Carcass Management Course
Biosecurity Module

USDA
United States
Department of
Agriculture

CUBIC
Enabling a Safer World

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Overview

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

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 information in three different lessons:

- Introduction
- Planning
- Operations

Upon completing this module, you should be able to:

- Understand biosecurity principles, policies, and procedures for animal health incidents
- Recognize biosecurity implications associated with carcass management
- Understand foreign animal disease and zoonotic disease risks
- Describe the components of a biosecurity plan
- Use operational guidance to implement biosecurity measures

Introduction Lesson Overview

In the event of a major animal health emergency, USDA APHIS, in its role as an emergency response agency, will deploy personnel to assist with response and recovery efforts. Biosecurity measures and management practices will be instituted to prevent the introduction and spread of disease agents during the response.

During an animal disease emergency, biosecurity measures are necessary to

- Help keep disease agents out of livestock and poultry populations (e.g., herds, flocks, or other groups of animals) where the agents are not already present
- Help prevent the spread of disease agents from infected groups in the population to uninfected groups within the same population
- Help reduce the risk of spreading pathogenic agents during the movement of personnel and materials necessary for activities associated with an animal health emergency response
- Help protect the health of responders and the general public

Introduction Lesson Contents

This lesson is divided into the following sections:

- Biosecurity Guidelines – Discusses biosecurity management practices to prevent the introduction and spread of disease agents
- Biosecurity Awareness – Introduces the biosecurity plan as useful guidance for all emergency response personnel
- Routes of Transmission – Examines the common routes of disease transmission encountered while engaged in carcass management activities
- Clothing and PPE – Reviews the use of PPE as a primary biosecurity defense in preventing disease or its spread
- Roles and Responsibilities – Presents the roles and duties of the ICS and the biosecurity group

Biosecurity Guidelines

During an animal disease emergency, biosecurity measures are necessary to:

- Help keep disease agents out of livestock and poultry populations (e.g., herds, flocks, or other groups of animals) where the agents are not already present
- Prevent the spread of disease agents from infected groups in the population to uninfected groups within the same population

An animal health emergency may adversely affect

- Livestock which may become ill, die, or have to be euthanized as a result of the disease;
- Producers, growers, and farmers, who may suffer the loss of animals and decreased income; as well as producers who are impacted because of lost markets for healthy birds;
- Livestock and associated industries, which may see decreased production, sales, and international trade; and
- Public health, in the case of zoonotic diseases

Figure 1. Carcass Management Team Wearing PPE

Biosecurity Awareness

A biosecurity plan can only be useful if all emergency response personnel are trained on the incident and site-specific biosecurity plans and strictly adhere to the guidance as written. Fatigue, stress, distraction, and lack of forethought can cause even the most conscientious individual to lose focus on the crucial importance of biosecurity measures.

- Personnel should exercise the utmost thought, patience, persistence, and care in creating and carrying out a biosecurity plan
- Advanced thinking, planning, and extra effort in following biosecurity procedures can prevent pathogen transmission, can protect the well-being of livestock and poultry, and can safeguard American agriculture

During an animal health emergency response, some response personnel may be required to visit multiple premises during the course of a work day. These personnel must be aware that these activities increase the risk of disease transmission and must be especially diligent with respect to compliance with biosecurity practices.

Figure 2. Biosecurity Signs

Routes of Transmission

Pathogenic agents can be transmitted from animal to animal or animal to human, and vice-versa through a variety of routes. The most common routes of transmission are aerosol, oral, direct contact, fomites, vectors, and zoonotic.

Aerosol transmission occurs when droplets containing pathogenic agents from an infected animal are inhaled by a susceptible animal.

- Most pathogenic agents that may be transmitted via aerosols do not survive for extended periods in droplets, so infected and susceptible animals must be in close proximity for disease transmission to occur
- Typically, respiratory diseases and some diarrheal diseases can be spread via aerosol transmission

Oral transmission occurs when pathogenic agents are consumed by a susceptible animal.

- Feces, urine, saliva, and other secretions may contain pathogenic agents which can contaminate feed, water, or other items (fomites)
- Animals lick or chew contaminated items, such as feed bunks, equipment, fencing, water troughs, and salt and mineral blocks, etc.

Routes of Transmission (cont.)

Direct Contact transmission occurs when a susceptible animal physically contacts an infected animal, wildlife, or a pathogenic agent in the environment, including feed, bodies of water, soil, or air.

- The susceptible animal is exposed when the pathogenic agent comes in direct contact with its skin, mucus membranes, or an open wound. Also in milk (nursing a calf, for example), in the urine, blood, saliva, nasal, ocular or genital secretions, urine or feces.
- Transmission can occur through rubbing, biting, licking, by contact with the blood or saliva of an infected animal, or through contact with fomites
- Diseases spread during breeding or from dam to offspring during gestation and delivery are also considered to be transmitted by direct contact
- Transmission can occur between animals of different species and through contact with humans

Fomites are surfaces or objects capable of transferring disease agents through either direct contact or oral transmission.

- Fomites can include boots, clothing, vehicles, shovels, tools, bowls or buckets, tack, brushes, clippers, needles, and other equipment
- Vehicles and trailers with contaminated tires, wheel wells, and undercarriages can serve as fomites (Note: contaminated vehicles and trailers were associated with the spread of porcine diarrhea during the 2013 epidemic in the U.S.)
- Humans with contaminated skin, clothing, shoes, or boots are also considered fomites with the potential for moving disease agents within the facility or from one facility to another

Routes of Transmission (cont.)

Vectors include wildlife such as birds, mammals, reptiles, insects or arachnids capable of transmitting pathogens from an infected animal to a healthy animal. Vectors can transmit disease agents either mechanically or biologically.

- In mechanical transmission, the vector transports the disease agent from one animal to another, with the disease agent remaining unchanged. Many species of flies serve as mechanical vectors, as do rats, mice, birds and other animals.
- In biological transmission, the vector (e.g., fleas, ticks, mosquitos) acquires the agent from an infected animal, usually through a blood meal, and the agent replicates or develops within the vector. The disease agent is subsequently introduced to a susceptible host, usually through a bite.

Clothing and PPE

Because pathogenic agents can be transmitted via contaminated clothing, careful attention to these garments is essential to a successful biosecurity effort.

- Before entering animal areas, ask about biosecurity procedures and make sure you understand them and comply with them (especially instructions for donning and doffing PPE)
- All responders, visitors, and employees should put on clean outerwear (e.g., coveralls) to cover their street clothes. Ideally, a separate set of clothing and footwear should be used.
- The outerwear may be either disposable or reusable once laundered
- In some types of facilities (e.g., swine and poultry), biosecurity protocols may include showering in and out of the facility. Also, protocols may require facility-dedicated clothing, which stays at the facility and is not taken off-campus.
- Refer to the Health, Safety, & PPE Module for more information

Figure 3. Examples of PPE

Roles and Responsibilities

USDA APHIS utilizes the Incident Command System (ICS) to organize animal health emergency responses. Under the ICS, the Incident Commander (IC) has overall responsibility for the management of the entire incident.

