

**STANDARD OPERATING PROCEDURES:
15. CLEANING AND DISINFECTION**

FAD PReP

**Foreign Animal Disease
Preparedness & Response Plan**



**United States
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Agriculture**

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The Foreign Animal Disease Preparedness and Response Plan (FAD PRReP) Standard Operating Procedures (SOPs) provide operational guidance for responding to an animal health emergency in the United States.

These draft SOPs are under ongoing review. This document was last updated in **January 2017**. Please send questions or comments to:

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Contents

15.1	Introduction.....	15-1
	15.1.1 Cleaning and Disinfection/Virus Elimination Overview	15-1
	15.1.1.1 Definitions	15-2
	15.1.2 Goals	15-2
	15.1.2.1 Preparedness Goals.....	15-2
	15.1.2.2 Response Goals	15-2
	15.1.3 Guidelines	15-2
	15.1.4 Coordination	15-3
	15.1.5 Assumed Ongoing or Completed Response Activities.....	15-3
15.2	Purpose.....	15-4
15.3	Responsibilities	15-4
	15.3.1 Overview.....	15-4
	15.3.2 Cleaning and Disinfection Personnel Responsibilities	15-4
	15.3.3 Cleaning and Disinfection Group Supervisor	15-6
	15.3.4 Site Manager	15-6
	15.3.5 Cleaning and Disinfection Team Leaders and Team Members.....	15-6
15.4	Cleaning and Disinfection/Virus Elimination Planning	15-6
	15.4.1 Assessment.....	15-6
	15.4.2 Site-Specific Cleaning and Disinfection (Virus Elimination) Plan	15-7
	15.4.2.1 Outline	15-8
	15.4.2.2 Review, Design, and Setup of the Premises	15-8
	15.4.2.3 Selection of Cleaning and Disinfection Methods.....	15-9
	15.4.2.4 Selection of Proper Disinfectants	15-10
	15.4.2.5 Personnel Requirements	15-11
	15.4.2.6 Personal Protective Equipment.....	15-12
	15.4.2.7 Cleaning and Disinfection of Equipment and Supplies.....	15-12
	15.4.2.8 Considerations	15-13
	15.4.2.9 Regulatory Permits and Approvals.....	15-14
	15.4.2.10 Site Security and Safety.....	15-14
	15.4.2.11 Quality Assurance/Quality Control	15-14
15.5	Cleaning and Disinfection/Virus Elimination Procedures.....	15-15
	15.5.1 Overview.....	15-15
	15.5.2 Cleaning Methods	15-16
	15.5.2.1 Dry Cleaning	15-16
	15.5.2.2 Wet Cleaning.....	15-17
	15.5.3 Evaluation of the Premises after Cleaning Procedures	15-18
	15.5.4 Disinfection Methods.....	15-19
	15.5.4.1 General Disinfectant Mixing Protocol.....	15-19
	15.5.4.2 Wet Disinfection Procedure	15-20
	15.5.4.3 Using Heat Treatment for Virus Elimination	15-21
	15.5.5 Procedures for Items Unable to be Cleaned and Disinfected	15-22
	15.5.6 Procedures for Premises Unable to be Cleaned and Disinfected.....	15-22
	15.5.7 Disposal.....	15-23

15.6	Post Cleaning and Disinfection.....	15-23
15.6.1	Evaluation of the Premises after Disinfection Procedures.....	15-23
15.6.2	Downtime.....	15-24
Attachment 15.A	Basic Cleaning and Disinfection Equipment and Supplies	15-25
Attachment 15.B	Cleaning and Disinfecting Respirators	15-26
Attachment 15.C	Disinfecting Slurry Pits	15-28
Attachment 15.D	Disinfecting Biohazardous Material Prior to Disposal.....	15-30
Attachment 15.E	Cleaning and Disinfecting Vehicles and Heavy Machinery.....	15-32
Attachment 15.F	Cleaning and Disinfecting Electronic and Euthanasia Equipment	15-35
Attachment 15.G	Cleaning and Disinfecting Egg Handling Materials.....	15-37
Attachment 15.H	Cleaning and Disinfecting Tankers, Lines, and Silos for Liquid Egg Products.....	15-41
Attachment 15.I	Egg Products Cleaning-in-Place Log.....	15-43
Attachment 15.K	Foot-and-Mouth Disease Animal By-Products	15-44
Attachment 15.L	References and Additional Resources	15-46
Attachment 15.M	Training.....	15-47
Attachment 15.N	Abbreviations	15-48

15.1 Introduction

The cleaning and disinfection (C&D) of equipment, materials, and premises is done to prevent or mitigate the spread of foreign animal diseases (FADs) during an outbreak. As part of a wider response, this helps to stabilize animal agriculture, the food supply, the economy, and to protect public health and the environment. This standard operating procedure (SOP) provides State Animal Health Officials, Animal and Plant Health Inspection Service (APHIS) personnel, and Incident Management Teams (IMTs) with guidance on choosing and using optimal C&D methods following an FAD outbreak in domestic livestock and poultry.

Several key APHIS documents complement this SOP and provide further detail when necessary. This SOP references the following APHIS documents:

- Foreign Animal Disease Preparedness and Response Plan (FAD PReP)/National Animal Health Emergency Management System (NAHEMS) Guidelines:
 - Biosecurity
 - C&D
 - Disposal
 - Health and Safety
 - Personal Protective Equipment (PPE)
 - Wildlife Management and Vector Control
- FAD PReP SOPs:
 - Biosecurity
 - Disposal
 - Health and Safety & PPE

Additional materials may be posted in response to specific disease outbreaks. These documents are available on the APHIS FAD PReP website: www.aphis.usda.gov/fadprep.

15.1.1 Cleaning and Disinfection/Virus Elimination Overview

During an FAD outbreak, C&D activities are conducted as a part of regular biosecurity operations (e.g., to disinfect vehicles) as well as to C&D previously infected premises to prevent the spread of disease and move towards restocking. The latter—the C&D of previously infected premises—can also be termed virus elimination. C&D is an effective means of lessening the threat of animal diseases by reducing the presence of pathogenic microorganisms and preventing the spread of disease agents. C&D can involve the use of physical, chemical, or biological processes to remove, inactivate, reduce, or destroy pathogenic microorganisms. Selected C&D methods should account for the physical characteristics of the premises and other factors, such as environmental conditions, which may influence the effectiveness of virus elimination.

15.1.1.1 Definitions

Table 15-1 lists relevant definitions. Virus elimination refers to the activities that are undertaken after depopulation and disposal on the premises, to return the premises to a “free” status. C&D, on the other hand, can refer to both activities conducted as part of biosecurity operations (including movement controls), as well as the measures that are conducted during virus elimination procedures.

Table 15-1. Cleaning and Disinfection Definitions

Cleaning	The removal of gross contamination, organic material, and debris from the premises or respective structures, via mechanical means like sweeping (dry cleaning) and/or the use of water and soap or detergent (wet cleaning). The goal is to minimize organic material so disinfection can be effective.
Disinfection	Methods used on surfaces to destroy or eliminate a specific species of infectious microorganism through physical (e.g., heat) or chemical (e.g., disinfectant) means. A combination of methods may be required.
Virus Elimination	C&D measures conducted with the primary purpose to destroy or eliminate all viruses on the premises as cost effectively as possible.

15.1.2 Goals

15.1.2.1 Preparedness Goals

The preparedness goals for C&D are as follows:

- Remove, inactivate, reduce, or destroy viruses on Infected Premises.
- Conduct C&D/virus elimination activities in the most cost effective manner possible.
- Choose appropriate C&D/virus elimination methods, based on the characteristics of the premises/houses, temperature, and other relevant factors.
- Conduct timely and effective initial C&D on all areas of the premises that do not have contaminated material (this includes vehicles and equipment), prior to final virus elimination activities on the entire premises.
- Conduct final virus elimination procedures in a timely manner.

15.1.2.2 Response Goals

The response goals for C&D are as follows:

- Ensure that C&D is conducted on any premises where a disease agent is presumed or confirmed to exist within 48 hours of disposal of depopulated animals.
- Remove, inactivate, reduce, or destroy pathogens at infected premises.

15.1.3 Guidelines

Proper C&D is essential to contain the spread of a disease agent and is an integral part of the eradication plan. Pest control must be completed before C&D can commence. Care must be taken to reduce the generation and dispersal of infective dust and aerosols. If items cannot be

adequately cleaned and disinfected, they must be disposed of by other appropriate means determined by the Incident Command.

If available personnel or materials are insufficient, Incident Command can request emergency 3D (depopulation, disposal, and decontamination) contractor support from the National Veterinary Stockpile (NVS).

15.1.4 Coordination

Key C&D coordination activities are as follows:

- Collaborate within the unified Incident Command personnel to develop an effective C&D strategy, including issues such as environmental conditions (e.g., relative humidity and wind).
- Determine supply requirements and delivery location, date, and time in collaboration with the Logistics Section.
- Arrange facility access and determine personnel requirements with the Operations Section.
- Prepare for and organize personnel supplies, equipment, and daily accommodations (e.g., food, water, and lodging) with the Logistics Section.
- Establish C&D stations that adhere to biosecurity measures, such as vehicle entry and movement control checkpoints with the Animal Biosecurity Group.
- Ensure that C&D and disposal processes are properly conducted with the Disposal Group.
- Coordinate with the property owner to ensure a smooth process.

15.1.5 Assumed Ongoing or Completed Response Activities

These procedures assume the following outbreak response activities are in progress or have been completed before C&D:

- Disease confirmation—*completed/ongoing*
- Movement control—*ongoing*
- Quarantine—*ongoing*
- Surveillance—*ongoing*
- Monitoring, countermeasure use, and vaccination—*ongoing*
- Biosecurity procedures—*ongoing*
- Security measures and crowd control—*completed/ongoing*
- Health and safety procedures—*ongoing*
- Effluent and runoff control—*ongoing*
- Appraisal and compensation—*completed*

-
- Depopulation—*completed/ongoing*
 - Disposal—*completed/ongoing*.

15.2 Purpose

This C&D SOP provides U.S. Department of Agriculture (USDA) APHIS Veterinary Services (VS) and other official response personnel with operational guidance on cleaning and disinfecting procedures for animal health emergency deployments. The guidance in this SOP is relevant in FAD outbreaks of varying sizes, whether the outbreak is isolated to a single premises or spans across States to multiple premises, because the Incident Command System (ICS) structure from which this SOP is based is both flexible and scalable. These procedures serve as guidance for response personnel performing C&D activities. If these procedures conflict with State, Tribal, Territorial, or local laws, regulations, or procedures, always follow the laws within your jurisdiction.

15.3 Responsibilities

15.3.1 Overview

The C&D Group is part of the Operations Section (see Figure 15-1 for an example of the ICS structure). The C&D Group provides services that are essential to an effective animal health emergency response by helping control and eliminate the disease agent. This section describes the responsibilities of C&D personnel as well as the importance of cooperation with the Disposal, Depopulation, and Appraisal Groups. This SOP also addresses the topics of hazard communication, exercising biosecurity measures, personnel orientation, and needs assessment.

