuritycenter.org/disinfect.php>. This database allows an animal disease to be entered and all appropriate disinfectants are listed for that disease.



2.4.3 Methodology – Associated Material Disposal

Special disposal requirements may be established by the IC for materials associated with the response and mitigation of a FAD. Such materials may include C&D waste water; disposable PPE; milk; parlor wash water; liquid or slurry manure; eggs and hatchery waste; feed, grain and straw; silage; dry manure; wool and mohair; and artificial insemination materials (semen and ova). Generally, these materials will be handled differently than carcasses. Much of the following formation is adapted from NAHEMS, 2005. In all cases, the IC may implement different or modified versions of the methodologies described below.

C&D Waste Water

Spent fluids from C&D should be containerized. These fluids should be considered contaminated and must be treated to inactivate disease agents in such a way as to render the wastewater acceptable for disposal in the nearby sanitary sewage system or for discharge onto and infiltration into the soil, if there are no regulations against that and it is publicly acceptable. Treatment methods will be dictated by the FAD pathogen being addressed. Specific guidance will come from the IC. In most cases, treatment for many of the FAD agents can be accomplished by lowering the fluids pH below 3.0 or raising it above 11.0. To be considered a hazardous waste by the Environmental Protection Agency, a liquid must have a pH of ≤ 2.0 or ≥ 12.5 . pH adjustments can be made by adding sufficient citric acid to the wastewater to reduce its pH level to less than 3.0. If necessary, acidified wastewater can be neutralized (to a pH of ~ 7.0) through the addition of sodium hydroxide or sodium bicarbonate. The use of sodium hydroxide could present additional health and safety issues and should be coordinated with the incident's Safety Officer. If the IC dictates that treatment requires elevation of the wastewater's pH to ≥ 10.0 , sodium bicarbonate or sodium hydroxide can be used. In all cases where pH adjustments are used for treatment, the presence of soil and organic matter in the wastewater will increase its buffering capacity and require considerably greater amounts of pH adjuster. Treated wastewater may be able to be discharged into a sanitary sewer system or onto the soil and



allowed to infiltrate. Risk from the wastewater can be further reduced by diluting it and by using larger than normal quantities of water in C&D operations.

Disposable Personal Protective Equipment

Disposable PPE will either be incinerated or sent to a municipal landfill. This material should be placed in an appropriate container and labeled. The container could be plastic trash bags (double bagged), or steel, fiber or plastic drums. The label should describe the material contained and the accumulation date. The IC will provide specific container and labeling requirements. These containers may require external C&D prior to their disposal, if the incinerator or landfill is outside the infected zone.

Milk

Milk from the Control Area should be treated to inactivate any disease agents before disposal measures are implemented. Generally, treatment is accomplished by reducing the pH of the milk to less than 3.0 or increasing it to more than 11.0, and holding the milk at this level for an hour. Small quantities of milk held on premises can be disposed of, after disease agent deactivation, in a burial pit along with carcasses, if necessary. On premises where other disposal methods (e.g., incineration) are used, milk can undergo agent deactivation and subsequently be disposed of in a shallow burial pit, through the sanitary sewage system or in a sewage lagoon. If disposal in a sanitary sewer system is considered, permission must be obtained from the sanitary sewer system operator prior to disposal.

Treatment of large volumes of contaminated milk (e.g., at dairy plants or transfer facilities) generally involves disease agent inactivation by heating or pH adjustment. Treated milk can then be pumped into a shallow, fenced-off pit. After the milk has evaporated or seeped into the surrounding soil, the pit can be covered. If this option is considered, the pit must have appropriate run-on and run-off controls to prevent uncontrolled discharges.