- The command staff includes the Logistics, Operations, Finance, and Planning Section Chiefs. Each section is further divided into units or groups.
- Prior to deployment, all responders should have received training about the organization and structure of the ICS, roles and responsibilities, and their duties

For further guidance, see the FAD PReP APHIS Foreign Animal Disease Framework: Roles and Coordination.

Biosecurity Group

The Biosecurity Group is part of the Disease Support Branch. It is led by the Biosecurity Group Supervisor, who reports to the Operations Section Chief. Biosecurity Team Members work on infected or contact premises and provide frontline assistance in containing and controlling a disease outbreak.

The Biosecurity Group Supervisor is

- Assigned to the ICP and is in charge of all Biosecurity Teams
- Identified and trained before an animal health emergency occurs
- Responsible for ensuring that biosecurity measures are implemented to prevent the disease agent from moving from infected premises to uninfected premises and/or from infected animals to uninfected animals on the same premises
- Tasked with preparing the site-specific biosecurity plan in consultation with the Safety Officer and other members of the incident management team

Figure 4. Biohazard Sign

Planning Lesson Overview

This lesson contains information to help you develop biosecurity measures which must be instituted during a response to an animal health emergency. Planning is essential to ensure that the carcass management task is carried out safely. Moreover, proper planning protects the workers, the general public, and the environment.

Important considerations include:

- Preparing a site-specific biosecurity plan
- Using a job hazard analysis to identify risks associated with the job tasks
- Deciding on the actions necessary to ensure responder biosecurity

Planning Lesson Contents

This lesson presents the following information:

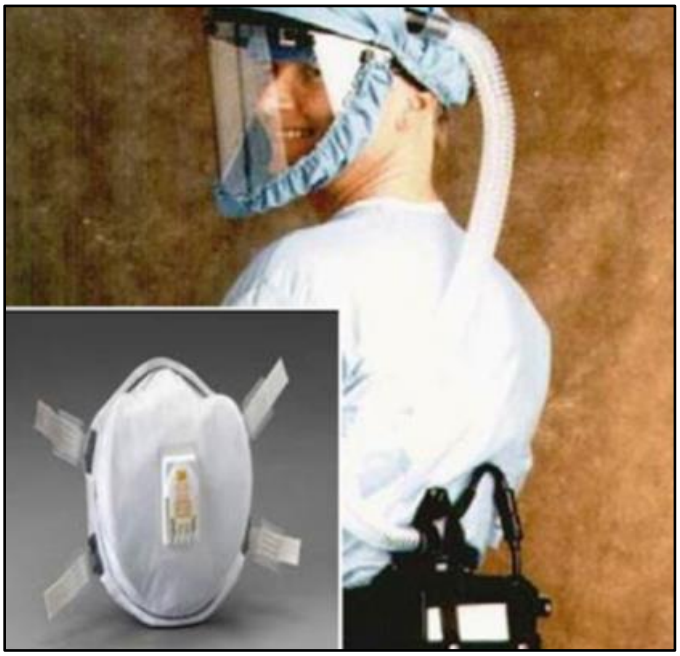
- Biosecurity Plan – Details specific biosecurity measures to be implemented at a specific site or incident
- Movement Controls – Presents basic recommendations for controlling movement of people, animals, and equipment
- Carcass Management – Outlines necessary biosecurity measures during major carcass management activities
- Transportation – Discusses planning measures to prevent spread of disease during transportation

Biosecurity Plan

A site-specific biosecurity plan for the response is developed by the Biosecurity Group Supervisor in consultation with the Safety Officer and approved by the Incident Commander. The implementation and exercise of biosecurity protocols are integral to response activities. Thus, the site-specific biosecurity plan must ensure adequate biosecurity measures (such as respiratory protection shown in the figure below) are in place for each part of the response.

Refer to the FAD PReP Foot-and-Mouth Disease and Classical Swine Fever SOP: 9 Biosecurity for additional information in writing a site-specific biosecurity plan.

Figure 5. Wearing Respirator



Mitigating Biosecurity Risks

Properly implemented biosecurity during an outbreak is imperative as it helps reduce the risk of disease transmission during the movement of personnel and material necessary for the extensive activities of the control and eradication campaign.

Biosecurity measures to reduce the risk of disease introduction and transmission include:

- Follow hand hygiene protocols. Wash hands before eating and drinking
- Use hand, head, face, and respiratory protection as per protocols
- Wear protective outerwear and appropriate footwear, including steel-toed or metatarsal protection, if needed
- Follow disinfection protocols for PPE, equipment (including fomites, such as but not limited to, pens, cell phones, note pads, etc.), yourself, and vehicles
- Follow protocols for physical handling, containment, and shipping of biological samples
- Follow protocols for the disposal of used PPE and disinfectants
- Follow protocols for the handling and disposal of biological materials, especially infected/contaminated materials, animal carcasses, manure, bedding, etc.
- Personnel Quarantine: limit personnel contact with other susceptible animals, including pets. The quarantine period depends on the infectious organism.
- Limit visits to other farms, zoos or livestock facilities and sharing equipment within premises or with other farms

Figure 6. Hand Protection

Cleaning and Disinfection

This refers to a combination of physical and chemical processes used to kill or remove pathogenic microorganisms.

- Effective cleaning and disinfection (C&D) minimizes pathogen transmission between premises
- Identification of the disease agent and understanding its biological properties and route of transmission are essential to developing an effective C&D plan
- Emphasis should be placed on adopting the basic microbiological principles of isolating the source of infection and C&D of personnel, supplies, equipment, vehicles, and sites
- A key element is the cleaning of a surface to remove dirt, debris, and organic material before using disinfectants
- Use proper disinfectants, follow manufacturer's instructions, and ensure adequate contact time

Practices which reduce the risk of pathogen transmission include:

- Disposing of contaminated materials that cannot be cleaned and disinfected
- Avoiding sharing equipment between operations or between functions in an operation (i.e., do not use the same equipment to handle both feed and manure)

Refer to the NAHEMS Guidelines: Cleaning and Disinfection

Figure 7. Cleaning Equipment

Movement Controls

Controlling movements of people, animals, vehicles, and equipment is critical to the maintenance of biosecurity. For day-to-day operations, movement control practices include:

- Maintaining a closed herd or flock
- Identifying all animals, keeping accurate records
- Protecting animals from contact with wildlife

Movement of people, animals, animal products and equipment on and off the property during an animal health emergency should be governed by strict biosecurity protocols. Ideally, premises should be fenced and have a single gated and locked entrance. Other means of controlling access to the premises include

- Placing a guard at facility entrances
- Locking unguarded entrances
- Patrolling and repairing boundary fences
- Only moving animals and animal products under appropriate permits
- Only moving compost from premises of origin under appropriate permit after the required standards have been satisfied

Figure 8. Biosecurity Signs

Carcass Management

Potential biosecurity risks for each option are discussed below.