The procedures described in this SOP and the *FAD PReP/NAHEMS Guidelines: C&D* are pertinent sources of guidance for C&D personnel. Participation in educational sessions and emergency response exercises is recommended to gain additional knowledge of C&D processes, methods, and safety considerations.

The Incident Commander oversees all activities (Planning, Operations, Finance/Administration, and Logistics) in large scale incidents involving multiple premises and covering large areas.

C&D activities are coordinated and overseen by the unified Incident Management Team from the Incident Command Post. After a C&D Group is established, depending on the incident, the C&D Group Supervisor may deploy one or more C&D teams to complete response activities. These teams may be either Task Force teams or Strike teams depending on incident requirements.

15.3.2 Cleaning and Disinfection Personnel Responsibilities

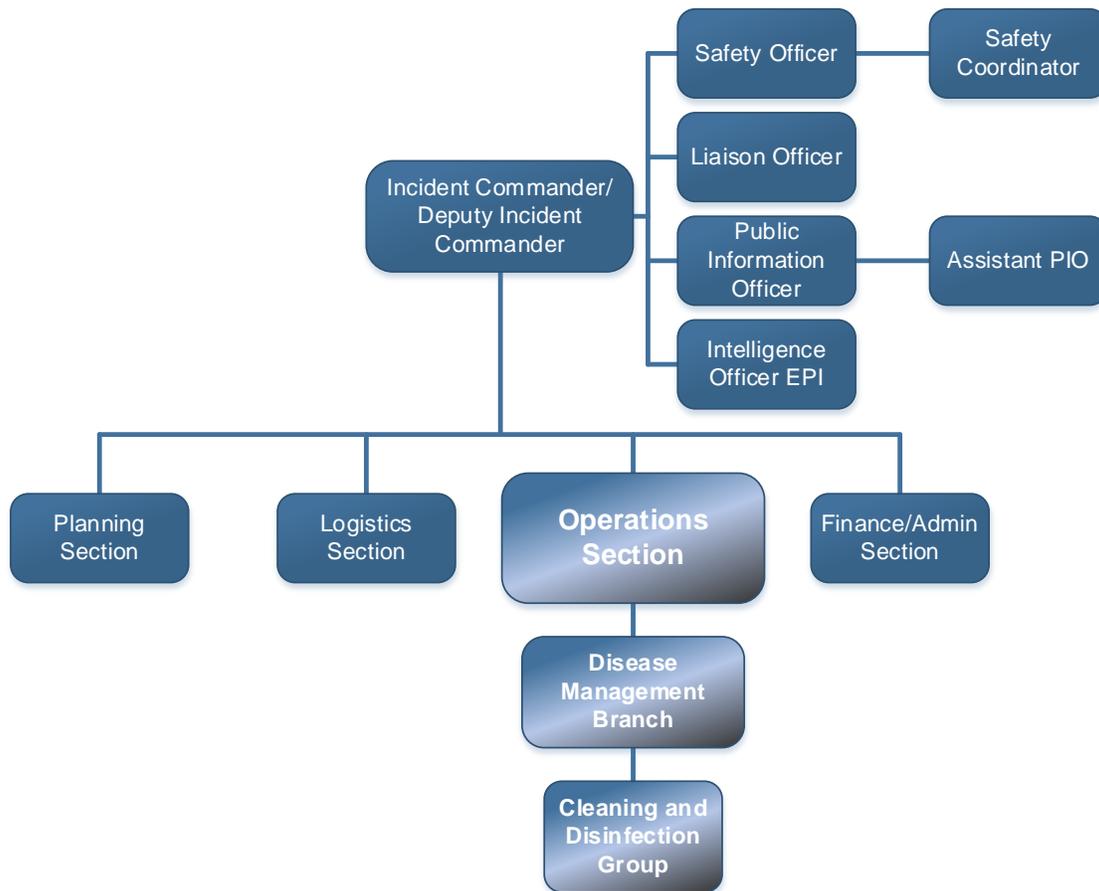
In general, the C&D Group is responsible for the following:

- Providing input on C&D/virus elimination procedures (for example, technical advice, briefings, and daily reports).
- Providing technical advice on C&D/virus elimination issues to owners or operators of Infected or Contact Premises.

- Coordinating closely with the Logistics Section to secure the necessary equipment and supplies.
- Coordinating C&D team activities with other ongoing response activities (such as surveillance, biosecurity, and disposal).
- Establishing, operating, and maintaining C&D stations as needed, including quarantined premises, controlled checkpoints for movement and vehicles, and decontamination stations.
- Providing personnel to supervise C&D/virus elimination activities.
- Scheduling and certifying C&D/virus elimination procedures on affected premises.

For more information on the responsibilities of C&D personnel, and for an overview of general C&D activities, please see the *FAD PReP/NAHEMS Guidelines: C&D* found at the FAD PReP APHIS website: www.aphis.usda.gov/fadprep.

Figure 15-1. Example of an Incident Command Structure¹



Note: EPI = Epidemiologist, PIO = Public Information Officer.

¹ The C&D Group falls under the Operations Section (a part of the Disease Management Branch) within the Incident Command Structure.

15.3.3 Cleaning and Disinfection Group Supervisor

The C&D Group Supervisor manages the cleaning and disinfecting process for infected premises. Responsibilities of this individual include directing and supervising all activities of the C&D personnel. A C&D Group Supervisor should have management and C&D experience in past incidents, as well as knowledge of animal disease. This position reports directly to the Operations Section Chief, who oversees all of the tactical operations of an incident.

15.3.4 Site Manager

On a single premises, the Site Manager is designated as oversight for daily operations and personnel. This individual assists with biosecurity, safety, and is the intermediary between all Groups on-site. The Site Manager is responsible for animal welfare, planning the site timeline, and the coordination of ordering resources. This position maintains communication between the IMT and the property owner regarding operational activity.

15.3.5 Cleaning and Disinfection Team Leaders and Team Members

C&D Team Leaders supervise the on-site activities of the C&D team (or C&D teams, depending on the size and needs of the Infected or Contact Premises). C&D Team Leaders have responsibility for one of the specific C&D functions, such as the individual C&D stations or checkpoints. In a large incident, different C&D Team Leaders may manage the functions of vehicle disinfection stations, equipment, supplies on quarantined premises (which will include on-site coordination with the Animal Biosecurity Group), and supervision of premises to be cleaned and disinfected.

The number of C&D team members will depend on the characteristics of the premises (number of buildings, size and separation of buildings, size of the area, sanitary conditions of the premises, and the time frame with which work can or must be completed). The C&D team consists of individuals who are experienced and skilled in C&D/virus elimination procedures and familiar with handling cleansers and disinfectants.

15.4 Cleaning and Disinfection/Virus Elimination Planning

Before beginning any C&D/virus elimination procedures, under guidance of the IMT, a situational assessment needs to be performed and a plan established so C&D/virus elimination response can ensure a well-coordinated approach. Proper planning helps to ensure the elimination or reduction of pathogens, prevents further movement of pathogens, and helps to ensure the safety of response personnel, animals, and the environment. It also minimizes the possibility that a lack of resources impedes the C&D/virus elimination process.

15.4.1 Assessment

In the assessment phase, information is gathered to assist with the planning of the C&D/virus elimination response. It includes the following (see Figure 15-2):

1. Identifying the FAD to be controlled or eliminated.

2. Conducting a situation assessment.
 - a. conduct a property assessment (location of electricity poles and lines, underground cables, phone lines, fuse box, and meter);
 - b. identify areas and items requiring specific C&D/virus elimination action;
 - c. identify any potentially hazardous situations; and
 - d. identify the location of drainages and run off destinations.
3. Estimating the time frame needed to address the situations.
4. Identifying areas requiring specific decontamination action.
5. Identifying any potential hazardous situation.

Figure 15-2. Assessment and Planning of C&D Procedures



Source: *FAD PReP/NAHEMS Guidelines: C&D*. Andrew Kingsbury, Iowa State University.

15.4.2 Site-Specific Cleaning and Disinfection (Virus Elimination) Plan

Information gathered during the assessment phase helps the C&D Group Supervisor effectively plan activities. In consultation with the owner (producer, agent, or designee) and the Site Manager, a site-specific plan is prepared. This plan should also address the details on proper disposal of materials (e.g., gross debris, chemical solutions) in a manner that minimizes the further spread of microorganisms that is compliant with Federal, State, Tribal, and local requirements and law.²

² USDA APHIS and Center for Food Security and Public Health (CFSPH). (2014). *FAD PReP/NAHEMS Guidelines: C&D*. Retrieved from APHIS FAD PReP website: www.aphis.usda.gov/fadprep.

15.4.2.1 Outline

A detailed written C&D/virus elimination plan should include the following:

- A review, design, and setup of the premises.
- Definition of the area to be cleaned and disinfected.
- Identification of appropriate locations for the C&D setup and process, and holding areas for:
 - vehicles and heavy equipment,
 - personnel, and
 - small equipment.
- Selection of Environmental Protection Agency (EPA) approved C&D products to be used.
- Description of proper C&D methods and processes to include:
 - cleaning,
 - disinfecting, and
 - downtime.
- Personnel requirements and assignments.
- Materials, supplies, and equipment.
- Regulatory permits and approvals.
- Plans for proper disposal of disinfectants and materials. (See the *FAD PReP/NAHEMS Guidelines: Disposal* and the *FAD PReP Disposal SOP*).
- Quality assurance and quality control.