Parlor Wash Water and Process Wastewater

Wastewater from dairies and dairy plants contaminated with infected milk must be treated to inactivate disease agents. Treatment should be sufficient to allow the wastewater to be disposed of in a municipal or industrial sewage system. Treatment can be accomplished by adding sufficient citric acid to the wastewater to reduce its pH level to less than 3.0. Risk from the wastewater can be further reduced by diluting it and by using larger than normal quantities of water in plant operations. If necessary, acidified wastewater can be neutralized (to a pH of ~7.0) through the addition of sodium hydroxide or sodium bicarbonate. The wastewater may then be discharged into the sewer system. If disposal in a sanitary sewer system is considered, permission must be obtained from the sanitary sewer system operator prior to disposal.

Liquid and Slurry Manure Storages

Manure in liquid or slurry form and wastewater from concentrated animal production operations are often stored in lagoons, earthen or concrete in-ground storages, and above-ground tanks before being land applied or brokered. When this material becomes contaminated with a disease pathogen, it will be necessary to isolate or quarantine the storage to prevent the spread of the pathogen to other animals. Due to technical difficulties of completely homogenizing the material in a containment and because of the material's high buffer capacity, treatment is generally not an option. The passage of time will eventually result in the destruction of the pathogen.

Adequate fencing is necessary as a part of this isolation or quarantine. Samples from the lagoon should be tested and found free of viable disease agents before the material is handled. If there is insufficient storage to contain normal precipitation without causing a release from the storage, liquid or slurry must be pumped into an alternative storage to provide adequate storage for natural precipitation events. Any additional containers also must be isolated or quarantined to prevent the exposure of susceptible animals to the pathogen.



When adequate space exists in the storage to accommodate natural precipitation and any wastewater resulting from C&D, the C&D water can be placed in the storage. If this method of C&D wastewater storage is used, all C&D should be completed before sampling the containment since the wastewater from C&D could contain appreciable amounts of detergent and disinfectant. Any routine operations of stirring or oxygenating the containment should continue during the C&D and storage operations.

If relatively small volumes of manure are removed from a containment to generate additional storage capacity, the removed material can be handled in a variety of ways. The pH can be adjusted to < 3.0 or > 11.0 by the addition of organic acid or alkaline reagents. If this method of handling is chosen, ensure that the material is mixed very thoroughly before taking the sample to test for pH. It is unlikely that a suitable site, free of susceptible livestock or wild species, could be found to spread untreated material from containment.

When composting is being used to dispose of animal carcasses, small quantities of a manure containment's contents can be added to the compost piles as an additional nitrogen and moisture source. The balance of carbon, nitrogen and moisture content is critical to effective composting and, thus, manure additions should only be conducted by personnel with composting expertise. The containment contents to be added to a compost windrow should be agitated thoroughly to add as much oxygen as possible to the material. Any containment contents added to compost should not be contaminated with wastewater from C&D.

Eggs and Hatchery Waste

Contaminated hatching eggs and hatchery waste should be buried after verifying that the eggs are no longer viable. Viable eggs and pips must be destroyed through maceration and then disposed of with other hatchery waste. Any live chicks would need to be first euthanized and then disposed of with the other hatchery waste. Landfilling also may be an acceptable option for disposal if transporting the material does not present an unacceptable biosecurity risk.



Feed, Grain, Hay and Straw

Feed, grain, hay and straw that may have been contaminated should be burned or buried. This includes spilled material or storage piles/stacks over which the owner has been walking while removing hay or grain and any materials that could have been in direct contact with infected animals. For mass storages of these types of materials, an entire pile may not need to be disposed of. Where approved by the IC, only outer layers of a mass storage may need to be disposed of. General guidance for dealing with these materials is as follows: for loose piles, at least three feet of loose material; for hay or feed sack stacks, at least two layers of bales or one layer of sacks should be removed from these contact areas and burned, buried or landfilled. If composting is being used as a disposal method for animal carcasses, any of these materials could be carefully included in the compost as an additional carbon source or bulking agent.

If it is necessary to salvage feed, grain, hay or straw on a premise where large quantities are stored, the possibility and extent of contamination should be determined through careful study. Contaminated material should be burned, buried, composted or landfilled. The surfaces of remaining stacks of grain, hay, straw or sacked feed should be fumigated or sprayed thoroughly with an appropriate disinfectant. The disinfection or fumigation of feed and feed ingredients must be conducted with non-toxic (animal or human) or non-residue materials. Generally, the disinfection of feed and feed ingredients will not be cost effective.

