

Carcass Management Course Mobile Treatment Technologies Module



United States
Department of
Agriculture



CUBIC
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Overview

Welcome to the Mobile Treatment Technologies (MTT) Module of the online Carcass Management Course. While completing this module, you may encounter references to the Emergency Management Tools; Health, Safety, and Personal Protection Equipment; Secure Transport; and to Biosecurity, which are broadly covered in their own separate training modules. These modules are found in the Introduction Modules, beginning with the Orientation Module.

This training module is presented from the perspective that you have already used the MLCh Tool (Matrix, Decision Loop, and Checklist) explained in the Emergency Management Tools Module and selected mobile treatment technology as the preferred carcass management option.

Effective management of animal carcasses and associated materials is a critical component of a successful response during an animal health emergency. Carcass management measures contain, treat, or destroy contaminated or potentially contaminated materials in order to:

- Prevent spread of a disease outbreak to protect the nation's agricultural industry
- Protect the environment by preventing carcass waste products from contaminating soil, water, and air
- Protect decaying carcasses from insects and scavengers which can transport pathogens to other locations
- Safeguard public health by removing potentially contaminated food products from the human food supply
- Safeguard animal health by removing potentially contaminated feed from the animal feed supply

Objectives

This module presents the material in four different lessons:

- Introduction
- Planning
- Evaluation
- Operations

Upon completing this course, you should be able to:

- Describe MTT as a method for carcass management
- Understand the advantages and disadvantages of MTT
- Identify personnel health risks associated with MTT
- Consider environmental risks associated with MTT
- Obtain regulations governing MTT by consulting with state officials
- Identify factors used to evaluate MTT as a carcass management option
- List critical elements when planning MTT
- Recognize key components of MTT operations

Introduction Lesson Overview

Mobile treatment technologies can offer alternative approaches to disposing of animal carcasses on-site, particularly in response to emergency situations. There are numerous types of mobile technologies currently available and more in development, but only a few will be presented in this lesson. These are:

- Mobile Incineration
- Mobile autoclave shredding
- Mobile alkaline hydrolysis

Figure 1. Mobile Treatment Technologies



Introduction Lesson Contents

This lesson is divided into the following sections:

- Mobile Incineration - Presents the key features of high temperature air-curtain incineration, gasification, and rotary kiln incineration to burn carcasses and other material
- Mobile Autoclave Shredding – Discusses the basic design to convert carcasses into usable products (protein meal and tallow) and waste by-products which require treatment prior to discharge
- Mobile Alkaline Hydrolysis - Describes the use of moderately high temperature and high pH to hydrolyze carcasses into sanitized by-products

Description

Mobile Treatment Technology in this context refers to carcass processing equipment that can be mounted on a truck bed or inside a trailer, hauled to infected premises, and operated to treat or destroy carcasses so the product is no longer infectious. The system must be small enough to meet weight and size restrictions on roads, and capable of being set up relatively quickly to operate upon arrival at a farm. The systems must also be suited for cleaning and disinfection, must be configured to avoid environmental releases, and must be reliable.