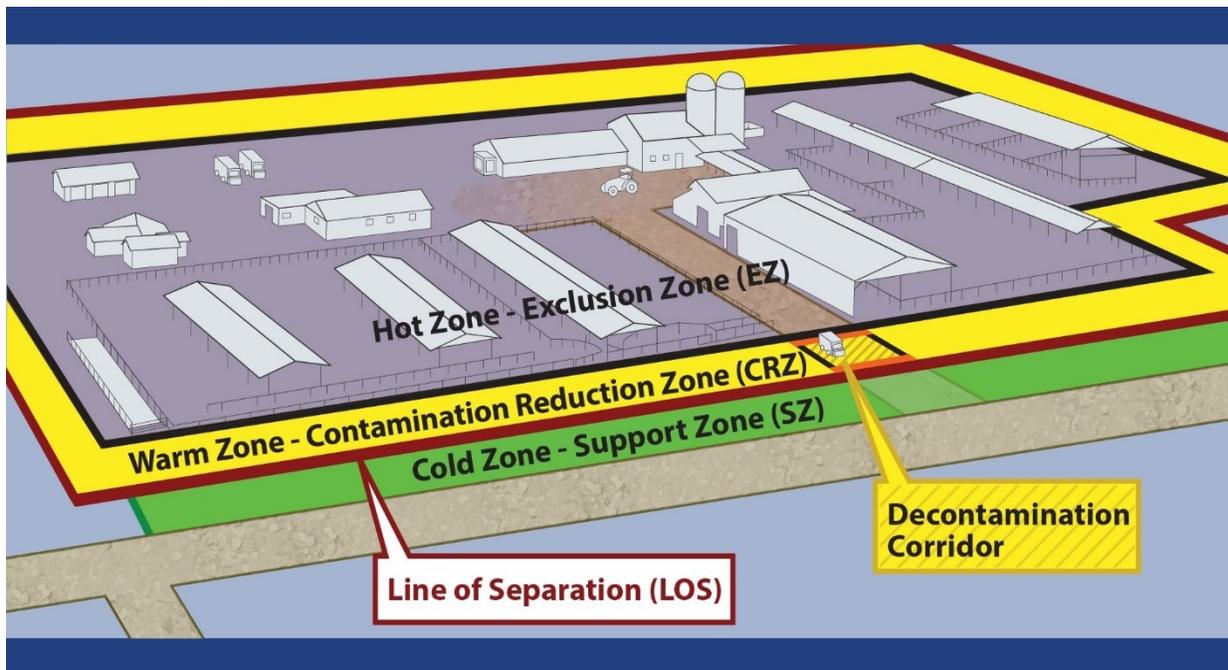
15.4.2.2 Review, Design, and Setup of the Premises

During the assessment phase, sufficient information is gathered to design and setup the premises for effective C&D/virus elimination. This part of the plan should include:

1. Selecting the most appropriate sites to conduct disinfection and decontamination for equipment and personnel. (See the *FAD PReP/NAHEMS Guidelines: C&D* for requirements to select disinfection and decontamination sites). The chosen location should
 - a. have minimal environmental impact; and
 - b. have adequate drainage per State, local, Tribal and Federal regulations.
2. Determining areas on the premises that need C&D/virus elimination. Consider the following, for example, when defining the C&D/virus elimination area:
 - c. Interior and exterior surfaces that need C&D.
 - d. Other structures or items such as fences that need C&D.

- e. Potential environmental risks for outdoor disinfection.
3. Designing and setting up the different stations, to include the following:
 - a. Holding areas, Hot Zone/Exclusion Zone (EZ), Warm Zone/Containment Reduction Zone (CRZ), and Cold Zone/Support Zone (SZ) for heavy equipment/machinery.
 - b. Holding areas, Hot Zone/EZ, Warm Zone/CRZ, and Cold Zone/SZ for small equipment and tools.
 - c. Hot Zone/EZ, Warm Zone/CRZ, and Cold Zone/SZ for personnel wash stations (see Figure 15-3).
 - d. Adequate privacy for personnel cleaning stations.
 - e. Placement of drainage pits, if needed, that are located away from sensitive environmental areas, such as wetlands or wellhead areas.
 - f. Areas for the placement of items for off-site disposal that require further processing such as decontamination and then transport to off-site facilities.
 - g. Placement of items for on-site disposal.

Figure 15-3. Biosecurity Control Zones



Source: Dani Ausen, Andrew Kingsbury, Iowa State University.

15.4.2.3 Selection of Cleaning and Disinfection Methods

The plan should also cover the various C&D/virus elimination methods that apply to that specific site. It must also specify the cleanliness and effectiveness to be achieved and identify the surfaces and structures to undergo C&D/virus elimination. There are different ways to accomplish C&D and a combination of methods may be necessary. (See the *FAD PReP/NAHEMS Guidelines: C&D* for guidance on choosing a C&D method.)

C&D methods may include

- steam cleaning or scrubbing by hand;
- shoveling, vacuuming, or sweeping out bulk materials;
- the chemical disinfectant to be used and its application (as a gas, liquid, foam, or powder) and whether those materials will be sprayed on; and
- physical (heat, ultraviolet light, or desiccation).

15.4.2.4 Selection of Proper Disinfectants

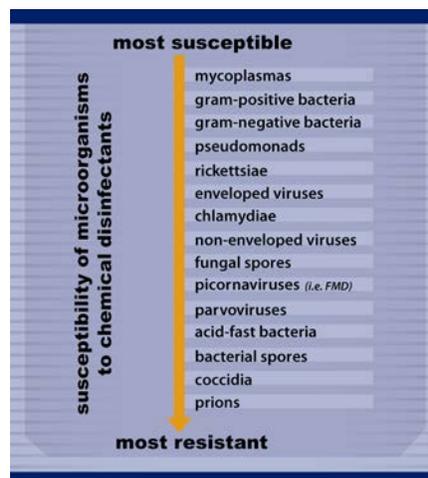
The requirements of the incident, specifically, the microorganism of concern, disinfection methods, and environmental factors all contribute to the disinfectant selection.

USDA APHIS recommends that the selection of the disinfectant and disinfection methodology should be based on EPA-registered labels for antimicrobial pesticides (that is, disinfectants). The label will be registered by the EPA either under Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 3 (regular label) or under FIFRA Section 18 (emergency use label). The disinfectant is used according to its registered label at the indicated dilution, use sites, application method, contact time, and cautionary statement against the pathogens specified on the label.

In addition, a registered disinfectant may be used according to label indication against pathogens not listed on the label (under a FIFRA Section 2[ee] exemption) provided that this use is not in conflict with State or local law. The non-label-listed pathogens should be equally or more sensitive to inactivation by the disinfectant than the heartiest pathogen listed on the registered label. The *FAD PReP/NAHEMS Guidelines: C&D* guidance includes recommendations regarding generally accepted disinfection practices.

Document, in the site-specific plan, the scientific rationale for instituting particular C&D parameters. (Figure 15-4 displays the susceptibility of different types of microorganisms to chemical disinfectants.)

Figure 15-4. Susceptibility of Microorganisms to Chemical Disinfectants



Source: Clint May and Andrew Kingsbury, Iowa State University.

If a non-EPA-registered disinfectant is determined to be the most effective, the IMT, Incident Command, or other Animal Health Official, must seek approval to use the non-EPA-registered disinfectant (see the EPA website on seeking exemptions at:

<http://www.epa.gov/opprd001/section18/>). Subsection [15.4.2.9](#), Regulatory Permits and Approvals, describes the process for obtaining permits for using a non-EPA-registered disinfectant. The EPA has approved the use of disinfection treatments, under the emergency exemption label, for hard, porous and nonporous food and non-food contact surfaces that are at risk of contamination for foot-and-mouth disease virus (FMDV), African swine fever virus, low pathogenic avian influenza virus, or highly pathogenic avian influenza virus.³

See the *FAD PReP/NAHEMS Guidelines: C&D* for guidance on using the appropriate disinfectant.

15.4.2.5 Personnel Requirements

Assessing the premises provides an understanding of the size and complexity of the C&D process. The number and expertise of the personnel required to conduct C&D depends on the quantity and size of the areas and buildings, the sanitary condition of the premises, and time frame the work is to be performed. The personnel components of the C&D plan must include the following:

1. An estimate of the required number of C&D personnel based on the size and scope of the job.
2. Identification of C&D members to fill the required amount needed. Use 3D contractors if necessary to fill positions.
3. Identification of specific briefings required before C&D activities, including safety requirements, site conditions, and specific tasks.
4. A determination of briefing frequency.
5. Training and credentialing requirements for C&D members and the verification of credentials, training, and security clearances. A summary of available training can be found in [Attachment 15.M](#).
 - a. If necessary, the IMT, and the Operations Section arranges to provide personnel with just-in-time training.
 - b. All personnel must be trained on basic C&D/virus elimination procedures, safety protocols, and briefed on the specific aspects of the incident. No one will be allowed to enter premises without verified credentials.
 - c. Include training on the safe handling of chemical compounds.
 - d. Discuss means of addressing and mitigating potentially hazardous situations noted during the pre-assessment phase.
6. The specific tasks for which a C&D member is responsible.

³ U.S. EPA. 2016. FIFRA Section 18 Emergency Exemption Label, Citric Acid. Available at https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/emergency-management/ct_disinfectants/.

The IMT works with Operations Section personnel to identify C&D personnel with the required expertise (as identified in the site-specific C&D plan). The IMT advises the Operations Section of any C&D personnel requirements that cannot be satisfied locally so that additional personnel can be assigned. Appropriate officials are also contacted by the IMT to coordinate the issuance of contracts and leases for equipment, supplies, or personnel for C&D operations.

If appropriate personnel are not readily available, contact the USDA APHIS VS NVS for access to 3D contractors.

15.4.2.6 Personal Protective Equipment

Personnel should only don PPE that they have been fully trained, medically cleared to use, and fit tested to wear. It is essential that personnel engaged in C&D wear at the least, coveralls, boots, and gloves. Face protection and a mask should also be worn during the mixing and application of disinfectant solutions, the production of significant amounts of dust, and the possibility of the presence of a zoonotic disease. Personnel must practice proper personal decontamination and doffing procedures, before leaving an infected premises or any Quarantined area, to prevent the spread of disease organisms.

See the *Foreign Animal Disease (FAD) Investigation Manual (FAD PReP Manual 4-0)* for PPE donning and doffing guidance. For more information on PPE, see the *FAD PReP Health and Safety & PPE SOPs*, the *Biosecurity SOPs*, and the *FAD PReP/NAHEMS Guidance: PPE and Health and Safety*. All documents are available on the FAD PReP APHIS website: www.aphis.usda.gov/fadprep.

15.4.2.7 Cleaning and Disinfection of Equipment and Supplies

Equipment needs will vary according to the specific situation. An assessment of the premises is conducted to help identify the specific equipment that is necessary. Pressure washing, and all other methods listed here, must be conducted as appropriate for the disease agent and other conditions, including environmental conditions. See [Attachment 15.A](#) for a list of basic C&D equipment and supplies. The C&D equipment and supplies component in the C&D plan must include the following:

1. Specify the materials, supplies, and equipment necessary to perform the C&D methods recommended in the plan.
2. Identify general equipment and supplies needed for C&D. They are as follows (see the site-specific C&D plan for specific requirements):
 - a. *Steam cleaning*. Steam-cleaning equipment, water, a generator, and fuel.
 - b. *Autoclave*. Fuel, or generator, and autoclaving bags.
 - c. *Pressure washing*. Pressure-washing equipment, water, a generator, fuel, detergent, mops, pumps, a collection system, and buckets.
 - d. *Scrubbing*. Brushes, extension handles, nonslip stepladders, detergent, water, mops, pumps, a collection system, and buckets.
 - e. *Vacuuming*. A vacuum, bags, filters, a generator, and fuel.

-
- f. *Brushing.* Brooms, brushes, dustpans and shovels, bags, and dust control.
 - g. *Demolition.* Pry bars, heavy equipment, rolloffs, liners, dust control, and trash bags.
 - h. *Chemical disinfection.* EPA-registered or exempted disinfectants, mixing apparatus, test strips to measure strength, dispensing equipment, containment system for preventing environmental release of concentrated disinfectants, safety cabinets, tarps, sandbags or booms, pumps, containers, and other equipment required for collecting and properly disposing of used disinfectant solution.
 - i. *Berming materials.* 4×4s, sand tubes, and sand bags.⁴
 - j. *Other equipment.* Plastic sheeting (> 2 millimeters thick), long-handled scrubbing brushes, sponges, buckets, towels, heavy-duty plastic garbage bags, framing materials, sump pump, power supply, and drums.⁵
3. Identify means for acquiring difficult-to-obtain equipment.
 4. Determine the supplies and equipment that may require special permitting.
 5. Identify means for obtaining the special permitting.