Silage

Contaminated silage and contaminated portions of silage storages must be removed and destroyed or disinfected. The disinfection or fumigation of feed and feed ingredients must be conducted with non-toxic (animal or human) or non-residue materials. Generally, the disinfection of feed and feed ingredients will not be cost effective.



Contaminated silage can be buried. Depending on the nature of the disease agent, any remaining silage may need to be sealed off for a period of time before being used as animal feed. In some cases, it may be necessary to plow under field crops that may be contaminated.

Manure

Contaminated dry manure may be burned, buried, composted or landfilled. Manure that cannot be burned or buried should be isolated or quarantined to prevent exposure to animals.

Depending on the nature of the disease agent and on environmental conditions, manure must remain composted for a period of time and reach specific temperatures in order to inactivate the disease agent.

Wool and Mohair

Wool and mohair are difficult to incinerate. Burial is the preferred method of disposal for these substances; however, they also can be landfilled.

Germplasm

If germplasm (e.g., semen or ova) is determined to pose a risk of agent spread, it should be disposed of safely. Incineration or burial is likely the best option. Any potentially contaminated germplasm that is not disposed of can be moved only under state or USDA permits.

2.5 Health and Safety

General first aid and access to emergency medical services must be provided during all activities associated with any disposal activities. This portion of a response would be coordinated by the Safety Officer, a member of the Command Staff.



Personnel working with contaminated material of carcass disposal should be provided PPE to minimize their exposure to contaminated materials and prevent the spread of the infectious agent. All workers at a disposal site should wear disposable PPE. Unless the infectious agent poses a public health hazard, or is stipulated by the IC, respiratory protection may not be necessary. Disposal workers who could come in contact with potentially contaminated liquids should wear waterproof clothing (disposable is preferred; i.e., Tyvek® or Saranex®) or rain suits, with hoods, that can be disinfected and reused. Rubber gloves and rubber boots also will be needed. These items can be disinfected and reused. Under gloves, cotton or nitrile, should be worn under the outer rubber glove. Personnel also should wear hardhats fitted with face shields to protect their faces. In addition, dust masks can be worn to protect the workers' mouths and to prevent ingesting splashed materials.

2.6 Communication

Because of the dynamic nature of an emergency response to a FAD event, the catastrophic mortality disposal plan must be implemented in an effective manner relative to the ever-changing understanding of the nature and extent of the disease in question. In order to allow the mortality disposal teams to quickly respond to changing field conditions, communication between the teams and IC must be maintained through the chain of command. Real-time communication and pre-shift meetings constitute the required communication needed to support catastrophic mortality disposal associated with a FAD outbreak or other natural disaster resulting in large-scale livestock or poultry loss. The disposal of other associated material is generally less time critical and will be handled in a similar fashion.

2.7 Documentation

Throughout the process of catastrophic mortality disposal, it will be necessary for the county to maintain various types of documentation. For indemnity payments or other forms of state or federal reimbursement or cost sharing, it will be necessary to document the resources applied and expended by the county in providing catastrophic mortality disposal. These costs can include the



number of animals and pounds of livestock disposed of, labor charges, equipment rentals or purchase costs of expendable equipment or supplies, subcontractor costs, or any other costs associated with providing the mortality disposal services. The collection and evaluation of this information will be the responsibility of the Finance and Administration Section.

Information on the types of materials, disposal methods and locations of other associated materials also need to be documented. This documentation provides a complete record of the FAD mitigation and will be important in post-event monitoring.

Due to the nature of an emergency response, it is critical to identify personnel who will be responsible for documenting these issues or monitoring and verifying that the needed documentation is being collected by other parties. In some cases, identifying a specific response job that includes documentation will be preferable, especially if personnel will be rotated through shifts and response jobs. This role and responsibility should be identified and described in a county's LEOP.