Composting

Below are ways to minimize biosecurity risks during composting.

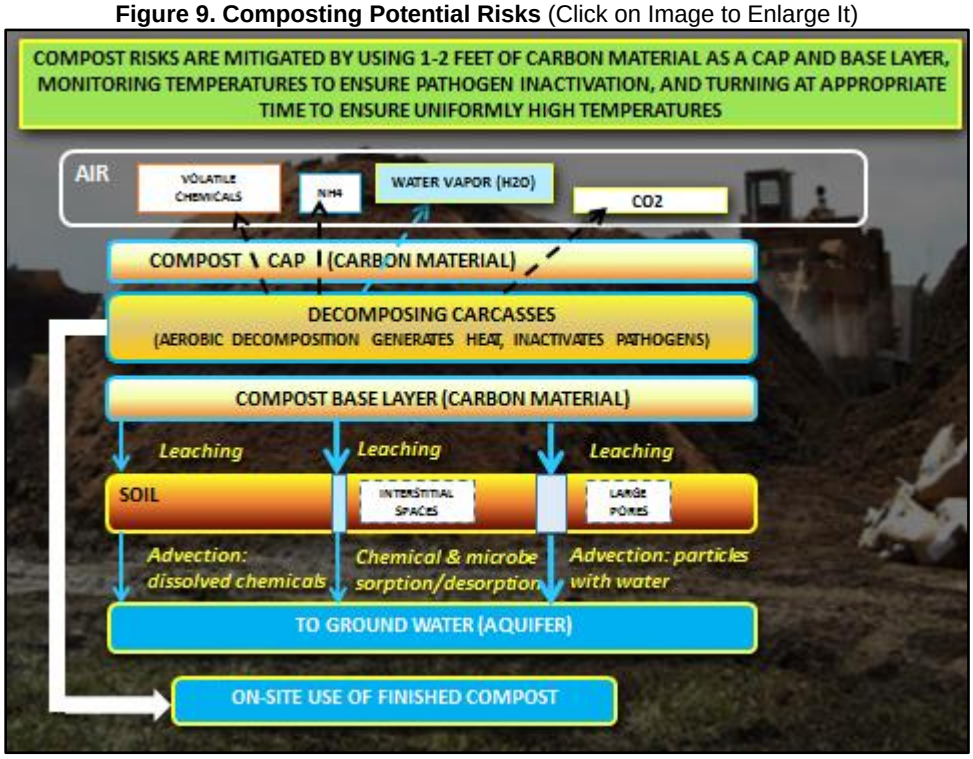
- When constructing initial compost windrows, beginning with a 1-2 foot base of carbon material will minimize infected liquids leaching from the windrows and absorb excess precipitation that falls on the windrows. Biosecurity risks from compost leaching can also be decreased by utilizing locations that are outside floodplains, have a 2-4% slope, and are the required distance from ground and surface water sources.
- When constructing initial compost windrows, moving infected animal carcasses and associated waste materials such as manure and bedding can create dust or aerosols which may harbor active pathogens and drift to unaffected animals. Indoor composting reduces the risk if it is performed without actively ventilating the building. In either case, misting the materials with water during windrow construction can suppress airborne particles.
- Grinding or cutting infected carcasses prior to composting can aerosolize pathogens and produce infected liquids. Grinding or cutting should be avoided or performed so that aerosols and liquids are contained.

Carcass Management (cont.)

Composting, cont.

- Once windrows are built, covering them with a 1-2 foot thick cap of carbon material such as wood chips will prevent wind from blowing exposed pathogens to unaffected areas, control odors, and will prevent vectors such as wild birds, insects, and animals from contacting infected material
- If windrows are turned during the composting process before all portions of the windrow have reached adequate temperatures for the required time to inactivate pathogens, dust suppression measures can help control airborne pathogens. Depending on the turning process and amount of remaining carcass material, applying a new cap may be necessary for vector and odor control.
- Ensuring all windrows meet required temperatures, for the required time, to inactivate pathogens before releasing the compost from quarantine
- See figure below for a schematic showing potential biosecurity risk pathways. The thicker the arrow, the greater the potential risk.

Figure 9. Composting Potential Risks (Click on Image to Enlarge It)



Carcass Management (cont.)

Rendering

Biosecurity risks and mitigations associated with rendering are listed below.

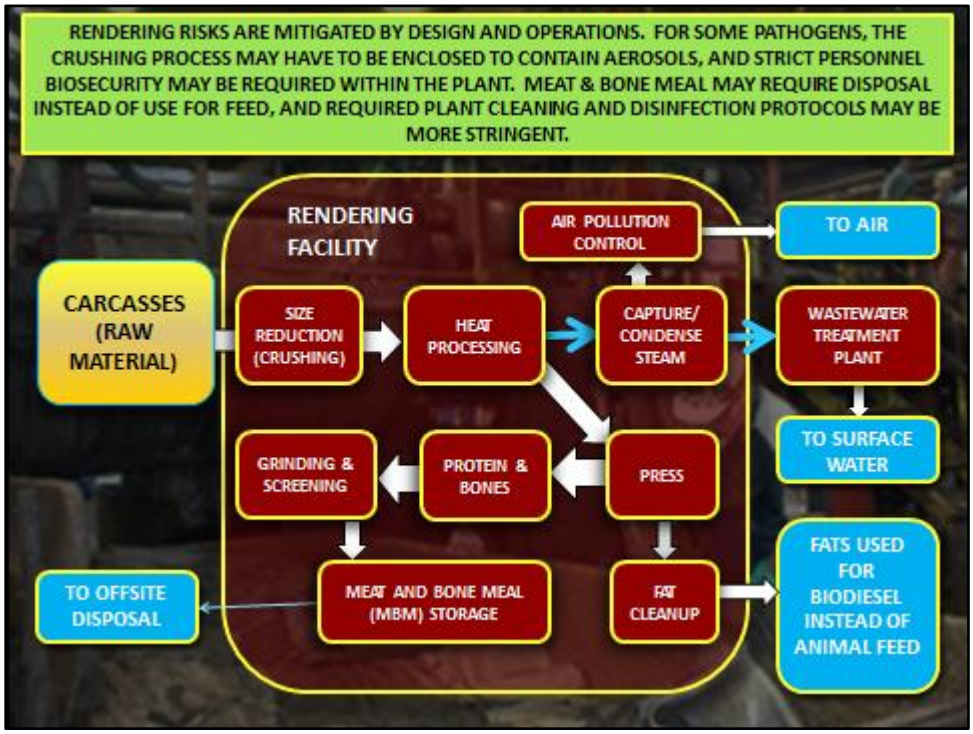
- Loading infected carcasses into trucks for transport to rendering can create airborne particles that may harbor active pathogens. Minimizing handling and using dust suppression when needed can minimize this risk.
- Transport of infected carcasses can result in dispersion of airborne particles and liquid releases which can carry active pathogens. To minimize this risk, securely containing infected carcasses in leak-proof, covered trucks or lining trucks with impermeable materials and covering them will prevent release of pathogens.
- Dumping infected carcasses at the rendering plant may generate airborne pathogens. The risk can be reduced by minimizing handling and using dust suppression or containment.