The Logistics Section provides the required equipment such as materials, detergents, and disinfectants identified by the C&D personnel. From the list of required C&D materials, supplies, and equipment in the site-specific C&D plan, the IMT identifies what is already available on site and orders unavailable items through the Logistics Section.

15.4.2.8 Considerations

The site-specific C&D plan also should address the following:

- A protocol for disinfecting common types of structures, pens, and equipment found in typical commercial operations.
- Estimation of the planned period of time to complete the C&D process.
- A process to certify and record that the premises, vehicles, and heavy and small equipment have been successfully cleaned and disinfected.
- Guidance for containment of waste water and disinfectants to protect susceptible area environments. Provide details on how to dispose of material (organic and inorganic) that minimizes the further spread of microorganisms and that is compliant with Federal, State, and local requirements and policies. (See the *FAD PReP Disposal SOP*).
- Provide a process for documenting, recording, and appraising items for fair market value that are exposed to or contaminated by disease value. See Title 9 Code of Federal Regulations Section 53.3 for more information on appraisal.

⁴ Missouri Department of Agriculture. (2008). Cleaning and Disinfection: Standard Operating Guide No. 004. In *Missouri Department of Agricultural Emergency Response Actions: Livestock Disease Emergency*. Retrieved from http://agriculture.mo.gov/animals/pdf/animalag_guide4.pdf.

⁵ Missouri Department of Agriculture. (2008). Cleaning and Disinfection: Standard Operating Guide No. 004. In *Missouri Department of Agricultural Emergency Response Actions: Livestock Disease Emergency*. Retrieved from http://agriculture.mo.gov/animals/pdf/animalag_guide4.pdf.

15.4.2.9 Regulatory Permits and Approvals

The unified Incident Command, in particular, the C&D Group, coordinates to obtain these regulatory permits and approvals, such as environmental permits and EPA approvals for various chemicals used during the C&D process.

The site-specific C&D plan should specify the approvals needed to perform C&D activities, for example:

- EPA exemption for emergency use of an unregistered pesticide or of a registered pesticide for a use not listed on the label, if applicable.
- Licensing of disinfectant applicators, if required.
- Testing and approval of C&D solutions before discharging them to the environment, as applicable (for example, testing the strength of a bleach solution using a Hach test kit).
- Other approvals, such as environmental permits.

See the *FAD PReP/NAHEMS Guidelines: C&D* for more information on C&D regulatory permits and approvals.

15.4.2.10 Site Security and Safety

All personnel entering the site must do the following:

- Meet security requirements as established by the Incident Command.
- 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 C&D plan.
- Wear required PPE as specified in the site-specific health and safety plan. (See the *FAD PReP Biosecurity SOPs*; the *Health and Safety & PPE SOPs*; and *FAD PReP/NAHEMS Guidelines: Biosecurity, Health and Safety, and PPE*.) All employees must follow Good Manufacturing Practices, Good Agricultural Practices, and the personnel hygiene and safety program that their company has established relating to PPE, biosecurity, and C&D protocols.
- Be familiar and appropriately prepared to prevent the various chemical and physical hazards associated with the C&D of premises. (See the *FAD PReP/NAHEMS Guidelines: C&D*.)

15.4.2.11 Quality Assurance/Quality Control

The C&D plan should outline all quality assurance/quality control metrics, including post C&D evaluation and inspections necessary to comply with the plan; for example, ensure that

- all personnel are trained on proper C&D/virus elimination procedures;
- all surfaces are cleaned before they are disinfected;

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- debris is removed and disposed of appropriately with visual inspection; and
 - required disinfectant concentrations and contact times are achieved, and sufficient quantitative verification tests confirm disinfection, if applicable.

15.5 Cleaning and Disinfection/Virus Elimination Procedures

The information provided here is for guidance only. The procedures offered below are to provide an example of the procedures that are conducted in response to an FAD outbreak; they do not indicate what *will* be done in an incident, or exactly *what or which* procedures will be implemented. In an FAD outbreak, specific guidance will be provided by the unified Incident Command on any C&D/virus elimination procedures.

15.5.1 Overview

The material composition (for example, concrete and metal) of an item or structure that requires C&D can impact the type of methods that should be used. (See *FAD PReP/NAHEMS Guidelines: C&D* for more information on the considerations and contraindications.)

The specific processes for C&D vary by the item to be cleaned and disinfected and are described below. This SOP includes item-specific C&D processes such as:

- Respirators ([Attachment 15.B](#))
- Slurry pits ([Attachment 15.C](#))
- Biohazardous materials ([Attachment 15.D](#))
- Vehicles and heavy machinery ([Attachment 15.E](#))
- Electronic and euthanasia equipment ([Attachment 15.F](#))
- Egg handling materials ([Attachment 15.G](#))
- Tankers, lines, and silos ([Attachment 15.H](#))
- Foot-and-mouth (FMD) animal by-products ([Attachment 15.K](#))

For general C&D, the following steps must be taken:

1. Wear adequate PPE as described in the site-specific health and safety plan during all steps of C&D. (See the *FAD PReP Biosecurity* and *FAD PReP Health and Safety & PPE SOPs*.)
2. Select an appropriate disinfection station for small equipment and personnel. (See the *FAD PReP/NAHEMS Guidelines: C&D* and the *FAD PReP Biosecurity SOP* for criteria on selecting appropriate disinfection locations.)
3. Remove sensitive equipment.
4. Consult with the Vector Control Group personnel on insect and vector control plans.
 - a. Remove dead insects and rodents and dispose of according to the site-specific disposal plan; consult with the Disposal Group. (See the *FAD PReP Disposal SOP*.)
 - b. Eliminate openings where wild animals and rodents can enter the building.

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5. Disconnect utility supplies if described in the plan. Acquire an alternative electric supply as an electrical source for cleaning.
 6. Control ventilation to maintain human comfort and prevent pathogen dispersion.
 7. Seal and disinfect all drains and run offs.
 8. Empty all watering and feeding apparatuses, disassembling if appropriate, to facilitate C&D.
 9. Conduct the dry cleaning; wet cleaning (washing, rinsing, and drying); disinfecting (mixing protocol; wet disinfection; and heat treatment); and downtime protocols as indicated by the unified Incident Command and discussed, as examples, in Subsections [15.5.2.1](#) to [15.5.4.3](#) and [15.6.2](#).
 10. Use a systematic procedure for C&D:
 - a. Always start at the back of the facility and proceed to the front.
 - b. Always begin application on the ceilings and move down the walls to the floor, then across the drain.
 11. Gather the cleaning and disinfecting equipment (for example, rakes, shovels, scrapers, brushes, trucks, spray/disinfection devices) and clean and disinfect these items (see [Attachment 15.A](#) for C&D equipment and supplies). Reapply disinfectant as needed to keep the surfaces wet for the required contact time.
 12. If the facility is fumigated, make the facility airtight after the cleaning and washing steps.

15.5.2 Cleaning Methods

Cleaning is one of the most important steps in the C&D process. The cleaning process can be executed as **dry cleaning and/or wet cleaning**. When done appropriately, cleaning alone can remove over 90 percent of microorganisms.⁶

15.5.2.1 Dry Cleaning

Dry cleaning involves the removal of any gross contamination and organic material (for example, soil, manure, bedding, and feed) from production areas or equipment. Consideration must be taken in selecting the best time and performing this particular systematic way of cleaning to not aerosolize viruses. Shovels, manure forks, brooms, and brushes should be used to sweep, scrape, and remove organic material and debris from surfaces. Heavy equipment (tractors or bobcats seen in Figure 15-5) may also be required to clear away and discard large amounts of bedding and manure.

The following steps for cleaning are recommended:

1. Minimize remaining organic material; in most cases the original surface should be visible on floors, walls, and fans (e.g., wood or metal).

⁶ USDA APHIS and CFSPH. (2014). *FAD PReP/NAHEMS Guidelines: C&D*. Retrieved from APHIS FAD PReP website: www.aphis.usda.gov/fadprep.

Figure 15-5. Heavy Equipment for Dry Cleaning



Source: FAD PReP/NAHEMS Guidelines: C&D

2. Refer to the unified Incident Command for guidance on how much organic material is acceptable to leave present on any surface, related to whether or not that surface is accessible to restocked animals.
3. Priority is to ensure all wet organic material is dry or removed. This is likely to be the most recent deposits to the site and thus, the most likely to have infectious material.
4. Ensure all remaining organic material dries; i.e., if weather has made material damp or wet, allow to dry naturally or remove. Drying is an effective way to destroy/eliminate the virus.
5. Dispose material appropriately, following unified Incident Command instructions.
6. For situations with stored manure or manure pits, State and APHIS officials will make a disposal determination with the IMT.

15.5.2.2 Wet Cleaning

Wet cleaning involves the use of water and soap or detergent.

15.5.2.2.1 Washing

Following the removal of gross contamination (dry cleaning), areas or items should be washed with detergent. The washing process helps to further reduce the number of microorganisms and to remove any oil, grease, or exudates that may inhibit the action of disinfection. Washing prior to disinfection is one of the most commonly overlooked steps in the C&D process.

The following steps for washing are recommended:

1. Obtain alternate power supplies if all electrical power will be shut off for washing.

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2. Turn off, unplug, and remove or tightly cover any electrical equipment with plastic sheeting. Contact an electrician if necessary.
 3. If necessary, use brushes to scrub all contaminated surfaces with water and detergent in accordance with the site-specific plan, ensuring that cleaned areas are free of dirt and debris. Warm water can aid in removing organic debris. Caked-on materials may require prolonged soaking time.
 4. Use warm to hot water (90–130°F [32–54°C] or higher).
 5. Flush, sanitize, and drain all components of the watering and feeding systems. If possible, remove and disassemble these devices to remove organic debris and permit proper cleaning. Flush, sanitize, and drain reservoirs.
 6. For ventilation components, individually clean fans, casings, motors, belts, curtains, ventilation pads, and louvers, ensuring they are free of manure, debris, dust, and dirt before disinfection. Individually wipe, clean, and sanitize equipment such as thermostats, scales, time clocks, electrical panels, switches, and light bulbs and protect them as needed from recontamination during the cleaning process.
 7. Dispose of all C&D solutions in accordance with the site-specific disposal plan.

15.5.2.2.2 *Rinsing and Drying*

After washing, all surfaces should be thoroughly rinsed, as residues from cleaners and detergent can inactivate certain chemical disinfectants.

The following steps for rinsing and drying are recommended:

1. Use clean, cold water that is under low pressure to rinse all contaminated surfaces to remove any remaining dirt, debris, and residue. This is necessary to remove any soap or detergent residue, which if present may inactivate several chemical disinfectants.
2. Visually inspect the surface for cleanliness; there should be no “beading”. Instead, the water should spread evenly over the surface. All surfaces should be free of all foreign matter.
3. Dispose of the rinse water in accordance with the site-specific plan.
4. Allow sufficient drying time (overnight) so no free liquids remain on the washed surfaces.