Possible actions or items that should be included in a documentation checklist include:

Responder time (hours)	Pounds of livestock or poultry disposed of at a location
Number of responders	Meals provided
Identity of responders	Location of each responder
Mileage to the disposal area	Equipment at each point
Sanitation services provided	Usage time for equipment
Coordinates of disposal areas	Specific quantities of expendables used
Method of disposal	Animal ownership identity
Animal identity	

Documentation also will be essential in order to track vehicles, heavy equipment, and people who exit and enter the disposal area.

Documentation should be maintained in written form. Video, photographs and tape-recorded messages can be used to supplement the written documentation. Written documentation can be maintained in a logbook format, or by using documentation worksheets, or a combination of



both. Documentation should be recorded with an ink pen, and any entry errors should have a single line drawn through them with the author's initials and date recorded at one end of the line. If a logbook is used, it should have numbered pages, and the spine should be sewn, making the removal of pages both difficult and obvious. Pages should never be removed from a logbook. Anyone making entries in the logbook should sign and date the bottom of each page. If documentation worksheets are used, the author should sign and date the bottom of each worksheet. Sets of logbooks and worksheets should be assigned to each response task (e.g., traffic control, decontamination/disinfection, mortality disposal, etc.) or a master set of logbooks and sheets can be maintained. Logbooks and worksheets should be assigned unique identification numbers. When the logbooks or a group of worksheets is issued from Planning (response related) or Finance and Administration (cost and time reporting related) to a responder, the identification numbers of the logbooks and worksheets should be recorded, and the recipient should sign them out in a document tracking log maintained by the issuing Section. This establishes a chain-of-custody for the documentation.

If pictures, video or taped messages or interviews are used to supplement the documentation record, the following information should be documented for each picture, video segment or audiotaped message or interview:

- Photographer or interviewer
- Subject
- Time and date
- Person interviewed (video or audio taped)
- Photo and film roll number
- Direction (pictures and video)
- General weather conditions (e.g., temperature, wind direction, humidity, sky condition, etc.)

2.8 Training

Personnel training will be a critical component of planning to initiate a catastrophic mortality disposal plan associated with a FAD outbreak or other natural livestock or poultry disaster. Training also will be necessary to deal with the other associated materials that require disposal. Besides the equipment-specific training required for the heavy equipment operators, all



personnel associated with disposal will require training in: FAD, biosecurity, the operation and maintenance of cleaning and disinfection equipment, cleaning and disinfection procedures, associated environmental protection issues, and documentation requirements. Training in FAD and biosecurity can be provided at a local level by private, state or federal veterinarians. Local fire or emergency medical services personnel can provide training relative to cleaning and disinfection. In some counties, Military Reserve or National Guard units and also local health departments can assist with providing cleaning and disinfection training.

2.9 Public Information

Once the FAD response is initiated and quarantines are established, the Public Information Officer (PIO) attached to the Command Staff and MDA's PIO will initiate the county's public information and media plan to inform the local community of the mortality disposal associated with the livestock or poultry emergency response. It is unlikely that disposal of other associated materials will require public information dissemination. This notification may involve public announcements via radio, television, web site, newspaper and signage announcing that catastrophic animal mortality is occurring, where it is occurring, and why it is necessary. Any information release should be coordinated with state or federal PIOs attached to Area Commands. Local responders should identify and make use of any state or federal pre-prepared information or press releases that could be used in responding to a catastrophic livestock or poultry event.

In general, response workers should be trained to refer any press or other project-specific inquiries to the public relations officers designated for the response.

2.10 Mental Health Services

A response dealing with an outbreak of a FAD can result in the widespread euthanasia of livestock and poultry over a large area. Natural disasters, such as floods or tornadoes, also can result in large-scale poultry or livestock losses. The major differences between the local impacts



of a FAD versus a natural disaster are: (1) recovery from a FAD will be protracted, possibly over months; (2) a FAD will generally impact a much greater area; and (3) a FAD is likely to require the widespread euthanasia of entire herds or flocks.