Carcass Management (cont.)

Rendering, cont.

- Grinding infected carcasses releases aerosolized pathogens. Pathogen spread can be reduced by ensuring the grinding process is enclosed, all workers follow biosecurity protocols, and ensuring the plant is properly cleaned and disinfected after processing infected animals.
- Continuous rendering may be preferable to batch rendering because each time a vessel is opened (for re-filling) during the batch process, airborne pathogens may be released

Figure 10. Rendering Potential Risks (Click on Image to Enlarge It)



Carcass Management (cont.)

Permitted Landfill

Biosecurity risks and mitigations for landfilling are listed below:

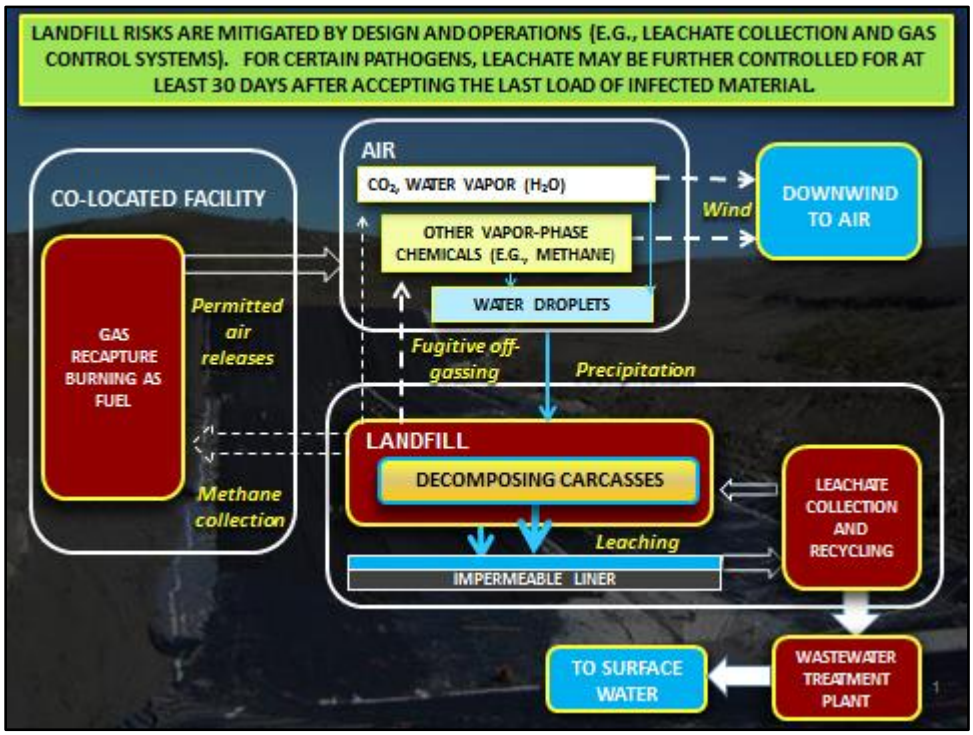
- Loading infected carcasses into trucks for transport to a landfill can create airborne particles that may harbor active pathogens. Minimizing handling and using dust suppression when needed can minimize this risk.
- Transport of infected carcasses can result in dispersion of airborne particles and liquid releases which can carry active pathogens. To minimize this risk, securely contain infected carcasses in leak-resistant covered trucks or line trucks with impermeable materials and covers to prevent release of pathogens.
- Dumping infected carcasses at the landfill may generate airborne pathogens if the container is breached during dumping. To reduce this risk, minimize handling; avoid breaching the container, and use dust suppression.

Carcass Management (cont.)

Permitted Landfill, cont.

- Infected carcasses generate leachate that can contain active pathogens. To minimize the risk of spreading pathogens, ensure there is more than 30 feet of other waste between the carcasses and leachate collection system, avoid spraying the leachate from infected carcasses on the surface of the landfill for at least 30 days after receipt of the last load, or transport the leachate to a wastewater treatment plant for processing rather than storing it in open ponds.

Figure 11. Permitted Landfill Potential Risks (Click on Image to Enlarge It)



Carcass Management (cont.)

Burial

Biosecurity risks and mitigations for burial are listed below:

- Loading infected carcasses into trucks for transport to the burial site can create airborne particles that may harbor active pathogens. Minimizing handling and using dust suppression when needed can minimize this risk.
- Transport of infected carcasses can result in dispersion of airborne particles and liquid releases which can carry active pathogens. To minimize this risk, securely contain infected carcasses in leak-resistant covered trucks or line trucks with impermeable materials and covers to prevent release of pathogens. Specialized bags are available for this purpose, although the bags may need to be vented. See the Secure Transport Module for more details.
- Dumping infected carcasses at the burial site may generate airborne pathogens. To reduce this risk, minimize handling, use dust suppression, and immediately cover the carcasses with clean soil.
- Infected carcasses generate methane and other gases during decomposition, causing the decaying carcasses to rise to the top of the burial trench or pit and emerge from the cover soil. Lancing the rumen of large animals or crushing smaller animals such as poultry reduces the chance for gas accumulation, but increases the risk of airborne pathogen spread. To avoid these risks, transport infected carcasses to a permitted landfill which has a gas control system.

Carcass Management (cont.)