15.5.3 Evaluation of the Premises after Cleaning Procedures

An inspection is conducted after the cleaning of a premises is completed to ensure:

- Gross debris (for example, manure, unused feed, or bedding) have been removed.
- All grossly contaminated surfaces have been identified and sufficiently cleaned prior to disinfection procedures.
- Any contaminated wood or items difficult to clean have been appraised, removed, and disposed of in a manner that minimizes spread of pathogens (for example, burned, composted, or buried).

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- All fixtures and fittings have been dismantled and cleaned.
 - All infected or suspected areas have been properly washed, rinsed, and dried; visual inspection should be conducted to ensure surfaces are clean and no organic material has been left behind.
 - Effluent from the cleaning procedures has been handled in a manner to minimize or avoid environmental impact.

15.5.4 Disinfection Methods

This SOP provides examples for chemical disinfection methods; however, heat or ultraviolet radiation are other physical methods of disinfection. In fact, heat treatment was a key method of virus elimination during the 2014–2015 highly pathogenic avian influenza (HPAI) outbreak in the United States which is covered in Subsection [15.5.3.3](#).

For more information on heat treatment for virus elimination, see HPAI response guidance available at www.aphis.usda.gov.

The method of disinfection will depend on many factors; in any FAD outbreak, the unified Incident Command and National Incident Coordination Group (ICG) will provide guidance on virus elimination procedures. (See the *FAD PReP/NAHEMS Guidelines: C&D* for more detailed information on the different methods of disinfection (physical, soap and detergents, and chemical.)

1. Calculate the total surface area of the floor, ceiling, and walls. Approximately 100–150 square feet of surface area can typically be covered by one gallon of diluted disinfectant, but consult a subject matter expert to ensure the appropriate dilution.
2. Select the appropriate chemical disinfectant (see the *FAD PReP/NAHEMS Guidelines: C&D* on different types of chemical disinfectants) as specified in the site-specific plan.

15.5.4.1 General Disinfectant Mixing Protocol

The proper mixing of disinfectant is critical to achieving the right concentration for effective disinfection and the health and safety of C&D personnel. This section describes a general disinfectant mixing protocol:

1. Wear appropriate PPE when opening and mixing disinfectants. At minimum, wear disposable outwear (for example, coveralls, boots, hat, and gloves).
2. Ensure that the chemical disinfectant has been stored properly (a cool location is necessary to maximize shelf life) and is within the maximum shelf life before mixing. Check the product label for the expiration date. The shelf life of a disinfectant is not always noted on the label. In such situations, if there are concerns about the chemical's effectiveness, use a test kit. Test kits can help determine whether any chemical degradation of the disinfectant's active ingredients has occurred. Some chemical disinfectants come equipped with test kits (Figure 15-6).

Figure 15-6. Test Kits



Source: FAD PReP/NAHEMS Guidelines: C&D.

3. Calculate the required amount of disinfectant. For liquid chemical disinfectant solution, calculate the total surface area of the floor, walls, ceiling, and fixed equipment requiring treatment. In general, one gallon of diluted disinfectant usually covers approximately 100–150 square foot of surface area. Use test-kits to ensure that the diluted solution contains the necessary amount of active ingredient.
4. Ensure that the correct proportion of disinfectant concentrate is added to the correct volume of water.
5. Mix the required amount of disinfectant solution in accordance with label instructions or FIFRA Section 18 exemption criteria. Always add concentrate to water, not water to concentrate.
6. In cold temperatures, the building may require heating to ensure that the disinfectant is effective; please consult with a subject matter expert on disinfectant effectiveness.
7. Once a solution has been prepared, it must be used on the same day or it may become inactive. If there are concerns about the chemical's effectiveness, test kits can help to determine whether any chemical degradation of the disinfectant's active ingredients has occurred.

It may be necessary to maintain a log of the prepared solution; it is critical in minimizing excess solution preparation and maintaining the efficacy of the disinfectant.

For more information on the preparation and application of disinfectant, see the *FAD PReP/NAHEMS Guidelines: C&D*, at www.aphis.usda.gov/fadprep.

15.5.4.2 Wet Disinfection Procedure

Apply disinfectant in a pre-cleaned facility from top to bottom and from back to front. The time a disinfectant is in contact with the surface is important and varies with the type of disinfectant. Carefully follow the specific instructions on the disinfectant label. Reapplication of disinfectant may be necessary to achieve the product label-indicated contact time.

The following steps are recommended for general disinfection:

1. **Apply** the disinfectant to the contaminated surfaces in accordance with the site-specific plan and product label.
2. Ensure that the disinfectant has had adequate **contact time** as specified on the disinfectant label. Note that the recommended contact time will vary by the type of surface being treated, and reapplication of disinfectant may be necessary to achieve the product label-indicated contact time. (See the *FAD PReP/NAHEMS Guidelines: C&D on Material Composition* for more information.)
3. Completely **rinse** the chemical disinfectant with water, as it can likely cause harm to animals. Allow surfaces to thoroughly air **dry** before utilizing the area.
4. Ensure that any unused disinfectant concentrate and solution are either stored in accordance with the label instructions and the site-specific health and safety plan or properly disposed.

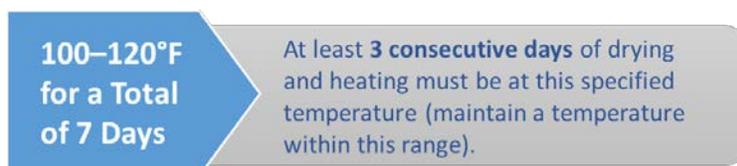
15.5.4.3 Using Heat Treatment for Virus Elimination

Cleaning followed by the application of wet disinfectant has been the common practice used to eliminate viruses on infected premises, such as HPAI. However, specifically for HPAI, dry cleaning and heating of houses/barns (also called heat treatment) was demonstrated as a cost-effective option as an accepted method of disinfection/virus elimination in recent HPAI outbreaks in the United States.

Any disinfectant method(s) selected should consider the characteristics of the premises/houses and other factors which may impact the effectiveness of the virus elimination activities. Heat treatment may not be appropriate in all situations. The C&D/virus elimination options selected and implemented must be included as part of the approved C&D plan and approved by State Animal Health Officials and APHIS.

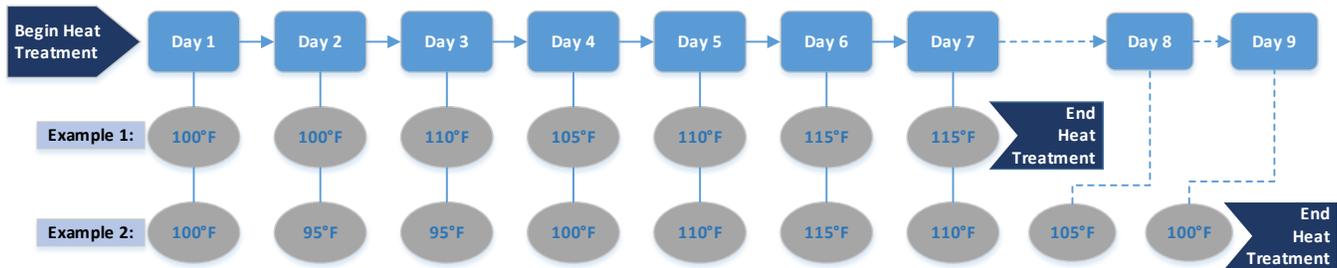
Heating barns/houses that have been dry cleaned is often the most efficient way to disinfect infected premises and destroy/eliminate viruses (e.g., HPAI). Current policy guidance (Figure 15-7), for HPAI only, states that barns/houses must be heated to between 100°F and 120°F for a total of 7 days; with at least 3 consecutive days (of the 7 days) of heating continuously to within this temperature range. To avoid damage to structures and fixtures, temperatures should not exceed 120°F.

Figure 15-7. Drying and Heating Specifications



See Figure 15-8 for two examples of a successful heat treatment that fulfills these requirements.

Figure 15-8. Example of Successful Heat Treatment



1. For the first example in Figure 15-8, the premises is able to maintain the barn at the specified temperature (between 100°F and 120°F) for 7 straight days. This fulfills the requirement for a total of 7 days at temperature, as well as 3 consecutive days at temperature.
2. In the second example, a heater breaks down at the same time the premises experiences severe cold weather temperatures. This premises is able to repair the heater quickly, but the temperature in the barn drops below 100°F for 2 days. In this case, the premises must heat the barn for a longer period of time to fulfill the requirement of 7 total days at temperature, with 3 consecutive days at temperature. However, the premises can count the first day at temperature towards the 7 total day requirement.

If a premises cannot meet the 7 day total requirement (between 100 and 120°F), in addition to the 3 consecutive day requirement at temperature for an extended period of time (greater than 2 weeks or as recommended by Incident Command), the premises may need to consider an alternative means of disinfection, in discussion with State and APHIS officials.

For further information, see HPAI response guidance available at www.aphis.usda.gov on virus elimination and heat treatment.

15.5.5 Procedures for Items Unable to be Cleaned and Disinfected

As previously mentioned, most items found in animal production situations (for example, wood, insulation, feed, and bedding) cannot be properly cleaned and disinfected. Special C&D considerations for specific materials can be found in the *FAD PReP/NAHEMS Guidelines: C&D*. Items identified for disposal must be disposed according to the disposal plan. (See the *FAD PReP/NAHEMS Guidelines: Disposal* and the *FAD PReP Disposal SOP*.)

15.5.6 Procedures for Premises Unable to be Cleaned and Disinfected

If a premises cannot be cleaned and disinfected, fallowing is recommended for 120-days or a period advised by the unified Incident Command. The fluctuation of temperature and season will affect this length of time suggested. Typically, fallowing should be reserved for premises that would need to be completely repaired or destroyed in order to be effectively cleaned and disinfected. However, there also may be production types/situations that do not allow for effective C&D. An inspection may be required by the State Animal Health Official or APHIS at the end of the fallow period.

15.5.7 Disposal

The site-specific disposal plan describes disposal options suitable for the specific site. Not all disposal options are appropriate for every type of waste generated. C&D personnel should coordinate with the Disposal Group on the proper way to dispose of disinfectant solutions, pesticides, and other waste items resulting from the C&D process and from C&D supplies to bedding, feed, and manure. Solid waste rules must be used to classify these materials.

15.5.7.1.1 *Disposal of Disinfectants (Concentrate and Waste)*

Any small amount of unused waste disinfectant concentrate should be disposed of according to the label instructions. Consult a qualified waste disposal professional for the disposal of larger quantities of disinfectant concentrate. No special procedures of disposal are required for small quantities of waste disinfectant solution resulting from excess spray and runoff. Large amounts of waste disinfectant must be collected, tested, characterized, and disposed of by the appropriate jurisdiction. If possible, it can be filtered and reused.