Figure 2. Gasifier



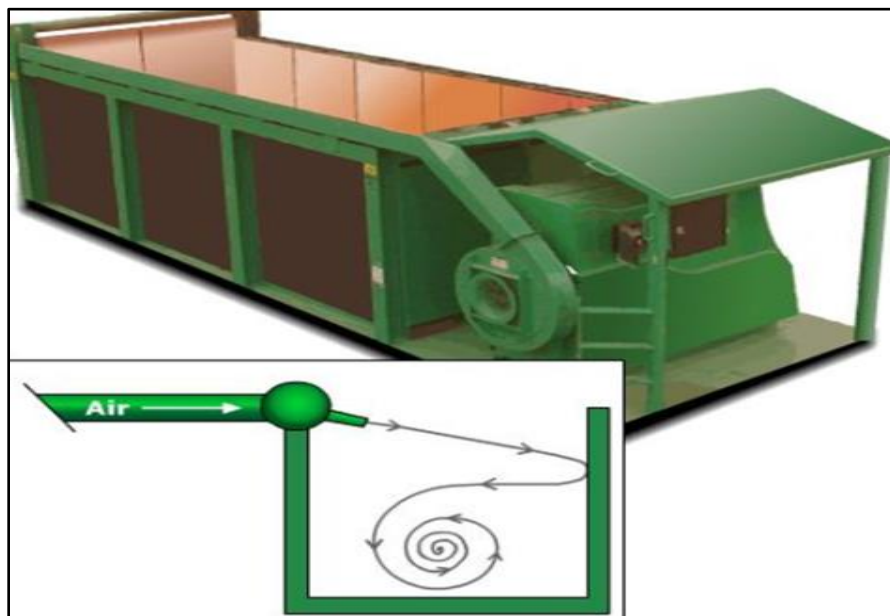
Mobile Incineration

Air-curtain incineration

This thermal method uses a combination of forced air and fuel (such as wood or coal) to burn carcasses and/or associated materials. This method is used outdoors but, in contrast to open-air burning, uses a fan and manifold to greatly increase the air flow.

- High volume air greatly increases the temperature and accelerates carcass combustion process through enhanced mixing
- Combustion can occur up to six times faster than open-air burning
- Large-capacity fans driven by diesel engines deliver the high-velocity air down into either a metal refractory box or burn pit
- This process is extremely solid-fuel-intensive

Figure 3. Air Curtain Refractory Box



Mobile Incineration (cont.)

Air–curtain incineration (cont.)

High velocity air across and down at an optimum angle into a firebox pit creates an air curtain on top and a rotational turbulence within the firebox.

- High velocity air provides an oxygen-enriched environment that accelerates the combustion process (similar to the effect of fanning a fire)
- Nearly complete combustion can be achieved with a properly-constructed fire pit with reduced amounts of escaped particulates (particularly the organic component of particulate matter), significantly reducing visible smoke

On-farm preprocessing of carcasses may be required, such as grinding, fermenting, or freezing. However, grinding carcasses infected with Highly Pathogenic Avian Influenza (HPAI) is not recommended because of the risk of aerosolizing the virus.

Figure 4. Burn Pit with Air Curtain Incinerator



Mobile Incineration (cont.)

Gasification

This technology is a variant on conventional incineration that converts carcasses into gases - mainly carbon dioxide, water vapor, carbon monoxide, methane and hydrogen. Some ash is also produced and can be managed using methods outlined for incineration.

- Conversion takes place in containers that contain low temperature primary (gasification) chambers, where organic material from carcasses is driven into the gas-phase as a combustible mixture, and high temperature secondary (combustion) chambers where this combustible mixture is burned off
- Some of the produced gas may be used for heat energy to further the gasification process
- There are two types of systems: batch and continuous. Continuous gasifiers, still under development, are more efficient when compared to batch systems, however may have more complicated machinery than batch systems.

Figure 5. Transportable Gasifier



Mobile Incineration (cont.)

Gasification (cont.)

The primary chamber (gasification) is operated at temperatures of 1500-1800° F (816-982°C) using only small amounts of air, and the secondary chamber (combustion) is operated with excess air at temperatures on the order of 1800°F (982°C).

- Heat from the secondary chamber can be used to provide the heat to maintain primary chamber temperatures
- Because the gas flow rates through the system are much lower than found in conventional combustion processes, higher throughputs can potentially be attained in smaller sized equipment
- The residual ash is pathogen free and can potentially be landfilled, buried, or used as a soil amendment, provided it satisfies other solid waste management requirements

Mobile Incineration (cont.)

Rotary kiln

The rotary-kiln incinerator is flexible - handling liquid, sludge, solid, or gases in very large quantities. It maintains operating temperatures from 1500-3000°F (800-1650°C). The kiln has two chambers, a primary and secondary chamber. The primary chamber consists of an inclined refractory lined cylindrical tube that rotates, moving the material from the feed end to the discharge end with the help of gravity. The inner refractory lining serves as an insulating barrier to maintain high temperatures in the kiln. The secondary combustion chamber consists of either a horizontal or vertical refractory-lined chamber with gas- or oil-fired burners that burn out unburned material leaving the primary chamber.

- Movement of the cylinder on its axis facilitates movement of waste
- Conversion of solids to gases, occurs in the primary chamber through volatilization, destructive distillation and partial combustion reactions
- Gas phase combustion reactions mostly occur in the secondary chamber
- Incombustible solids, called clinkers, spill out at the end of the cylinder
- A tall flue-gas stack, fan, or steam jet supplies the needed draft; typically an induced draft fan is needed if any scrubbers or particulate control devices are installed downstream of the kiln
- Ash drops through a grate and is collected for subsequent management

Figure 6. Mobile Rotary Kiln



Autoclave shredding

Autoclave shredding is also referred to as grinding sterilization, and grinding and steam. Some units also use elevated pressure to facilitate the process. Autoclave shredding is the process of reducing the size of animal carcasses into small pieces which can be quickly heated to inactivate pathogens. The process may include the addition of wood chips to produce a sterile solid product.