Burial, cont**.**

- Infected carcasses generate leachate that can contain active pathogens. To minimize the risk of spreading pathogens to groundwater and surface water, transport infected carcasses to a permitted landfill with liner and leachate collection systems.
- Decomposition of carcasses and related materials is a lengthy process, and residues may persist in soil and groundwater for many years
- Certain geological conditions, such as sandy soil and a high seasonal water table, can increase the risk of pathogens reaching groundwater and surface water, so these conditions should be avoided by consulting with environmental professionals during site selection

Figure 12. Burial Potential Risks (Click on Image to Enlarge It)

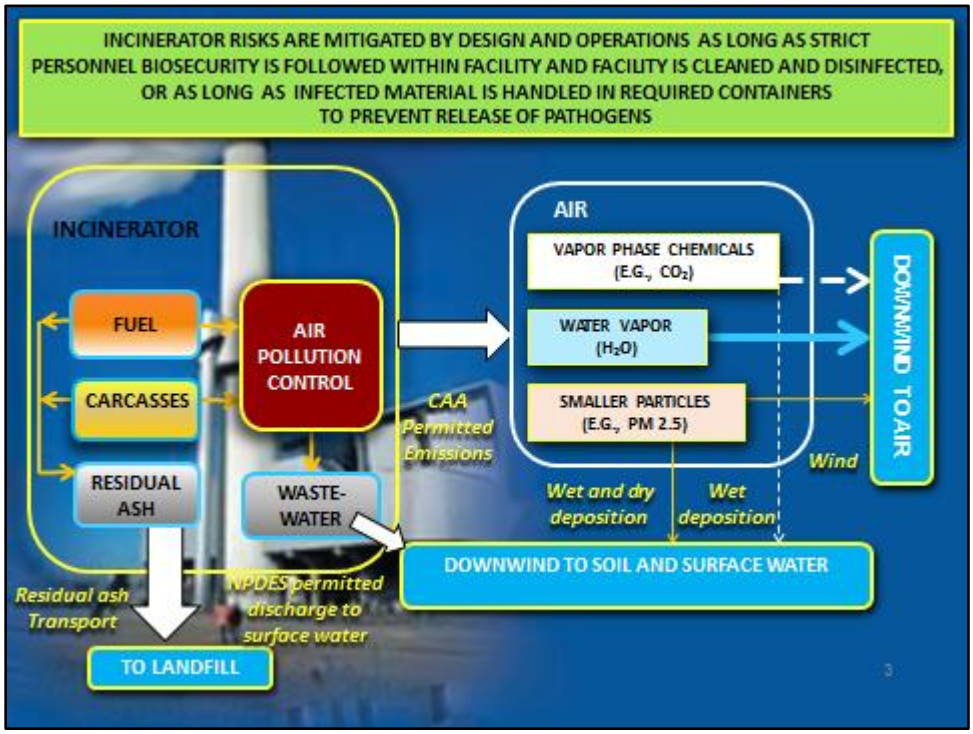
Carcass Management (cont.)

Thermal Methods

The biosecurity risks associated with off-site thermal methods include:

- Loading infected carcasses into bags or boxes for transport to incineration can create airborne particles that may harbor active pathogens. Minimizing handling and using dust suppression, when needed, can minimize this risk.
- Transport of infected carcasses can result in dispersion of airborne particles and liquid releases which can carry active pathogens. To minimize this risk, securely containing infected carcasses in leak-resistant, covered trucks, lining trucks with impermeable materials and covering them, or packaging the materials in secure containers will prevent release of pathogens.
- Offloading containers of infected carcasses at the incineration facility may generate airborne pathogens if the packages are opened. Thus, minimize handling and use dust suppression or containment to reduce this risk.

Figure 13. Incinerator Potential Risks (Click on Image to Enlarge It)



Carcass Management (cont.)

Thermal Methods, cont.

On-site thermal methods such as air curtain incineration or pyres, involves moving infected carcasses in vehicles from the barn or pen to the air curtain incinerator or pyre on the same premises, dumping the carcasses into the air curtain firebox/trench or onto the pyre, then burning the carcasses with other fuel such as wood, coal, and/or liquid fuel. Biosecurity risks and mitigations for on-site thermal methods are listed below.

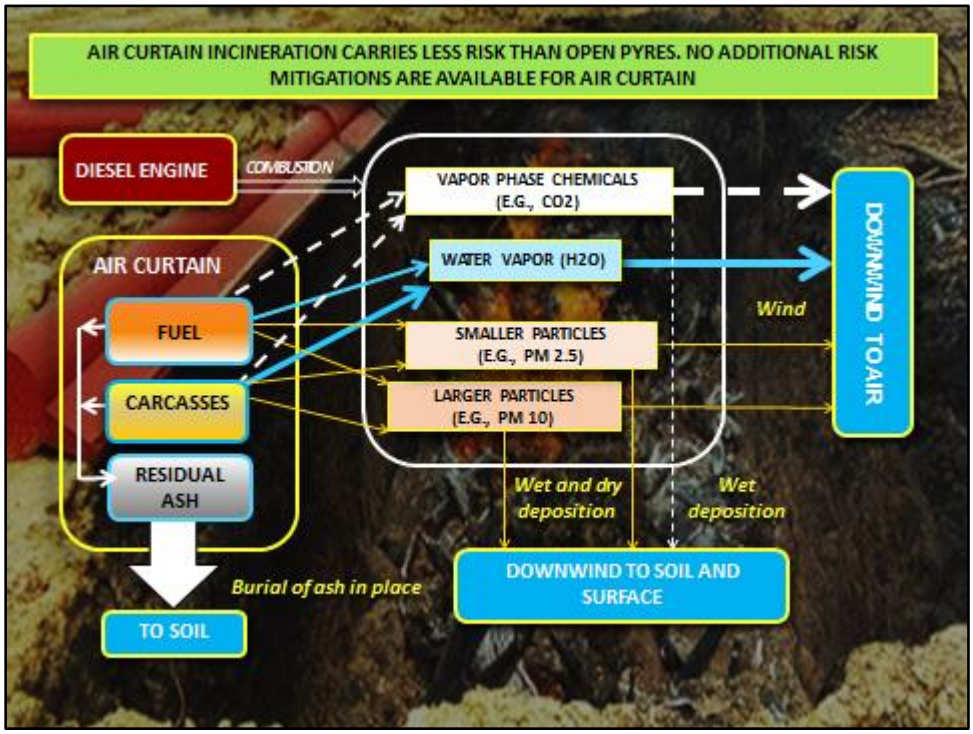
- Loading infected carcasses into the vehicle for transport to the on-site air curtain firebox/trench or pyre can create airborne particles that may harbor active pathogens. Minimizing handling and using dust suppression when needed can minimize this risk.
- Transport of infected carcasses can result in dispersion of airborne particles and liquid releases which can carry active pathogens. To minimize this risk, securely containing infected carcasses in leak-proof, covered trucks, lining trucks with impermeable materials and covering them, or packaging the materials in secure containers will prevent release of pathogens.

Carcass Management (cont.)

Thermal Methods (cont.)