The outbreak of a FAD or other livestock- or poultry-related disaster will generally disrupt family and community routines. In many cases, this will result in a subsequent disruption of family and community dynamics. For example, the mass mortality of herds or flocks could deprive producers of a means to generate income, and it may be perceived as a total loss of their livelihood. The response to a FAD can also have a negative impact on the community infrastructure (e.g., quarantines). In addition, the local community will be interacting with an influx of strangers and the associated bureaucracies of any state or federal programs or agencies responding to the disaster. These factors can combine to create stressors for responders and the impacted community.

The stress associated with a FAD outbreak, or livestock or poultry natural disaster, can result in physical, mental and behavioral reactions of the responders and the community members. In the United Kingdom, during the 2001 Foot-and-Mouth Disease (FMD) outbreak, situations where producers considered and, in some cases, committed suicide, were unanticipated results of the stress. Similarly, personnel involved in mass euthanasia of infected animals can often become depressed.

Generally, anyone associated with a FAD outbreak or livestock or poultry natural disaster will be affected by it. The degree of impact will vary greatly. While, in many cases, the stress will decrease over time, counties should be prepared to offer crisis intervention and counseling, and other forms of support to the community and responders throughout the entire response. In some cases, longer-term assistance will be required.

Providing this type of community and individual response will require specially trained personnel. Local mental health professionals (public and private), hospitals, and state and federal mental health agencies can all provide these personnel. In addition, law enforcement



agencies and some volunteer organizations have personnel trained to provide this support. Examples of volunteer organizations that could assist with providing the mental health component of a FAD or natural livestock or poultry response could include local religious leaders and crisis counselors from volunteer organizations, such as the American Red Cross.

The scope and duration of these services will be tailored to each event. However, it will be critical to incorporate the announcement of these services with the public relations plan and information disseminated to the community. Letting the impacted citizens know what services are available and how to access them will be imperative for any mental health assistance program to succeed.

It is likely that most counties have a mental health response plan already developed and attached to their LEOP. For these counties, it will not be necessary to go through the planning process again; rather, the existing plan needs to be incorporated into any agricultural appendix to their LEOP.



REFERENCES

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AUSVETPLAN 2000 Operational Procedures Manual Cleaning.

NAHEMS. (2005). *Disposal*. United States Department of Agriculture. April, 2005.

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APPENDIX A

DISPOSAL METHODS CHECKLISTS

(**Adapted from** Nebraska Department of Environmental Quality Integrated Waste Management Program and Nebraska Department of Agriculture. 2004. “*Catastrophic Animal Mortality Management Plan – Emergency Disposal of Animal Carcasses.*”)