Figure 7. Portable Autoclave Shredding



Autoclave Shredding (cont.)

An example of a mobile autoclave is the [Mass Animal System](#) by Enviro-Safe Treatment Solutions, LLC. As shown in the photo below, the process involves:

- Depositing animal carcasses in the hopper
- The carcasses are exposed to steam for a period of time to inactivate pathogens
- The process reaches temperatures up to 272°F (133°C) degrees at 45 psi, and is capable of processing up to 8,000 lbs. / hour
- The unit can accommodate small animals, such as poultry
- A sterilized, but still putrescible by-product exits the system into the hopper at the far right of the image
- The by-product can be rendered to capture fats/oils for fuel production or can be combined with wood chips for composting

**Figure 8. Enviro-Safe Treatment Solutions Mobile Autoclave
(Printed with permission from Enviro-safe Treatment Solutions)**



Disclaimer: This module is not endorsing the product of a specific vendor, but merely using the data on this product as an example

Alkaline Hydrolysis

Alkaline hydrolysis is a mobile technology that involves processing carcasses at moderate temperatures, and high pH (usually a strong base like potassium hydroxide or sodium hydroxide) to convert the proteins, nucleic acids, and lipids to a sterile aqueous solution and solid by-products.

- The sterile, aqueous solution consists of small peptides, amino acids, sugars, and soaps
- The solid by-product consists of mineral constituents of the bones, teeth, as well as undigested but sterilized metal, plastic, and cellulose materials
- Because it is one of only a few technologies that can destroy transmissible spongiform encephalopathies (TSE), it remains a viable carcass management method
- The capacity of alkaline hydrolysis units is typically relatively small, only able to process one or two bovine-sized carcasses per day. The aqueous effluent from the alkaline hydrolysis process may present difficulties in disposal due to its high biological oxygen demand and elevated pH that may impact wastewater treatment processes.

Figure 9. Alkaline Hydrolysis Unit



Advantages

Some mobile treatment technologies can be useful alternatives to other on-site emergency carcass management technologies, depending on the situation.

Other advantages may include:

- On-site carcass management eliminates the need for off-site transportation
- MTT may be quickly implemented due to portability of units
- The three types of MTT discussed in this module inactivate pathogens
- The self-contained units are generally acceptable to the public

Disadvantages

Treatment technologies change over time and may not be readily available. Because they are mobile, these technologies are sized for highway transport and may have limited throughput and capacity.

Potential disadvantages of using on-site mobile technologies include the following:

- Availability of resources and equipment may be limited, particularly in a widespread emergency outbreak
- Accessibility to equipment may be impeded depending on vendor proximity to the on-site location
- Specially skilled operators who are trained in biosafety and biosecurity may be needed to keep equipment running
- Level, paved areas may be needed to set up equipment and stage materials
- Availability and/or sources of spare parts for back-up equipment may be limited
- Extensive utilities may be required such as water, fuel, chemicals, bulking agent and electricity for operations and support equipment
- MTTs generally have limited capacity because the systems must be small and light enough to transport, potentially making the process time-consuming and requiring refrigeration or other temporary storage for untreated carcasses
- Some technologies may require preprocessing of carcasses, such as grinding, shredding, or cutting, which can aerosolize pathogens

Disadvantages (cont.)

- Air-curtain incinerators reach temperatures typically higher than those reached in open-air burning, but it cannot be adequately monitored or regulated to ensure that TSE infected material would be rendered non-infectious. Thus, this method is not recommended for carcass management with a suspected or confirmed infection with a TSE agent.
- Air curtain fire boxes have limited capacity
- Alkaline hydrolysis is limited by low carcass material capacity, and is also time consuming, requiring at least 3 hours to kill microbial pathogens and 6-8 hours to deactivate TSE prions
- Alkaline hydrolysis results in significant quantities of potentially hazardous aqueous waste. This aqueous waste, termed effluent, has an extremely high pH and must be discharged in an environmentally safe manner, including requiring possible neutralization prior to discharge. Wastewater treatment facilities may be reluctant to allow discharge due to high biological oxygen demand.
- A permit for effluent disposal should be negotiated with the appropriate regulatory officials. Acceptance of the effluent should be discussed with wastewater treatment facilities prior to using this technology.