- Offloading of infected carcasses at the on-site air curtain firebox/trench or pyre may generate airborne pathogens. To reduce the risk, minimize handling and use dust suppression or containment.
- Once the materials are ignited in the air curtain firebox/trench or pyre, it takes considerable time to fully combust the carcasses, which have high water content. During this period of incomplete combustion, airborne particles (soot, ash, steam) are emitted and could harbor active pathogens. Air curtain incinerators minimize this risk by containing the emissions inside the box or trench with a curtain of air.

Figure 14. Air Curtain Incineration Potential Risks (Click on Image to Enlarge It)



Transportation

Although not always possible, on-site carcass management is preferred from a biosecurity perspective so that biosecurity issues associated with transportation of carcasses are avoided. However, onsite options have serious limitations such as environmental harm with unlined burial; lack of carbon sources and inadequate space for composting; and limited throughput for transportable options, making transport likely if large herds or flocks are infected with a disease.

- Transportation requires thoughtful and extensive planning to ensure good biosecurity and to prevent further spread of disease
- Infected waste materials must be moved in closed, leak-resistant dumpsters or trucks and the exterior of the vehicle must be disinfected prior to transport
- Additional or secondary containment may be necessary

Refer to the Secure Transport Module for additional information.

Figure 15. Vehicle Cleaning & Disinfection

Operations Lesson Overview

This lesson contains general procedures in preparing for safe practices during an emergency animal response. This will help ensure that the carcass management process is conducted in a biosecure manner and that disposal group personnel are familiar with and exercise appropriate biosecurity measures.

The following topics will be briefly addressed:

- Briefing team members on aspects of the biosecurity effort
- Implementing site security and control measures
- Establishing visitor risk mitigation policies and practices
- Establishing and enforcing biosecurity and surveillance protocols
- Understanding work zone controls and establishing control zones
- Practicing contamination avoidance and prevention
- Employing decontamination practices

Operations Lesson Contents

This material in this lesson is presented in a step-wise manner that provides detailed instructions and key steps based on the criteria and measures instituted during recent U.S. animal disease outbreak responses.

- Briefings – Members involved in the biosecurity effort must be briefed on their duties, policies, and procedures such as biosecurity protocols
- Site Security – Introduces control measures designed to limit access to the infected premises by untrained personnel and visitors
- Visitor Risk Mitigation – Lists policies and practices for controlling movement of personnel visiting the potentially infected premises
- Biosecurity and Surveillance Protocol – Presents steps for establishing and enforcing biosecurity measures
- Work and Control Zones – Shows defined working areas and practices for instituting measures in each zone to prevent the spread of contamination
- Contamination Avoidance – Reviews procedures for preventing contamination and establishing a decontamination area
- Decontamination – Examines decontamination processes and procedures

Briefings

The Biosecurity Group Supervisor briefs Biosecurity Group Members on all aspects of the biosecurity effort, including their duties, policies, and procedures such as biosecurity protocols before entering the Hot Zone-EZ. The Biosecurity Group Supervisor regularly prepares briefings and reports for the Operations Section Chief and notifies him or her immediately of any problems.

Other briefings include:

- The site safety officer briefs all responders on safety precautions for each operation in accordance with the site-specific health and safety plan
- Orientation and Training Cell personnel brief C&D Group members on the nature of the disease and circumstances that might affect the response

Refer to the APHIS SOPS on Biosecurity for additional information.

Figure 16. Briefing the Carcass Management Team

Site Security

Place signs in the appropriate areas in the site to indicate instructions or precautions that site personnel and visitors must follow when entering the site.

All personnel entering the site must:

- Meet security requirements as established by the Incident Commander (IC)
- Present documentation of verified credentials showing they are qualified to perform their assigned tasks
- Present documentation that they have received all required briefings as defined in the site-specific biosecurity plan
- Wear the required PPE specified in the site specific health and safety plan

Each day prior to entering a potentially infected site for the first time, personnel perform the following tasks:

- Don PPE and use only clean equipment and supplies
- Verify that Biosecurity Control Zones are properly delineated
- Do not attempt to disinfect a surface without thoroughly cleaning it first

Visitor Risk Mitigation

In the event of an animal health emergency, the risk posed by visitors increases, especially if the premises are in or near the Control Area.

- The Biosecurity Group Supervisor consults with the Quarantine and Movement Control Group to establish policies for controlling access to quarantined areas and premises
- The closer a premises is to the IP, the greater the risk and need for strict biosecurity and C&D procedures
- In an outbreak, all visitors are considered high-risk, especially if the premises are located in a quarantined area

The following is a general discussion of risks posed by visitors to animal production facilities:

- Social visitors, veterinarians, equipment service technicians, salespeople, and delivery people are an example of the visitors a facility may have on a regular basis. The degree of risk can be classified as low, medium, or high, depending on the type of visitor and amount of animal contact.
- In the event of an animal health emergency, visits to the premises should be limited to essential personnel only; all visitors should be considered high risk.
- Producers should develop biosecurity protocols for all visitors and strictly enforce them.
- Producers should restrict visitor contact with animals as much as possible

Biosecurity Protocol

Government personnel, as well as other individuals, visit multiple premises routinely and can inadvertently come into contact with viruses and bacteria on these properties.

- Without the proper precautions, personnel can spread microorganisms to other premises
- Field personnel should make extraordinary efforts to prevent the spread of an agent to other facilities or animals and follow sound Biosecurity Practices to prevent spread of diseases in day-to-day operations (even when dealing with healthy animals)
- During a known emergency animal disease outbreak, animal health officials specify additional precautions that must be followed

All response personnel must take minimum biosecurity measures, which include:

- Wearing rubber boots (or other footwear that can be cleaned and disinfected) or disposable plastic boots
- Prior to entering or leaving an animal facility, removing all dirt and organic matter from boots and thoroughly disinfecting them
- Wearing disposable or reusable coveralls, laboratory coats, smocks, or other suitable outerwear when coming into contact with animals, manure, or secretions and disposing of or containing reusable coveralls for laundering.
- Thoroughly washing hands with soap and water prior to entering and when leaving a premises

Surveillance Biosecurity Protocol

The following protocol applies to surveillance or similar operations where responders travel to multiple potentially infected sites during the course of a workday. Below are procedures for beginning the process:

- Upon reaching the premises, park the vehicle in a location off the road and outside the entrance of the premises
    - Team members don boots and legs of Tyvek suits before leaving the vehicle then finish donning Tyvek suits, gloves, mask, and hair bonnet before proceeding. See the Health, Safety & PPE Module for details.
    - One team member remains by the vehicle and is considered the “clean team member”, who handles all clean equipment and forms
- The team member entering the premises will be considered exposed or contaminated and is designated the “dirty team member”
    - The clean team member hands equipment from the vehicle to the dirty team member
    - The dirty team member remains dirty for the entire day
- The dirty team member retrieves the sample bags containing the specimens which have been properly surface-disinfected with a chemical disinfectant prior to removal from premises. This prevents spread of infectious agents in the event that animal samples come back positive for disease.
- Properly decontaminates and disposes PPE (e.g., Tyvek suits, gloves, mask, hair bonnet) per protocol
- Disinfects vehicle tires. This is a sound biosecurity practice even during surveillance or routine operations.