Disposal Option Consideration Checklist		
Disposal Option: On-Site Burial		
Site Selection of the Burial Area		
Is the burial area close to the mortality site?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the burial area at a location accessible by large trucks and earth moving equipment?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the area large enough to accommodate the material being disposed of??	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the disposal site located on a relatively flat area (less than a 2% slope) with low permeability soils?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are there buried or overhead utility lines in or around the burial area?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the area outside of sensitive areas (i.e., floodplains, wetlands, etc.)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the area at least 500 feet from homes, 1,000 feet from primary highways, 500 feet from a secondary highway, and 300 feet from any other road?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the area within a designated wellhead protection area for a public water supply well, within 1,000 feet of a public water supply well or within 500 feet of a private drinking well water?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the seasonal high groundwater static water table at least 15 feet below ground surface?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is bedrock at least 15 feet below ground surface?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Logistics and Operational Issues		
Do mortalities need to be transported to the location?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Can adequate cleaning and disinfection be established and maintained at the burial site during the disposal activities.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Has a borrow source for low permeability cover material been identified?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Should cover material be needed, has transportation requirements been considered?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
In areas with sandy soils, has the need for a synthetic liner been considered?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Has fencing for the completed burial area been considered?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Disposal Option Consideration Checklist Disposal Option: Off-Site Landfill Disposal		
What is the distance to the nearest landfill?	Describe: _____ miles	
Is the landfill permitted and willing to accept dead and potentially diseased animals?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
What is the maximum number of carcasses that the landfill is capable of accepting on a daily basis or within 36 hours?	Describe:	
Does the landfill have the capacity to accept the entire herd if required?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
What are the hours of operation for the landfill?	Describe:	
What are the disposal fees?	Describe:	
Transportation Issues		
Has immediate access to lined, leak-proof, and covered vehicles to transport animals to the landfill been prearranged?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is there an acceptable source of absorbent materials such as sawdust or straw to place in bottom on liner vehicle?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
How many transport vehicles are available?	Describe:	
How many animals can be transported per day?	Describe:	
Does the route to the landfill pass by other livestock facilities?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Disposal Option Consideration Checklist Disposal Option: Air-Curtain Incineration		
Has an air-curtain incineration vendor been identified? <i>(If interested in this option, please MDNR at (800) 361-4827)</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Will air permit be required by MDNR or county?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If an earthen trench is being considered for incineration:		
1. Has the incineration site been identified?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. Is the depth to groundwater at least 15 feet below ground surface?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3. Are soil types/subsurface material suitable for excavation of 10 feet deep vertical wall trenches?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4. Have all subsurface utilities been identified in incineration area?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the incineration area close to the mortality site to avoid unnecessary transport of carcasses that may spread disease?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is there adequate room around the incineration site to allow for the movement of heavy equipment and the storage of the required fuel source?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Logistics and Operational Issues		
Has access to digging equipment (i.e. front end loader or backhoe) been prearranged?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is an adequate fuel source readily available? <i>(Note: As a rule of thumb, a ration of 1:1 or 1:2 of mortality weight to wood weight required.)</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Disposal Option Consideration Checklist Disposal Option: On-Site Composting		
Site Selection of the Composting Area		
Is the composting area close to the mortality site to avoid unnecessary transport of carcasses that may spread disease?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the area at a location accessible by large trucks if cover materials will be transported to the site from off-farm sources?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the area on well drained locations that are not subject to runoff or ponded water, and are outside of floodplains or wetlands?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the area at least 500 feet from homes, public roads, or other areas frequented by the public?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the area within a designated wellhead protection area for a public water supply well or within 500 feet of a private drinking water well?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Has an adequately sized area(s) been identified? <i>(Note: Approximately 0.5 to 0.6 acres are required for each 100 head of cattle to be composted.)</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the site in an open field location well away from timbered areas or buildings that provide cover for rodents and other scavengers?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Logistics and Operational Issues		
Is an adequate carbon source readily available? <i>(Note: As a rule of thumb, approximately 12 cubic yards of cover/base material is needed for each 1,000 pound animal composted. This is equivalent to 1 ton of ground hay or straw, 1.4 tons of ground cornstalks, or 3.2 tons of corn silage.)</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is there access to the following recommended equipment: skid steer loader, tractor, manure spreader, backhoe or other earth moving equipment, and mixer grinder?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is there an accessible source of water so that pile moisture content can be managed?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Disposal Option Consideration Checklist Disposal Option: Off-Site Disposal to Rendering Facility		
What is the distance to the nearest rendering operation?	Describe: _____ miles	
Is the rendering facility located in state or out of state?	<input type="checkbox"/> In State	<input type="checkbox"/> Out of State
Are there issues associated with transporting the dead animals out of state?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Does the rendering company provide pick-up services?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Does the rendering company place any restrictions on accepting animals whose cause of death are a disease agent?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
What is the maximum number of carcasses that the rendering company is capable of accepting and transporting on a daily basis or within 36 hours?	Describe:	
What are the hours of operation for the rendering company?	Describe:	
What are the disposal fees?	Describe:	
Transportation Issues		
If pick up service is not provided by the rendering company, does the producer have immediate access to lined, leak-proof vehicles to transport animals?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Does the producer have immediate access to absorbent materials such as sawdust or straw to place in bottom on liner vehicle?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
How many vehicles are available?	Describe:	
How many animals can be transported per day?	Describe:	
Does the route to the landfill pass by other livestock facilities?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

APPENDIX B

EXAMPLE MORTALTIY DISPOSAL AGREEMENT

MORTALITY DISPOSAL AGREEMENT

THIS AGREEMENT is made effective as of this _____ day of _____, 20____,
by and between _____ County (“COUNTY”) and _____
 (“Landowner”). This agreement will be in effect until the _____ day of _____,
2____.