Evaluation Lesson Overview

This lesson contains information to help you further evaluate use of MTTs for carcass management.

Factors in the evaluation include:

- Knowing and understanding applicable regulations
- Identifying the waste stream
- Evaluating the site for suitability for MTT
- Recognizing the environmental impact

Evaluation Lesson Contents

This lesson presents the following Information:

- Regulations – Covers the regulations governing MTT operations
- Waste Stream Evaluation – Contains questions one can use to assess the materials on the infected premises to determine suitable management options
- Site Evaluation – Presents information including questions to assess whether or not a MTT is suitable for carcass management at a particular location
- Environmental Impact – Includes a discussion of potential environmental impacts, important biosecurity considerations, and public health considerations associated with using MTTs

Regulations

All waste materials slated for management and/or transport must be correctly classified by a certified waste management professional prior to assure appropriate carcass management. The classification of the waste will depend upon the specific type of incident and the federal agency with primary authority.

Planning and response efforts for waste management should include consultation with experienced personnel familiar with all management regulations in the affected areas. Additional regulations include:

- [Clean Air Act](#) for air emissions from incinerators
- The U.S. Occupational Safety and Health Administration (OSHA) has set requirements and recommendations for those engaged in hazardous waste operations involving disease-causing organisms ([29 CFR, Chap 1910](#))
- [Resource Conservation and Recovery Act](#) (RCRA) for solid waste processing
- Use of personal protective equipment in hazardous waste operations can be found at [29 CFR 1910.134](#) and [29 CFR 1910.156](#)
- Title [40 CFR 262.11](#) requires any person generating hazardous waste must follow strict protocols
- State Departments of Health and Environmental Quality issue regulations that determine which wastes are considered 'regulated' or require special handling. Check the Regulated Medical Waste [RMW State Locator](#) to find the classifications.
- States will have the ultimate authority to allow or disallow the use of a particular MTT in a given situation

Waste Stream Evaluation

The following are issues one should consider before using MTT:

- What types of infected material?
 - Carcass: type, size, number, and condition
 - In-barn manure/litter: type, volume, moisture content, density
 - Stored manure/litter: type, volume, moisture content, density
 - Feed? Quantity and location
 - Eggs? Quantity and condition
 - Bedding? Non-infected manure compost?
 - Paper products? Decontamination residue? Other debris?

- How much material needs to be treated?
 - If there is a type and/or quantity of material that is beyond the capabilities of MTT, off-site carcass/waste management may be required
 - The material from a large outbreak may have to be addressed by multiple on-site options and off-site locations as capacities are reached

Mobile Treatment Evaluation

Is an agreement or are regulations already in place with the State that allows emergency carcass management using MTT? This will help speed up implementation of the carcass management process.

- How will emissions be monitored to protect public health? Will the pathogen be spread by MTT before the material is fully treated?
- Who owns/operates the premises? Owner/operator resources may be available to help with the on-site carcass management process.
- Is the site completely secure at all times? What security measures are in place?
- What actions will be taken to reduce odor and vermin related to staged-material awaiting treatment/management? Ensuring that the operation is following regulations and procedures effectively is important to avoid any negative publicity surrounding the carcass management activities.
- Can a sufficient supply of fuel be acquired and delivered?
- Does the applicable permitting authority allow a particular mobile technology?
- Can the permit conditions be met?
- Will the MTT operate near high-density housing or other public areas which could be affected by emissions?
- Are climatic and weather factors (e.g., the direction of the prevailing winds) and seasonal conditions (e.g., wet or frozen ground) suitable for the MTT?

Mobile Treatment Evaluation Questions

The next few questions can help evaluate the suitability of MTT for treatment and management of infected carcasses:

- Are mobile treatment technologies available for your area?
- Are the units available for deployment and can they be transported to your site?
- Are you able to meet all site/utility requirements?
- Can the units be fully cleaned and disinfected after use?
- Do the units have adequate capacity to meet your needs? If the capacity is less than needed, can the carcasses be stored or refrigerated?
- Are skilled operators and spare parts available to keep the units operational?
- Does the infected premises have an acceptable location to accommodate the mobile equipment/unit?
- Can sufficient fuel be acquired and delivered for high temperature mobile incineration?
- Is the technology permitted by the state and local environmental agencies?
- Can the by-products be readily disposed?