15.5.7.1.2 *Disposal of Pesticides*

The services of a licensed pesticide applicator should be obtained for pesticide use, in accordance with State law. The local authority solid waste management can provide guidance on the appropriate disposal process for pesticide waste.

15.5.7.1.3 *Disposal of Solid Waste*

Treat C&D supplies (e.g., towels and mops) as debris and properly disinfect them before removal from premises. Rendering is generally not applicable for manure, bedding, or feed; however, onsite composting can meet the needs of disposal for these materials as long as the site is suitable. If not, these materials will have to be securely transported to a permitted landfill, or disposed by one of the following options: regional composting, fixed incineration, open burning, unlined burial, or mobile technologies.

See the *FAD PReP/NAHEMS Guidelines: Disposal* and the *FAD PReP Disposal SOP* for additional guidance on disposal procedures for disinfectants, pesticides, and solid waste available on the APHIS FAD PReP website: www.aphis.usda.gov/fadprep.

15.6 Post Cleaning and Disinfection

15.6.1 Evaluation of the Premises after Disinfection Procedures

Following the disinfection of premises and equipment, an inspection should be conducted (by individual as designated by the unified Incident Command) to ensure that appropriate disinfection has been completed successfully. If there is any doubt or sign of inadequate procedures, additional measures may be required.

The evaluation assesses and confirms that the following have taken place:

- All grossly contaminated areas have been identified and properly disinfected with an appropriate disinfectant.

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- All personnel are aware of disinfection measures and implement them for themselves and their equipment (e.g., PPE, tools, and instruments).
 - Any contaminated wood or items difficult to disinfect have been appraised, removed, and disposed of in a manner that minimizes spread of pathogens (e.g., burned, composted, or buried).
 - All fixtures and fittings have been disinfected.
 - All infected or suspected areas have been properly disinfected.
 - An EPA-registered or exempted disinfectant that is effective against the target microorganism was used at the appropriate concentration.
 - The necessary contact time of the disinfectant was permitted.
 - Effluent from the disinfection procedures has been handled in a manner to minimize or avoid environmental impact.

For further information on premises evaluation elements, see the *FAD PReP/NAHEMS Guidelines: C&D* found at www.aphis.usda.gov/fadprep.

15.6.2 Downtime

In accordance with response plans and to verify that C&D is complete, the premises must have had adequate downtime prior to being restocked, regardless of the type of disinfection/virus elimination procedures that are conducted.

Take the following steps for downtime procedures:

1. As soon as the premises has been certified as clean and disinfected by the unified Incident Command, downtime may begin.
2. Diagnostic testing may be required depending on the disease agent; the unified Incident Command will provide guidance on restock testing.

Attachment 15.A Basic Cleaning and Disinfection Equipment and Supplies

The following is an EXAMPLE ONLY list of basic C&D equipment and supplies found in Appendix F in *FAD PReP/NAHEMS Guidance: C&D*. Other supplies may be necessary to properly complete C&D procedures.

Individual Equipment (Each member's personal equipment)

1 pair	Coveralls—cloth
2 pair	Coveralls—disposable
1 each	Coat—waterproof
1 each	Pants—waterproof
1 each	Hat—waterproof
1 pair	Gloves—heavy gauntlet rubber
5 pair	Gloves—surgical rubber (for fine work if needed)
3 each	Masks—surgical (if needed)
1 each	Respirator (if needed)

Hand Tools

2 each	Claws hammer
2 each	Pliers
2 each	Screwdriver
2 each	Philips screwdriver
2 each	Crescent wrench (12 inch)
2 each	Crowbar
2 each	Hatchet
2 dozen	Wire brushes (with scraper nose) Fiber brushes (long handled)
6 each	Pails (12–14 quart)
2 dozen	Sponges
1 each	Tent (or other shelter)
2 each	Axe
2 each	Shovels (flat)
2 each	Fork (manure)
3 each	Brooms (heavy)
4 each	Hoes
2 each	Garden rakes
2 each	Scrapers (long handled) (i.e., ice scrapers or straighten hoes)
2 each	Post-hole digger
3 each	Hose (3/4 inch x 25 foot)
1 each	Shop vacuum
1 each	Electrical cord (12 gauge—100 ft)

Power Tools and Equipment

1 each	Spray unit and tank
2 each	Spray nozzle
1 each	Safety can (5 gallon—with gas)
5 each	Hose (3.4 inch x 50 foot)

Miscellaneous

10 pair	Rubber gloves
4 each	Safety goggles
2 each	Plastic tub (10 gallon)
2 each	Metal cans (10 gallon)
2 each	Garbage can (galvanized—30 gallon)
100 each	Plastic bag (8 mil—50 gallon)—for debris
50 each	Plastic bag (4 mil—30 gallon)—for clothes and miscellaneous
1 each	First Aid kit with eye wash
1 gallon per person	Bottled water (in pint or quart portions)
1 quart per person	Sports drink
1 per person	Soap (for personnel decontamination)

Chemicals

1 gallon	Detergent (liquid) Virkon® S Bleach
100 lbs for 300 gallons working solution	Soda Ash (Sec. 18) (anhydrous sodium carbonate [Na ₂ CO ₃]) 4% w/v= 1 lb/3gallons water
50 lbs for 300 gallons working solution	Lye (Sec. 18) (sodium hydroxide [NaOH]) 2% w/v= 1 lb/6 gallons water) ⁷
	Test strips for disinfectant concentration
	Other suitable disinfectants

⁷ USDA APHIS has an exemption for use of this chemical to inactivate FAD agents.

Attachment 15.B Cleaning and Disinfecting Respirators

Respirators, if properly cleaned and disinfected, may be used as PPE again. Procedures for cleaning and disinfecting half and full respirators are detailed below.

For more information on respiratory protection C&D, consult with the Safety Officer at the IMT, as well as the Safety, Health, and Environmental Protection Branch of the Emergency Management, Safety, and Security Division.

Respirators must be cleaned after each use.

General Information

1. The process should always include these steps:
 - a. Cleaning
 - b. Disinfecting
 - c. Rinsing
 - d. Drying
 - e. Reassembly
 - f. Inspection and testing prior to use.
2. Respirators should be cleaned and disinfected in a way that does not damage the respirator or cause injury to personnel.

Procedures

These procedures are based on Occupational Safety and Health Administration guidelines:⁸

- A. Remove filters, cartridges, or canisters. Disassemble face pieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
- B. Wash components in warm (43 °C [110 °F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- C. Rinse components thoroughly in clean, warm (43 °C [110 °F] maximum), preferably running water. Drain.

⁸ U.S. Department of Labor—Occupational Safety and Health Administration. (1998). In *Appendix B-2 to § 1910.134: Respirator Cleaning Procedures (Mandatory)*. Retrieved from http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9782.

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- D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:
1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 °C (110 °F); or,
 2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 °C (110 °F); or,
 3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
- E. Rinse components thoroughly in clean, warm (43 °C [110 °F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on face pieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
- F. Components should be hand-dried with a clean lint-free cloth or air-dried.
- G. Reassemble face piece, replacing filters, cartridges, and canisters where necessary.
- H. Test the respirator to ensure that all components work properly.

Attachment 15.C Disinfecting Slurry Pits

Slurry pits contain liquid manure (or slurry), a combination of feces, urine, fresh rainwater and runoff, cleaning materials, and bedding materials. Different methods of rendering pathogens inactive within a slurry pit exist; however, the most practicable in the event of an outbreak is the use of chemical processes.

Refer to the unified Incident Command and the National ICG for further guidance on disinfecting slurry pits.

Planning

1. Assess the capacity of the slurry pit.
2. Acquire mobile high-performance stirring equipment.

Guidelines

1. Exercise appropriate safety precautions. Consider the following:
 - a. Noxious fumes such as carbon monoxide, carbon dioxide, hydrogen sulphide, ammonia, and methane may be released with mixing.
 - b. Always have a minimum of two personnel engaged in mixing or preparing the tanks, never one person working alone.
 - c. The area must be well ventilated.
 - d. Personnel should wear respirators, safety harnesses, and a lifeline.
 - e. Slurry must not be less than 30 cm from the top of the tank.
 - f. Never trust the “crust” on top of a tank to take weight.
2. No fresh slurry must be added to slurry pits undergoing disinfection.
3. Store slurry for at least 60 days in the summer and 90 days in the winter before application on pasture.
4. Do not allow animals to graze for a minimum of 30 days after slurry application.

Procedures for Disinfecting Slurry Pits⁹

1. Examine the slurry pit and determine the amount of remaining space.
 - a. The slurry pit should not be at maximum capacity to allow for the addition of chemical products for disinfection.
 - b. If the slurry pit is at maximum capacity, dig an alternative pit and line with plastic sheeting. Pump the slurry into the new pit for treatment.

⁹ Haas, B., Ahl, R., Bohm, R., & Strauch, D. (1995). Inactivation of viruses in liquid manure. *Scientific and Technical Review of the Office International des Epizooties*, 14(2), 435–445. Retrieved from <http://www.oie.int/doc/ged/D8958.PDF>.

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2. Vigorously stir the pit.
 3. Add the chemical disinfectant.
 - a. The chemicals should alter the pH to less than 2.0 or to greater than 11.0.
 - b. Ensure that the chemical disinfectant is properly distributed throughout the slurry pit.
 - c. Vigorously stir the chemicals in the pit for a minimum of 6 hours after application and on a daily basis for a minimum of 2 hours per day until the manure is considered safe.
 - d. Maintain at the required pH for a minimum of 7 days.

Attachment 15.D Disinfecting Biohazardous Material Prior to Disposal¹⁰

Some biohazardous materials, such as sharps and unused vaccines, must be appropriately disinfected prior to disposal. Decontamination is necessary to render an article safe for either reuse or disposal. The majority of biohazardous material is disinfected for the purposes of safe disposal and not reuse. Some biohazardous materials cannot achieve disinfection but only sanitization.

Treating these types of biohazardous materials can occur under these scenarios:

1. Professional biohazardous materials collection and processing is not available.
2. To limit the crossing of biosecurity lines under vaccination to kill scenarios, biohazardous materials must be disinfected on premises.
3. The site-specific disposal plan does not recommend or permit the thermal method for these biohazardous materials.

Planning

1. Determine whether the biohazardous materials, or which biohazardous materials, will be disposed on the premises or off site.
2. Obtain the required equipment to disinfect biohazardous materials such as:
 - a. autoclaves and autoclave bags and
 - b. PPE for operators.
3. Identify adequately trained personnel to operate the autoclave.
4. Check the equipment to ensure that it is properly operating.

Operations for Autoclaving

Autoclaving biohazardous materials is an adequate means of physical decontamination to render an article safe for disposal. The autoclaving process involves pressurized steam sterilization at 15 pounds per square inch (PSI) (1.05 kg/cm²), to achieve a chamber temperature of at least 121°C (250°F), which is effective at inactivating microorganisms. Autoclaving also is appropriate for disinfecting materials for reuse. However, following a FAD outbreak, autoclaving will be used for decontaminating items prior to disposal. Procedures for autoclaving biohazardous materials are described below; however, an autoclave may not be readily available.