WHEREAS, the COUNTY, in response to a foreign animal disease (FAD), is required by
the State of Missouri to dispose of livestock or poultry to prevent the spread of a FAD
will utilize the land of the Landowner, to permanently dispose of livestock or poultry
carcasses in _____ County, Missouri, hereafter referred to as the “Disposal
Area.”

WHEREAS, Landowner owns the Disposal Area and more particularly described as
follows:

Street: _____

City: _____ State: _____

Zip Code: _____

Township _____ Range _____, Section _____, in _____ County, Missouri.

NOW THEREFORE, the parties hereto agree as follows:

1. Right to dispose of _____ pounds of livestock or poultry mortalities, hereafter
known as “carcasses.” These carcasses will be _____ (composted,
incinerated or intact) prior to disposal. These carcasses will originate from _____
_____ county. Landowner agrees to cooperate with COUNTY in all
reasonable respects to facilitate the disposal of carcasses. COUNTY shall have
the right to enter the Disposal Area to construct a burial pit for carcass disposal.
Right-of-entry and the right to construct a disposal pit is only provided by the
Landowner upon the issuance of a depopulation order or the requirement to

- dispose of carcasses in response to a FAD, issued by the State of Missouri and including the county in which the Disposal Area is located.
2. Right to Dispose of Carcasses. COUNTY agrees to cooperate with Landowner in taking all reasonable and necessary actions to ensure that the disposal of carcasses on Landowner's Property shall not unreasonably interfere with customary agricultural land management practices. In return, COUNTY agrees to maintain the Disposal Area in an environmentally protective manner for one year after the closure of the disposal pit.
 3. Animal-Specific Information. Upon Landowner's request, COUNTY shall provide to Landowner information concerning the number, volume, weight, species and disease of the carcasses disposed of in the Disposal Area. This request can be made up to one year after the FAD incident has been mitigated in the County housing the Storage Area.
 4. Compliance with Environmental Laws. COUNTY agrees to take all action necessary to comply with federal and state environmental laws and regulations. COUNTY warrants that the permanent disposal in the Disposal Area will not violate existing Missouri regulations governing the FAD response.
 5. Successors. The rights and obligations of COUNTY in and to this Agreement shall inure to the benefit of, and bind, its successors and assigns. The rights and obligations of Landowner in and to this Agreement shall run with the title to the Landowner's Property and shall accrue to the benefit of, and bind, all persons holding, or claiming to hold, a property interest therein.
 6. Term. This Agreement shall continue for a term of five (5) years from the date of this Agreement. This Agreement shall automatically renew for another five-year period unless written notice is given by either party at least ninety (90) days prior to the expiration of the Agreement. Notwithstanding the foregoing, COUNTY

may terminate this Agreement prior to its stated term if (a) it is so directed by the State of Missouri, or (b) COUNTY delivers notice to Landowner that compliance with applicable laws or regulations would be unduly burdensome as described in Section 8 hereof.