Environmental Impact

All mobile technologies involve various inputs and outputs, which may impact the environment. The inputs are all limited resources which may be needed in significant quantities, resulting in consumption of non-renewable resources. Inputs may include:

- Fuel for combustion, electricity, or heat generation
- Water for steam or processing
- Chemicals for disinfection/pH adjustment

The outputs may be hazardous, depending on the process and may require other carcass management measures. Outputs may include:

- Liquid effluent from autoclave shredding and alkaline hydrolysis may be highly concentrated, requiring treatment prior to management or discharge
- Air emissions
- Ash, bone residue, shredded solids, or animal meal

Environmental Impact Questions

- Does the MTT operator have a plan in place to dispose of by-products generated through the MTT process?
 - Will by-products be considered contaminated or hazardous waste?
 - Can the byproducts be recycled onsite or disposed at a municipal solid waste landfill?
- Are any required air emission monitoring or control devices installed on the unit to maintain air quality?
- How will any liquid effluent be managed or disposed?
- Is the unit in compliance with all permit requirements?
- Does record keeping meet the regulatory requirements?
 - This is important to identify who may be legally liable, in case there is an environmental release

Biosecurity

Biosecurity is a series of management practices designed to prevent the introduction and spread of disease agents on an animal production facility. During an animal disease emergency, biosecurity measures are necessary to keep disease agents out of healthy livestock and poultry populations and prevent the spread of disease agents from infected groups to uninfected groups within the same population.

Below are some biosecurity considerations. For more comprehensive biosecurity information, refer to the Biosecurity Module.

- Plans must be in place to prevent disease spread during transportation. For more information see the Secure Transport Module.
- Workers who handle infected carcasses need to take proper precautions and should be equipped with appropriate PPE in accordance with site-specific plans. Refer to the Health, Safety, & PPE Module.
- In cooperation with appropriate public health agencies, personnel should be monitored afterward for signs of illness if pathogen of interest is potentially zoonotic

NOTE

The agent causing the disease may not be the only agent that poses a risk to personnel. Other potential risks may occur from *Salmonella*, *Campylobacter*, Q fever and coliforms.

- Proper storage for carcasses should prevent scavenging by wildlife and access by other vectors
- Prior to the selection of a MTT as an option, verify that it has been shown to adequately inactivate/contain the pathogen of concern

Public Health Considerations

A comprehensive understanding of the type and strain of pathogen associated with the animal disease event is essential to prevent further spread of infection and to safeguard human, animal, and environmental safety and security. Biosecurity measures along with cleaning and disinfection protocols will be governed by the type and strain of pathogen present.

- Care must be taken to conduct operations in such a manner that public health is protected
- Negative public perceptions may be an issue in the event of large-scale carcass management, such as mobile incineration. Care must be taken to conduct operations in such a manner that public health is protected.
- Use of MTT may require transportation of potentially contaminated biomass that may create additional public health concerns
- Heightened public health concerns will exist and must be addressed when dealing with a zoonotic disease agent
- Carcasses infected with spore forming bacteria may not be candidates for certain MTT
- Certain MTT may not be suitable for animals infected with or exposed to a disease agents responsible for TSE (e.g., scrapie, Bovine Spongiform Encephalopathy, and Chronic Wasting Disease)

Public Health Questions

The next few questions can help evaluate public health concerns when using MTT units:

- Are there event- and site-specific health and safety plans for the MTT operators that are approved by a credentialed Safety Officer?
- Are MTT operators trained in proper handling of potentially infected material and the requirements of the health and safety plan? If not, will specialized operators be available for temporary service?
- Is employee health and safety monitored by the employer and are health and safety rules enforced? If the contaminant poses an increased health risk to employees, it is important that personnel use required protection and are monitored regularly by healthcare workers to ensure they are not exhibiting effects of exposure in accordance with CDC and OSHA guidance and regulations.

Planning Lesson Overview

This lesson contains information to help you plan carcasses management by using MTT. Planning is essential to ensure that the task is carried out efficiently and unimpeded by a lack of resources. Successful management of a large number of contaminated animal carcasses requires proper planning to protect workers, the general public, and the environment.