If autoclaving is not an option, the sharps container must be treated as a fomite and handled accordingly.

¹⁰ USDA. (2009). USDA Policies and Procedures on Biohazardous Waste Decontamination, Management, and Quality Controls at Laboratories and Technical Facilities. In *Departmental Regulation Number: 9630-001*. Retrieved from https://www.ocio.usda.gov/sites/default/files/docs/2012/DR9630-001_0.htm.

Procedures

1. Retrieve the contaminated biohazardous materials at the autoclaving site. These items should have already been set aside in their proper locations.
2. Carry the contaminated materials to the autoclave in closed, leak-proof containers (autoclave bags).
3. Place the autoclave bags in polypropylene or stainless steel pans.
4. Ensure that the autoclave bags are loosely closed. This is necessary to allow steam to penetrate into the bag to maximize the decontamination.
5. Add water to the material (250–500 ml) to facilitate heat transfer of the material being decontaminated only if doing so does not facilitate the release of potentially infectious material from the bag.
6. Load and start the process.
7. The process begins when the autoclave has reached 121°C (250°F) and 15 PSI.
 - a. 90 minutes are recommended for the decontamination of waste in low-sided polypropylene containers with bags half-filled and loosely gathered.
 - b. 120 minutes are recommended for tightly packed bags.
 - c. See Table 15.G-1 for EPA recommended processing times.
8. After the cycle is complete, allow the pressure in the autoclave chamber to return to zero.
9. Ensure the pressure in the autoclave chamber has returned to zero.
10. Slowly open the autoclave door (remain behind the door) and allow the steam to gradually escape.
11. Allow materials inside the autoclave to cool for 15–30 minutes.
12. Operator must don appropriate PPE.
13. Remove the item from the autoclave.
14. Place the now decontaminated bagged items in the Cold Zone-SZ for off-site disposal at a landfill. (See the *FAD PReP Disposal SOP*.)

Table 15.G-1. EPA Recommended Decontamination Processing Times¹¹

Item	Time
Trash	60 minutes
Glassware (vaccine vials)	60 minutes
Liquids	60 minutes/gallon
Animal carcasses	8 hours
Animal bedding	8 hours

¹¹ USDA. (2009). USDA Policies and Procedures on Biohazardous Waste Decontamination, Management, and Quality Controls at Laboratories and Technical Facilities. In *Departmental Regulation Number: 9630-001*. Retrieved from https://www.ocio.usda.gov/sites/default/files/docs/2012/DR9630-001_0.htm.

Attachment 15.E Cleaning and Disinfecting Vehicles and Heavy Machinery

All vehicles (for example, cars, livestock carriers, feed trucks, milk trucks, and carcass transporters) and heavy machinery (for example, excavators, backhoes, and bulldozers) that have been used on infected premises must undergo proper C&D processes before departing the premises because of the potential to transport pathogens across premises. The cargo space of animal transport vehicles specifically need to undergo comprehensive C&D between animal loads as well.

See the *FAD PReP/NAHEMS Guidelines: C&D and Biosecurity* for more details on the C&D of vehicles and heavy machinery. For additional information on cleaning and disinfecting vehicles and heavy machinery, refer to the unified Incident Command for guidance.

Planning

1. Establish a large-scale disinfection station. (See the *FAD PReP/NAHEMS Guidelines: C&D* on site selection for guidance on choosing the appropriate location.)
2. Establish a holding area where disinfected vehicles can remain during the necessary disinfectant contact time.
3. Set up the disinfection station to contain spent fluids and debris from vehicles and heavy equipment, potentially by using berming materials (such as sand bags and straw bales). A pump may be used efficiently to collect drainage from C&D procedures into a holding tank. This washing and disinfection station should be large and strong enough to accommodate vehicles and heavy equipment:
 - a. The area should be made at least twice as big as the largest vehicle to allow adequate working room for the C&D personnel.
 - b. Place plywood sheeting on top of the material or the construction of ramps to protect the berms at the entrances and exits.

General Procedures

1. Don appropriate PPE such as rubber gloves and eye protection.
2. Remove the following items and set these items aside for C&D:
 - a. Equipment in the truck bed or trailer, or in the vehicle's trunk.
 - b. Fixtures and fittings.

Cleaning Procedures

1. Dispose of soiled bedding and refuse.
2. Use shovels, manure forks, brushes, low-pressure sprayers, or mechanical scrapers to remove all visible organic material from the exterior of the vehicle. Remove any deposits of mud and straw from the wheels, wheel wells, tires, mudguards, and exposed chassis of

the vehicle. Wheels and wheel wells can be a particular fomite that requires detailed attention to ensure proper C&D. It is essential that appropriate PPE be worn, especially when zoonotic disease agents are involved.

Washing Procedures

1. Use detergent and warm water (90°F–130°F) to wash the vehicle and removed items. Any deposits of mud and straw should be removed from the wheels, wheel wells, tires, mudguards, and exposed chassis of the vehicle.
2. Pre-soak items with debris that is difficult to remove with simple washing in detergent and warm water.
3. Rinse the vehicle in cold water. If that is not possible, allow the vehicle to sit for 5–10 minutes and allow the residual rinse water to drip off.

Exterior Disinfection

1. Select the appropriate disinfectant (See the U.S. [EPA-approved list](#).)
2. For vehicles and trailers, apply the disinfectant to the exterior of the vehicle, including the bodywork, wheels, and undercarriage. Figure 15.H-1 depicts responders disinfecting farm equipment.
3. Spray all areas, including the wheels, wheel wells, tires, mudguards, and exposed chassis of the vehicle with a non-corrosive disinfectant.
4. Allow ample wet disinfectant contact time according to label directions with the vehicle or trailer, rinse, and allow to dry thoroughly.

Figure 15.H-1. Washing Heavy Machinery



Source: Tegwin Taylor, Iowa State University.

Interior Cleaning and Disinfection

Interior disinfection of the vehicle is necessary if the driver leaves the cab. If so, all surfaces on the interior of the cab will need to be disinfected.

1. Remove all non-fixed items from the vehicle to be cleaned and disinfected.
2. Sweep and brush away any debris or mud from the cab's interior.
3. Wash and rinse the interior thoroughly, including floor mats.
4. A holding area can be used for vehicles to stay during the required disinfectant contact time.
5. Gather the C&D equipment (for example rakes, shovels, scrapers, brushes, trucks, manure spreaders, bucket loaders, and spray and disinfection devices) and clean and disinfect these items. Store in a secure location.

Documentation

Documentation is critical for tracking C&D procedures conducted for vehicles and heavy machinery. Log sheets should be used and stored in a logbook to record dates of C&D completion and all disinfectant information (type, quantity, preparation date, etc.).

All entries on log sheets should be written in ink, signed, and dated. One single line should be drawn through any errors made on a log sheet and then initialed and dated by the originator. Log sheets should not be removed from a logbook.

Attachment 15.F Cleaning and Disinfecting Electronic and Euthanasia Equipment

Some items may be difficult to clean and disinfect. Have these items appraised and then discard them.

Setup

1. Prepare the disinfectant. The disinfectant should be on the [EPA-approved list](#) of disinfectants.
2. Identify a disinfectant station for small equipment. The site should be near the entrance or exit points. The ideal site will be in proximity to a water supply and drainage.
3. Setup the C&D station on an impermeable surface (for example, plastic sheeting).

Procedures

Small Electronic Equipment

1. Dismantle if it is easily disassembled and reassembled.
2. Ensure that the selected disinfectant does not damage or corrode the equipment.
3. If the electrical equipment is airtight, it may be safely cleaned and disinfected by wiping it down with disinfectant or gently spraying with an appropriate disinfectant solution. The most practical method involves placing the equipment inside an airtight enclosure (for example, plastic sheeting) for fumigation.
4. If the small handheld equipment has been used inside a Quarantine Zone and has been protected inside a plastic bag
 - a. wipe down the protective plastic bags with disinfectant
 - b. wipe the body of the equipment with disinfectant, and
 - c. discard the plastic bag.

Equipment Used to Euthanize Livestock

Equipment such as captive-bolt guns and firearms are considered to be grossly contaminated. They need to be appropriately and regularly cleaned for the equipment to be in proper working order and safely decontaminated for the next user. Refer to unified Incident Command guidance for steps and frequency needed to properly C&D euthanization equipment. In general, be aware of the following:

1. Equipment must be dry cleaned regularly to remove gross contaminants.
2. Consult the euthanizing equipment manufacturer's guidelines and disinfect according to the product label. Captive bolt devices often have specific guidance for dismantling and disinfecting the bolt apparatus, including procedures for operator safety and types of disinfectant and oil to be used for cleaning.

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3. Failure to regularly clean and disinfect euthanizing equipment can cause poor performance and present a danger to operators.

Attachment 15.G Cleaning and Disinfecting Egg Handling Materials¹²

Egg handling materials covered in this attachment include:

- packing materials;
- plastic flats, pallets;
- dividers; and
- materials constructed of wood (pallets, divider board, and tic-tacs).

The following procedures provide minimum steps for the C&D of plastic, washable, egg handling materials. Alternative procedures/methods to accomplish C&D objectives may be used contingent upon specific

Disinfectants

Follow manufacturer's directions for concentration and for contact time when using EPA-approved disinfectants. Disinfectants should be applied to clean surfaces. Each operator should evaluate drying time post disinfectant application to ensure prescribed contact time is achieved.

Mechanical Washing and Sanitation of Plastic (Impervious Surfaces) Egg Handling Materials

Pre-Operation

1. Confirm that C&D equipment is clean and ready for operation.
2. Ensure that water levels are correct, temperature of wash water is at target temperature (90°F minimum), chemical supply lines for detergents and sanitizers are connected, concentrations are at suppliers (equipment) recommendations, and that fresh water supply line is open.
3. Record and sign operation log noting date and time, temperature of wash and rinse, detergent concentration, and chlorine concentration in rinse.

Operation

1. Introduce washable flats, pallets, and dividers (tic-tacs) into washing system after all pre-operation checks are successfully completed.
2. Maintain operating log noting:
 - a. temperature of wash and rinse waters,
 - b. detergent and chlorine concentrations, and
 - c. condition of wash water from excessive foaming and build-up of egg.

¹² Originally from the *Secure Egg Supply Plan, 2013*. Provided as guidance only. Please contact a subject matter expert and experienced personnel with any questions on concentration or flow levels.

Note: Systems using manual addition of detergents will require frequent monitoring for detergent and chemical strength compared to systems using online monitoring of detergent concentration. Chlorine in rinse must be at or above 50 ppm and less than 100 ppm.

3. Visually inspect after C&D to confirm that the egg handling materials are free of egg or other organic soil. If not clean, use a brush on observed areas and repeat the cleaning and sanitation cycle to completely remove any observed organic matter.
4. Make corrective changes as required to operate system within established ranges for temperature and chemical concentrations. Note and record corrective actions in the operating log.
5. At mid-shift, drain wash-water tank and perform mid-shift cleaning.
6. Repeat pre-operational checks before starting operations.