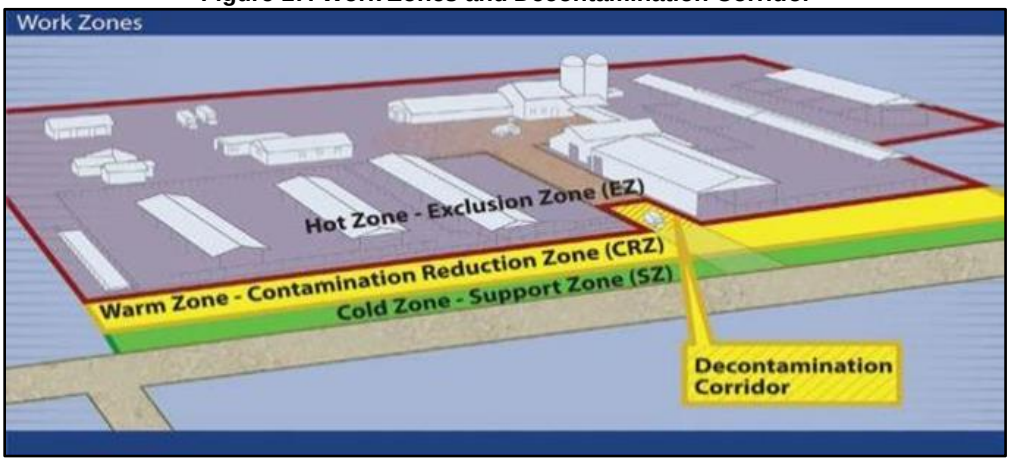
Work Zone Control

This protocol applies to depopulation, carcass management, and decontamination activities where response operations will occur in a single location over multiple days. Biosecurity Control Zones are established to prevent spread of contamination away from the IP. All work zones are adequately marked using signs, fencing, traffic cones, and caution tape.

There are three types of Control Zones:

- Exclusion Zone (EZ)—Hot Zone
- Contamination Reduction Zone (CRZ)—Warm Zone
- Support Zone (SZ)—Cold Zone

Figure 17. Work Zones and Decontamination Corridor



Establishing Control Zones

1. Demarcate the outer edge SZ with green tape. This provides a visual barrier for entry into the site. Only personnel who are a part of the operation may go beyond the green tape.
2. Demarcate the inner edge of the support zone with yellow tape. Beyond the yellow tape is the CRZ.
3. Place all tools, equipment, and water that will be used in the SZ between the green and yellow tape.
4. The CRZ worker and two exclusion workers don PPE in accordance with the site-specific health and safety plan.
5. The SZ worker remains in the SZ and does not need to don PPE.
6. Before entering the CRZ, the CRZ worker verifies that the exclusion workers are in full PPE compliance.
7. Exclusion workers establish the EZ by placing the red tape appropriately.
8. The CRZ worker places a tarp on the ground to establish the corridor for entering and exiting the CRZ from the SZ.
9. All required equipment is now transferred from the SZ to the CRZ. This includes all equipment required for C&D, depopulation, and preparation for carcass management.
10. Two exclusion workers enter the EZ with all equipment required for depopulation, carcass management, and decontamination.

Support Zone

The Support Zone (SZ) is the “cleanest” of the three zones and poses the lowest relative risk of exposure to pathogens and hazards such as decontamination chemicals. In this zone:

- Personnel are not required to wear PPE or handle contaminated articles or equipment, nor are they required to conduct decontamination
- Medical support is provided to personnel in this zone, and facilities are provided for personal needs such as eating, drinking, or bathroom use
- Equipment resupply and assembly takes place
- Donning of PPE occurs and accommodations for dressing are provided
- Management of all activities occurs, directing personnel and depopulation, decontamination, and carcass management activities
- This area is staffed by at least one person
- Workers are not exposed to hazardous conditions
- Administrative, clerical, and other support functions are based here
- Air and surface monitoring are conducted as needed to ensure that it remains uncontaminated
    - If contamination is detected, zone boundaries are adjusted until corrective action and monitoring results indicate that this zone is uncontaminated
- Access to the EZ and CRZ are strictly limited to individuals who meet all medical monitoring, training, and PPE requirements
- Visitors must receive appropriate training, be medically cleared to wear the appropriate level of protection, receive a safety briefing, and be escorted by designated personnel
    - Visitors not meeting requirements must remain in the support zone

Contamination Reduction Zone

The Contamination Reduction Zone (CRZ) is the high risk area with potential exposure to pathogens, as well as, chemical exposure to disinfectants. In the CRZ:

- Waste collection containers are decontaminated before transport off-site
- Personnel complete the final decontamination of equipment and personnel, perform final washing and rinsing, and apply disinfectant
    - Final doffing of personal protective equipment is completed
- There is a strict adherence to restrictions on movement of contaminated personnel and materials
    - At least one person remains in the CRZ to assist in the decontamination of those exiting the EZ
    - All personnel are required to wear full PPE
    - Decontamination of PPE takes place
- Based on monitoring results, the CRZ boundaries may be adjusted to ensure that the SZ remains uncontaminated
- Workers and equipment exit the EZ through the designated access points into the CRZ
- Workers and equipment are decontaminated, according to the procedures specified in the decontamination section of the site-specific biosecurity plan
- If necessary, emergency decontamination procedures are implemented
    - A decontamination corridor is established between the EZ and the CRZ where decontamination of personnel and equipment takes place
    - Response teams enter and exit the EZ through the access control points that are located at each end of the decontamination corridor

Exclusion Zone

The Exclusion Zone (EZ) is the potentially infected area, likely an area of a farm, local market, or roadside stand where infected animals have been stored and sold. This zone is where:

- Depopulation activities are performed and carcass management and decontamination may be performed depending on the situation
- Gross decontamination of equipment and personnel may be conducted to facilitate cleaning and disinfection in the CRZ
- PPE requirements can create risk of heat stress
- Workers will need to be monitored and rotated out with some frequency
- Staffing consists of at least a two-person team
- Personnel and equipment enter and exit via the designated access points
- Personnel adhere to established work procedures
- A “hotline” where personnel routinely enter or exit is located upwind from the EZ
- No person may exit until they have been properly decontaminated
- No person may enter the EZ without the proper level of PPE
- No person may enter the EZ prior to the establishment of a decontamination area
- Once entry has been made into the EZ, anyone who remains in the CRZ must be decontaminated or checked for contamination before they can exit into the SZ

Contamination Prevention

Preventing contamination is the most important step to avoid a decontamination process. Biosecurity measures include contamination avoidance activities as well as proper decontamination areas.