Important considerations include:

- Classifying and characterizing the waste material
- Identifying and obtaining suitable MTT
- Finding adequate carcass storage facilities
- Assessing availability of secure transportation

Planning Lesson Contents

This module is divided into several topical areas:

- Personnel – Highlights personnel planning requirements and related issues such as health, safety, and biosecurity
- Waste Classification – Discusses waste characterization and factors necessary to determine whether a MTT can accept the waste stream
- Materials, Supplies, and Equipment– Provides a list of equipment and supplies which might be needed
- Temporary Carcass Storage – Provides several considerations for temporary carcass storage until carcass management can commence
- MTT Identification – Describes planning considerations for selecting MTT
- Secure Transportation – Provides a list of important questions to consider before transporting carcasses
- Site Suitability – Describes planning considerations to determine the suitability of using MTT at a specific premises

Figure 10. Briefing the Carcass Management Team



Personnel

There are certain planning aspects that are common to all carcass management options. Those aspects include human health and safety, biosecurity, and physical security, as described below.

- Health and safety – Planning to implement use of MTT as a carcass management option should include measures to protect workers and the public from hazards associated with loading, transport, and processing of infected materials with MTT. Refer to the Health, Safety, & PPE Module and the Secure Transport Module.
- Biosecurity – Planning to use MTT must include strict biosecurity measures to minimize disease spread when handling infected materials. Refer to the Biosecurity Module.
- Physical Security – Planning efforts should consider security of personnel at the infected premises, and security of infected material during transport, and processing. Below are some ideas for minimizing physical security risks:
 - Providing a single entry point to the infected premises
 - Providing badges to all authorized personnel entering the infected premises
 - Signing in and out of the premises
 - Sealing truckloads at the origin and ensuring the seals are unbroken at the destination

Waste Classification and Characterization

Waste must be classified in order to determine if it can be processed by a particular MTT. For example, if the MTT involves incineration, plastic wastes should not be processed to avoid creating potentially harmful dioxin air emissions. If the MTT involves alkaline hydrolysis, waste streams such as bedding or wood chips will not be suitable. Consult a certified waste management professional when classifying waste and determining compatibility of wastes with MTT.

Response personnel should perform the following:

- Identify all waste materials designated for management (in accordance with the site-specific carcass management plan, if available). For more information, refer to the Emergency Management Tool Module.
- Mark waste materials and verify with the Disposal Group Supervisor that all designated materials are to be disposed of
- Sort materials by type (recyclables, putrescible waste, debris, and potentially hazardous waste)
- Stage the various waste materials in suitable areas and containerize putrescible or wet materials to avoid leaching to the environment. Waste materials may require tarp or shelter covering.
- Estimate the quantities of each waste type and record the information
- Characterize each waste type in accordance with all applicable local, state, and federal regulations
 - Improper waste management can result in penalties (fines or imprisonment)
 - Improperly disposed waste creates environmental contamination, and clean-up liabilities may also be incurred
 - Document the characteristics of each waste type and label all waste types in accordance with applicable regulatory requirements

Material, Supplies, and Equipment

The Disposal Group must identify all necessary materials, supplies, and equipment to carry out the chosen site-specific carcass management method(s).

This list is provided as an example of the types of materials, supplies, and equipment which might be needed with MTT:

- Health, Safety, PPE and associated personnel decontamination equipment
- Secure transport equipment (driven by trained drivers)
- Vehicle cleaning and disinfection equipment
- Vehicle liners, such as plastic sheeting or specialized bags
- Loading equipment
- Absorbent material to prevent leakage
- Regulatory authority approved containers, such as sharps containers that are puncture-resistant and leak-proof
- Bio hazardous waste bags and containers, if applicable. Note: use biohazard bags only for identified biohazard waste. Putting non-biohazard waste into biohazard bags results in excess expenses for carcass management.

Biohazard Waste

Includes plastic ware such as pipettes or pipette tips, culture plates, specimen vials, etc. that are contaminated with biological specimens, bacterial and cell culture material, or nucleic acids. It also includes towels and bench paper that are biologically contaminated (i.e., used where samples or cultures are opened and manipulated). It may also include culture or sample containers (e.g. plastic tubes of blood) that are contaminated with biological materials. The categories are based on the UN assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods ([UNECE](#)).

Material, Supplies, and Equipment (cont.)