Manual Cleaning and Disinfection of Plastic (Impervious Surfaces) Egg Handling Materials

Pre-Operation

1. Review the [EPA-approved list](#) of registered disinfectants for suitable disinfectants.
2. Assemble equipment (brushes, high-pressure washer, low-pressure spray, or foaming equipment for sanitizer application) and don appropriate PPE.
3. Prepare detergent and sanitizer solutions following manufacturer's directions.
4. Maintain operating log noting temperature of wash and rinse waters, detergent, and sanitizer concentrations.

Operation

[Attachment 15.F](#), Cleaning and Disinfecting Electronic and Euthanasia Equipment, provides more details on manually cleaning and disinfecting equipment.

1. Dry clean by brushing or scraping to remove accumulated organic matter and soil.
2. Wash with detergent solution using brushes or high-pressure washer and rinse with clean water.
3. Inspect for cleanliness and repeat wash procedure if not clean.
4. Apply sanitizing solution and allow sanitizing surfaces to dry.

Manual Cleaning and Disinfection of Wood-Based (Porous Surfaces) Egg Handling Materials

Pre-Operation

1. Review the [EPA-approved list](#) of registered disinfectants for suitable disinfectants. Note that Lombardi et al. (2008) reported that citric acid (1 percent), calcium hypochlorite

(750 ppm), and iodine/acid based disinfectants were effective disinfectants on wood surfaces.¹³

2. Assemble appropriate equipment (PPE, brushes, high-pressure washer, low-pressure spray, or foaming equipment for sanitizer application) and prepare detergent and sanitizer solutions following manufacturer's directions.
3. Maintain operating log noting temperature of wash and rinse waters, detergent, and sanitizer concentrations.

Operation

1. Dry clean by brushing or scraping to remove accumulated organic matter and soil.
2. Wash with detergent solution using brushes or a high-pressure washer and rinse with clean water.
3. Inspect for cleanliness and repeat wash procedure if not clean.
4. Apply sanitizing solution and allow sanitizing surfaces to dry.

Post Operation Handling of Cleaned and Disinfected Egg Handling Materials

1. Clearly label cleaned and disinfected plastic egg handling materials palletized on clean pallet as "Cleaned and Disinfected."
 - a. Include date and time.
 - b. Additional labeling may be required when the cleaned and disinfected materials are to be returned to the farm of origin.
2. Store cleaned and disinfected materials in a dry area separate from those used for incoming shell eggs and unwashed egg handling materials.

Operations within Control Areas or Receiving Eggs from Flocks in a Control Area

Additional procedures and documentation are required when operating in a Control Area or receiving eggs from flocks in a Control Area, as defined by either the State Veterinarian's Office or an APHIS Veterinary Representative.

Operations include:

1. procedures for maintaining materials by flock of origin,
2. documentation confirming segregation of materials and return to origin if used,

¹³ Lombardi, M.E., et al. (2008). Inactivation of Avian Influenza Virus Using Common Detergents and Chemicals. *Avian Diseases*, 52, 118–123. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/18459307>.

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3. every location or company providing C&D procedures in cases where they have and handle non-washable types of materials in the event of an FAD outbreak or incident, and
 4. each company developing its own C&D report form; these forms should be available to be copied by others. Forms should include some type of checklist.

Paper Flats and Corrugated Cases

All paper flats and corrugated egg handling materials moving from Control Areas under permit will be segregated at receiving plant and disposed by incineration or other approved methods determined applicable for local circumstances. (For more information on appropriate disposal methods, see the *FAD PReP Disposal SOP*.)

Attachment 15.H Cleaning and Disinfecting Tankers, Lines, and Silos for Liquid Egg Products¹⁴

Tankers, lines, and silos will undergo cleaning-in-place (CIP). Procedures require appropriate system design to ensure wetting of all surfaces and maintenance of design velocity, temperature, and chemical strengths.

Procedures

1. Prepare CIP system as defined for the plant.
2. Execute CIP ensuring the minimal time, temperature, concentration, and flow requirements outlined in the following tables are met.

Tankers

Process	Time	Temperature	Concentration	Flow
Pre-rinse	5.0 minutes	Ambient		
Caustic Wash	7.0 minutes	150°F	1.5–2.5%	70 gal/min
Rinse	3.0 minutes	Ambient		
Sanitizer	2.0 minutes	Ambient	1500–2500 ppm	

Lines

Process	Time	Temperature	Concentration	Flow
Pre-rinse	5.0 minutes	Ambient		
Caustic Wash	10.0 minutes	150°F	1.5–2.5%	≥ 5 ft/sec
Rinse	5.0 minutes	Ambient		
Sanitizer	2.0 minutes	Ambient	1500–2500 ppm	

Note: Apply an acid rinse as needed to remove mineral build-up (minimum 5,000 ppm).

Silos

Process	Time	Temperature	Concentration	Flow
Pre-rinse	5.0 minutes	Ambient		
Caustic Wash	15.0 minutes	150°F	1.5–2.5%	70 gal/min
Rinse	5.0 minutes	Ambient		
Sanitizer	2.0 minutes	Ambient	1500–2500 ppm	

Note: Apply an acid rinse as needed to remove mineral build-up (minimum 5,000 ppm).

¹⁴ Originally from the *Secure Egg Supply Plan, 2013*. Provided as guidance only. Please contact a subject matter expert and experienced personnel with any questions on concentration or flow levels.

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3. Perform a visual inspection on the vessel at the completion of CIP.
 4. Document the steps of CIP on the Egg Products CIP Log ([Attachment 15.I](#)).

For more information on CIP procedures and requirements, please see *Supplement 2: Cleaning and Disinfection Guidelines* in the *Secure Egg Supply Plan* available at <http://www.secureeggsupply.com>.

Attachment 15.I Egg Products Cleaning-in-Place Log

The following is an example Egg Products CIP Log, originally from the *Secure Egg Supply Plan*.

Plant: _____

Date: _____

Vessel ID	Time CIP (start)	Time CIP (end)	Inspection	Initial

Perform a concentration check once per shift on a (1) silo, (2) tanker, and (3) line.

Shift 1

Vessel	Caustic Concentration	Sanitizer Concentration	Initial
Tanker			
Line			
Silo			

Shift 2

Vessel	Caustic Concentration	Sanitizer Concentration	Initial
Tanker			
Line			
Silo			

Shift 3

Vessel	Caustic Concentration	Sanitizer Concentration	Initial
Tanker			
Line			
Silo			

Supervisor Review: _____

Attachment 15.K Foot-and-Mouth Disease Animal By-Products

Hay, Bedding, and Feed

Some of the most contagious livestock diseases, such as foot-and-mouth (FMD), can survive for extended periods of time under the right climatic and environmental conditions and are transmissible on fomites. The FMD virus (FMDV) survives at 4°C for 2 months on wool, 2–3 months on feces or slurry, and reportedly can survive for more than 6 months on soil surface under snow.¹⁵ Items such as hay, bedding, and animal feed can be a considerable source of infection and will likely be disposed after they have been treated with a disinfectant. (For more information, see the *FAD PReP Disposal SOP*.)

1. Treat the hay, bedding, and feed with an [EPA-approved](#) disinfectant for treating the FMDV.
2. Allow appropriate contact time.
3. Prepare the items for disposal. (See the *FAD PReP Disposal SOP*.)

Wool¹⁶

Because the FMDV is transmissible via fomites, wool must be properly treated to prevent disease spread. Wool harvested from animals infected with FMD can harbor the virus for weeks depending on temperature and humidity levels. Viruses present in wool can be inactivated through industrial washing, chemical depilation, fumigation, industrial scouring, or storage.

Industrial Washing

Immerse the wool in a series of baths of water, soap, and sodium hydroxide (soda) or potassium hydroxide (potash).

Chemical Depilation

Use a depilatory consisting of slaked lime of sodium sulphide.

Fumigation

1. Add formaldehyde.
2. Hermetically seal the chamber for at least 24 hours.

¹⁵ Bartley, L.M., Donnelly, C.A., & Anderson, R.M. (2002). Review of foot-and-mouth disease virus survival in animal excretions and on fomites. *Veterinary Record*, 151(22), 667-669. Retrieved from <http://veterinaryrecord.bmj.com/>.

¹⁶ World Organization for Animal Health (OIE). (2016). Infection with Foot-and-Mouth Disease. In *Terrestrial Animal Health Code* (8.8.). Retrieved from <http://www.oie.int>.

Industrial Scouring

Immerse the wool in a water-soluble detergent held at 60–70°C.

Storage

Store the wool at 18°C for 4 weeks, or 4°C for 4 months, or 37°C for 8 days.

Attachment 15.L References and Additional Resources

- Bartley, L.M., Donnelly, C.A., & Anderson, R.M. (2002). Review of foot-and-mouth disease virus survival in animal excretions and on fomites. *Veterinary Record*, 151(22), 667-669. DOI:10.1136/vr.104011.
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Attachment 15.M Training

All personnel involved in C&D must be properly trained on the latest C&D techniques.

For training in pesticides usage, see the Ohio State University Extension course “[Pesticide Safety Education Program](#).” It offers an online course that focuses on pesticide labeling, pest management, pesticide formulations, pesticide hazards and first aid lessons, PPE, pesticides in the environment, pesticide transportation, storage and security, emergency response, planning the pesticide application, pesticide application and procedures, and Ohio and Federal laws and regulations. Courses can be purchased individually. See <http://pested.osu.edu/> for more information.

Purdue University’s Biosecurity Center Organization offers a Veterinary Homeland Security Graduate Certification Program. The class “[Biosecurity for Veterinary Responders](#)” discusses “Basic Principles of Cleaning and Disinfection.” See <http://www.biosecuritycenter.org/> for more information on the certificate program and course offerings.

The National Animal Health Emergency Response Corps (NAHERC) training site provides a general C&D course. New users must create a login to access the free training at <http://naherc.cfsph.iastate.edu/>.

Attachment 15.N Abbreviations

3D	depopulation, disposal, and decontamination
APHIS	Animal and Plant Health Inspection Service
C&D	cleaning and disinfection
CFSPH	Center for Food Security and Public Health
CIP	cleaning-in-place
CRZ	Contamination Reduction Zone
EPA	Environmental Protection Agency
EPI	Epidemiologist
EZ	Exclusion Zone
FAD	foreign animal disease
FAD PReP	Foreign Animal Disease Preparedness and Response Plan
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FMD	foot-and-mouth disease
FMDV	foot-and-mouth disease virus
HPAI	highly pathogenic avian influenza
ICG	Incident Coordination Group
ICS	Incident Command System
IMT	Incident Management Team
LOS	line of separation
NAHEMS	National Animal Health Emergency Management System
NAHERC	National Animal Health Emergency Response Corps
NVS	National Veterinary Stockpile
OIE	World Organization for Animal Health

PIO	Public Information Officer
PPE	personal protective equipment
PSI	pounds per square inch
SOP	standard operating procedure
SZ	Support Zone
USDA	United States Department of Agriculture
VS	Veterinary Services