7. **Governing Law.** This Agreement shall be governed by and construed in accordance with the laws of the State of Missouri.
8. **Right to Deny Use of the Disposal Area.** During the term of this Agreement, Landowner may deny COUNTY the right to dispose of carcasses, provided Landowner gives COUNTY written notice of such decision at least one year prior to the date use is denied. During a response to a FAD during the term of this agreement, COUNTY may in its sole discretion decide not to dispose of carcasses in Landowner's Disposal Area. COUNTY may exercise its sole discretion not to dispose of carcasses at the Disposal Area should COUNTY believe that compliance with any applicable laws, regulations, or any other circumstances would make it unduly burdensome to dispose of carcasses in Landowner's Disposal Area.
9. **Indemnification of Landowner.** COUNTY shall indemnify and hold Landowner harmless from and against all claims, losses, demands and causes of action, including attorneys' fees, court costs/or judgments arising in favor of any person or other legal entity (including COUNTY's employees, agent invitees, contractors, tenants or licensees), provided such claim, loss, demand or cause of action is the result of the negligence or misconduct of COUNTY, its employees, agents, tenants or invitees.
10. **Indemnification of COUNTY.** Landowner shall indemnify and hold COUNTY harmless from and against all claims, losses, demands and causes of action, including attorneys' fees, court costs/or judgments arising in favor of any person or other legal entity (including COUNTY's employees, agent invitees,

contractors, tenants or licensees), provided such claim, loss, demand or cause of action is the result of the negligence or misconduct of Landowner, or Landowner's employees, agents, tenants or invitees.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first above written.

COUNTY

By: _____

Title: _____

LANDOWNER

By: _____

Print Name: _____

By: _____

Co-owner (if applicable)

Print Name: _____

APPENDIX C
CATASTOPHIC MORTALITY DISPOSAL PLAN TEMPLATE

DISPOSAL PLAN TEMPLATE INSTRUCTIONS

- Line 1: List the date this plan was written or revised.
- Line 2: List the name or other identifier associated with the operation. In some instances this may be a unit or building number.
- Line 3: List the person who can answer questions regarding the development or implementation of this plan.
- Line 4: List the street address for the operation that will be served by this plan.
- Line 5: List the telephone number for the person or persons identified in Line 3. Please provide land-line and mobile telephone numbers if possible.
- Lines 6a-6d: Identify each species (type) of livestock or poultry to be disposed of under the guidance of this plan. Provide an estimate of the number of animals, of each type, that will be disposed of according to this plan. Estimate the number of pounds of carcasses to be disposed of, by animal type, according to this plan.
- Lines 7a-7b: Identify the method of disposal selected for the animals listed on lines 6a-6d. In Missouri, burial is the preferred method; however, incineration, composting, rendering or disposal at a licensed landfill may be acceptable. If you have questions about appropriate disposal methods, contact your local extension agent, local emergency manager or the Missouri Department of Natural Resources. Once you have decided on a disposal method, use line 7b to present a brief description of what you plan to do and what resources you will need to implement this plan.
- Line 8: Identify the name and telephone numbers of any equipment or supply contractors you plan on using to implement this disposal plan.
- Line 9a-9b: Describe where you plan to locate the disposal area. On line 9b please list the coordinates (UTM or longitude and latitude) of the four corners of the disposal area. If the area represents an excavation, be sure to clear any utilities prior to selecting the location.
- Line 10: Describe any sensitive environments that are near the disposal area. Consider such things as depth to groundwater, drinking water wells, irrigation wells, proximity of surface water (creeks, ponds, etc.) and drainages that lead into surface water or away from the burial area.
- Line 11: Draw a general map showing major site landmarks such as tree lines, property lines, buildings, pens, manure storages and the disposal area.

CATASTROPHIC MORTALITY DISPOSAL PLAN

1. Date Prepared: _____
2. Operation Name: _____
3. Operation Contact: _____
4. Operation Address: _____

-
5. Contact Telephone: _____
 - 6a. Animal Type: _____ Number: _____ Pounds: _____
 - 6b. Animal Type: _____ Number: _____ Pounds: _____
 - 6c. Animal Type: _____ Number: _____ Pounds: _____
 - 6d. Animal Type: _____ Number: _____ Pounds: _____
 - 7a. Disposal Method: _____
 - 7b. Description of Method: _____

-
8. Contractor Contact: _____
 - 9a. Disposal Location: _____
 - 9b. Location Coordinates: _____

-
10. Sensitive Environments: _____
-

11. Location Map:

North ↑