Additional equipment and spare parts must be available for:

- Excavation of trenches with certain types of air curtain incinerators
- Carcass loading and unloading
- MTT byproduct management
- Firefighting if combustion is part of the MTT process
- Cleaning and disinfection
- Emergency communication systems

Material requirements for mobile incineration may include:

- Solid fuel such as coal, straw or hay, untreated timbers, kindling wood – dry with a low moisture content, and not come from green vegetation
- Diesel fuel to power generators

Material requirements for autoclave shredding may include:

- Wood chips or other bulking agent
- Diesel fuel or propane to power the system

Material requirements for alkaline hydrolysis may include:

- Potassium hydroxide or similar high pH chemical
- Diesel fuel or propane to power the system

Figure 11. Example Supplies Needed for Cleaning and Disinfection



Temporary Carcass Storage

When the Euthanasia Group generates mortalities at a faster rate than the Disposal Group can process them, some means of temporary carcass storage must be provided. It is important to identify where carcasses can be collected and stored until carcass management can commence. Guidance related to storage and collection of solid waste which may have some relevance to carcass collection and staging, refer to [40 CFR 243.200-1\(a\)](#).

Considerations for temporary storage include:

- Can the storage area be secured to prevent unauthorized access, scavengers, odors, rapid decomposition, and potential disease spread to susceptible species?
- Will the carcasses be stored using refrigeration or some other stabilization method such as grinding and preserving them in containers?
 - If so, are the equipment, supplies and materials available?
 - Can the equipment be cleaned and disinfected?
- Will the storage capacity be sufficient to accommodate the difference between the maximum expected euthanasia rate and the maximum carcass management rate?
 - If not, avoid euthanizing animals at a rate that exceeds carcass management and storage capacity
 - When maximum carcass management and storage capacities are reached, curtail euthanasia until adequate capacity is available
 - Consult with Incident Coordination Group leadership for strategies to minimize the number of animals to be euthanized and managed

Temporary Carcass Storage (cont.)

- Can wastewater and storm water runoff be controlled from the storage facilities?
- Outline a recordkeeping system for identifying and tracking all carcasses and other materials entering and exiting the storage area
- Can the storage facility be adequately cleaned and disinfected during and/or after the response?
- Can storage containers be made leak-resistant?
- Is there sufficient space for heavy equipment which may be needed to move large loads?
- What safeguards will be used to protect soil and groundwater from a release of leachate?
- Do safeguards meet all applicable local, state, and federal regulations?
- Ensure the storage method will contain leachate, address pressure buildup, and avoid uncontrolled release of gases and pathogens
 - Consult a certified waste management professional for assistance

Secure Transportation

Transport vehicles may be needed to move carcasses and other materials to the MTT. If the waste must travel on public roads, it should be transported in closed, leak-resistant and/or lined trucks or dumpsters. Secondary containment may be needed, depending on the type of waste being transported. Consult a certified waste management professional when developing this section of the carcass management plan. Some transport planning considerations are listed below:

- Does the MTT require waste to be in a specific form (e.g., not bagged or not mixed with bedding)?
- Is the MTT approved to receive the specific type of waste?
- Are all permit, agreement, and/or contract conditions delineated and will the loads meet the conditions? If not, what corrective actions would be needed?
- Are any haulers properly equipped to haul carcasses in accordance with all applicable laws?
- Are transport vehicles designed to handle the materials to be transported?
- Are the drivers adequately trained in biosecurity?
- Can two-way communications be maintained with the hauler during transport?
- Do shipments require law enforcement escorts?
- Will travel routes to the MTT avoid uninfected farms, road construction, neighborhoods, and densely populated areas?
- Has an alternate travel route been identified?
- What procedures will be followed if the vehicle is damaged during transit?
- How is the waste classified for transport? What packaging standards apply? Are all standards consistently met, including labeling, placarding, and manifesting, if required?
- How will transport vehicle traffic be minimized into the Control Area?

For more information, refer to the Secure Transport Module.

Site Suitability

Members of the carcass management team must contact or visit the premises and/or the appropriate state regulatory authorities to ensure carcass management is accomplished in accordance with all applicable laws and regulations.