Procedures for contamination avoidance include the following:

- Do not walk through areas of obvious or known contamination
- Do not handle or touch contaminated materials directly
- Make sure all PPE has no cuts or tears prior to donning
- Fasten all closures on suits, covering with tape, if necessary
- Particular care should be taken to protect any skin injuries
- Stay upwind of airborne contaminants
- Do not carry cigarettes, gum, food, or drink into contaminated areas

Precautions to minimize contaminating equipment include the following:

- Limit the amount of contamination that comes into contact with heavy equipment and vehicles
- If contaminated tools are to be placed on non-contaminated equipment or vehicles for transport to the decontamination pad, use plastic to keep the equipment or vehicles clean
- If samples must be taken from a site, bag the sample containers and disinfect outer surface before removing them from the site

Decontamination Area

A decontamination area must be set up before any personnel or equipment may enter areas that pose the potential for exposure to hazardous substances. The minimum decontamination layout is explained and depicted below.

For large equipment and vehicles, the decontamination layout, consists of an impermeable liner sloped back to the EZ or an impermeable contained area so wash water can be collected and properly disposed. The impermeable liner or area is large enough to accommodate workers, pressure washers, detergent, and disinfectant supplies and equipment.

The roadway, in the figure below, indicates the location where vehicle decontamination will occur.

Figure 18. Equipment & Vehicle Decontamination Layout

Decontamination Area (cont.)

Figure below depicts the layout for both vehicle and trailer decontamination. The layout consists of an impermeable liner sloped back to an area so wash water can be collected and later properly disposed. The impermeable liner or area is large enough to accommodate workers, pressure washers, detergent, and disinfectant supplies and equipment.

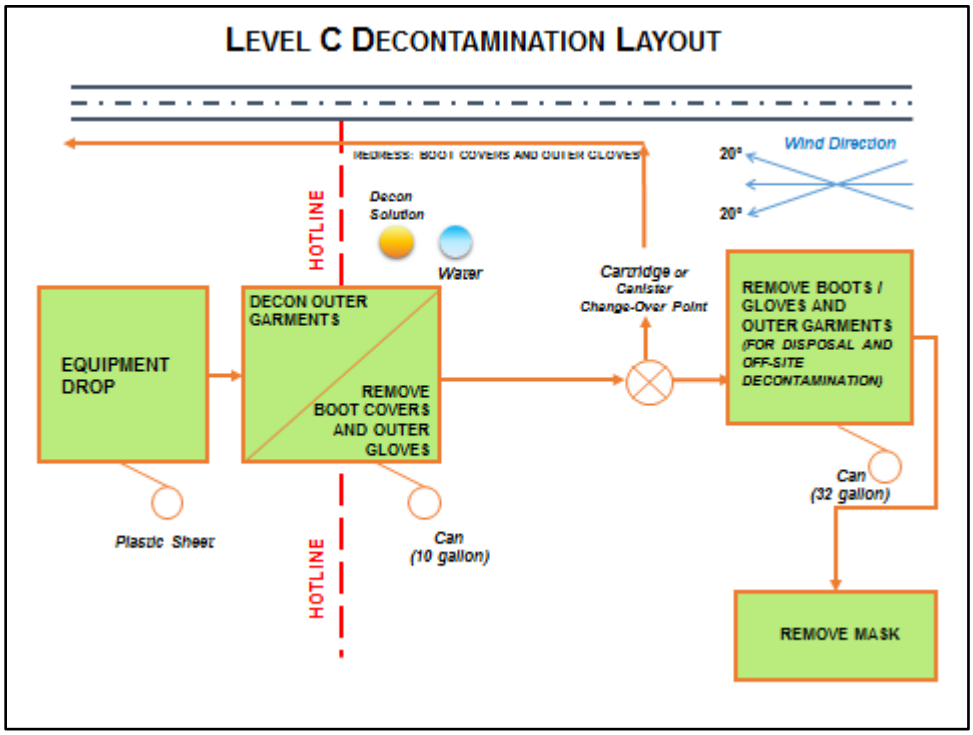
Figure 19. Trailer Cleaning & Disinfection Layout

Decontamination Area (cont.)

For personnel decontamination, the layout includes:

- The Equipment Drop Area (from left to right) is indicated by a rectangle with a circle below indicating the location of the Plastic sheet and a right pointing arrow to another rectangle divided by a diagonal line into the Decon Outer Garments area and the Remove Boot Covers and Outer Gloves area with a circle below indicating the location of a 10 gallon can
- A dashed line cutting vertically through this rectangle indicates the HOTLINE. To the right of the HOTLINE, above the rectangle, two circles indicate the location of the Decon Solution and Water. Two arrows continue from the second divided Decon rectangle to a circle marked with an X that has an upward pointing arrow that turns back toward the dashed HOTLINE to an area labelled Redress: Boot Covers and Outer Gloves, and crosses the dashed HOTLINE.
- Another arrow from the circle marked with an X continues to a rectangle indicating the area to Remove Boots/Gloves and Outer Garments (For Disposal and Off Site Decontamination) with a circle below indicating the location of a 32 gallon can. Another series of arrows pointing downward go to another rectangle, the Remove Mask final decontamination area.
- For additional information, see the OSHA Decontamination website

Figure 20. Level C Decon Layout (Click on Image to Enlarge It)



Decontamination Practices

Detailed steps for conducting decontamination can be found in the FAD PReP SOP: Cleaning and Disinfection and the APHIS SOPS on Biosecurity.

- Locating a decontamination station at the hotline in the decontamination area of the CRZ where personnel routinely enter or exit the EZ
- Upon exiting the EZ, personnel will doff overboots (if used), chemical-resistant boots, coveralls, and outer gloves at the specified decontamination station
- Instructing personnel in proper decontamination techniques, including removing protective clothing in an “inside out” manner
- Arranging the decontamination area to avoid contaminating the ground under and surrounding the area
- Retaining all doffed reusable PPE at the decontamination station for (cleaning/disinfection) and reuse

Figure 21. Personnel Cleaning & Disinfection Activities

Summary

Congratulations! You have completed the Biosecurity Module of the Introduction Module Series. In this module, you have learned to:

- Understand biosecurity principles, policies, and procedures for animal health incidents
- Recognize biosecurity implications associated with carcass management
- Understand foreign animal disease and zoonotic disease risks
- Describe the components of a comprehensive biosecurity plan
- Use operational guidance to implement biosecurity measures

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. Proceed to Home Page to begin the next module, Secure Transport.