During an animal disease outbreak, the carcass management team should consider the following:

- Selection of environmentally suitable locations for MTT is important in the disease management process
- To minimize subsequent exposures and disease spread, it is important to locate such treatment sites within or in close proximity to the infected premises
- The site access should be able to handle heavy truck traffic and allow for biosecurity around the site's perimeter
- The location where the MTT is to be operated must meet all requirements for that MTT, such as a paved, level pad, a covered area, an area close to required utilities, and/or an area where liquid effluents can be contained/managed

Due to the relative putrescibility of the carcasses and associated manure/bedding, it is critical to choose sites that will not be adversely impacted by potential releases of nutrient-laden leachate nor will result in nuisance complaints in the event that odors, flies, or scavengers begin to appear on-site.

Operations Lesson Overview

This lesson contains general guidelines in preparing for use of MTT for carcass management. The MTT Company must be consulted before beginning any treatment and carcass management measures.

Figure 12. Carcass Management Team Wearing PPE



Operations Lesson Contents

This material in this lesson provides general instructions for using mobile treatment technologies and measures during an animal disease outbreak response.

- Incident Management – Provides guidelines to the Disposal Group personnel when dealing with an animal emergency situation
- Infected Premises Preparation – Lists steps for assessing facility readiness to begin operations
- MTT Operations – Describes procedures for safe and proper carcass management using MTT

Incident Management

All Disposal Group personnel should familiarize themselves with the approved site-specific carcass management plan. The Disposal Group Supervisor should review the plan with the Disposal Group and brief them on all relevant aspects of the carcass management effort. For further guidance, refer to the [FAD PReP APHIS Foreign Animal Disease Framework: Roles and Coordination](#).

The Incident Coordination Group (ICG) /Incident Management Team (IMT) should ensure there is a system in place to identify carcass management team members with the required expertise

1. The Disposal Group Supervisor, Disposal Coordinator, or other assigned official should verify credentials, training, and security clearances of carcass management team members and arrange just-in-time training for carcass management team members.
2. The Disposal Group Supervisor should prepare briefings and reports for the Operations Section Chief.
3. The Safety Officer should brief all responders on safety precautions and will provide a briefing on the nature of the disease and other circumstances affecting the response
4. The Safety Officer or Biosecurity Officer should brief all responders on biosecurity protocols.
5. Plans should be developed to be sure that all onsite carcass management related personnel are briefed on safety requirements, site conditions, and tasks.
6. The Public Information personnel should develop material, such as Frequently Asked Questions, to address public concerns.

Infected Premises Preparation

1. Consult with local, county, state, and/or federal environmental officials to obtain specific information for the region or community in order to minimize any negative environmental effects associated with the use of MTT.
2. Determine all applicable public health or environmental protection laws, including fire codes and other regulations.
3. Consider regional climate and seasonal trends (e.g., general direction of prevailing winds, precipitation, thermal factors).
4. Inform local authorities about any planned thermal destruction.
5. Ensure that equipment, and spare parts, are available for the chosen treatment method.
6. Ensure enough trained personnel are available to maintain continuous operations of the MTT.
7. Provide appropriate sustenance and housing needs for carcass management personnel if necessary.
8. Verify the availability of MTT units and any required carcass storage/staging areas.
9. Locate the MTT in an area that is easily accessible to heavy vehicles hauling carcasses and equipment.
10. Gather the appropriate materials, such as fuels, chemical feeds, and other utilities.
11. Ensure availability of enough fuel to last 2-3 days or the length of time needed to maintain uninterrupted supply.

MTT Operations

1. Don all required PPE as detailed in the Site-Specific Health and Safety/PPE Plan.
2. Prepare the site according the requirements for the selected MTT.
3. Monitor the wind direction before and during mobile incineration operations
4. Handle all byproducts safely and dispose of properly in a manner approved by the appropriate regulatory agency.
5. Thoroughly clean and disinfect all MTT equipment upon completion of operation. See the [FAD PReP SOP15: Cleaning and Disinfection](#) and [FAD PReP SOPs: Biosecurity](#).

Summary

Congratulations! You have completed the Mobile Treatment Technologies (MTT) Module. In this module, you have learned to:

- Describe MTT as a method for carcass management
- Understand the advantages and disadvantages of MTT
- Identify personnel health risks associated with MTT
- Consider environmental risks associated with MTT
- Obtain regulations governing MTT by consulting with state officials
- Identify factors used to evaluate MTT as a carcass management option
- List critical elements when planning MTT
- Recognize key components of MTT operations

Please click [here](#) to download the certificate of completion for this module. You can enter your name on the certificate and save or print it for your records.