



**USAID** | **DELIVER PROJECT**  
FROM THE AMERICAN PEOPLE

# GENERAL INSTRUCTIONS

## DEPOPULATION, DECONTAMINATION, AND DISPOSAL (3-D) KIT

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# **GENERAL INSTRUCTIONS**

## **DEPOPULATION, DECONTAMINATION, AND DISPOSAL (3-D) KIT**

**USAID | DELIVER PROJECT, Task Order 2**

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# ACRONYMS

3-D Kit	Depopulation, Decontamination, and Disposal (3-D) Kit
AED	Academy for Educational Development
AI	avian influenza (bird flu)
AIIS	Avian Influenza International Stockpile
CRZ	Contamination Reduction Zone
DAI	Development Alternatives, Inc.
EU	European Union
FAO	Food and Agriculture Organization
H5N1	influenza A virus subtype
OIE	World Organization for Animal Health
PPE	personal protective equipment
SBS	surveillance and biosecurity
SOP	standard operating procedure
USAID	U.S. Agency for International Development
USDA	U.S. Department of Agriculture



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# INTRODUCTION

To support the containment of and response to a highly pathogenic avian influenza outbreak in recipient countries throughout the globe, the U.S. Agency for International Development (USAID) maintains the Avian Influenza International Stockpile (AIIS). The stockpile contains personal protective equipment (PPE) kits, decontamination kits, and laboratory specimen collection kits. In response to the recommendations from the USAID AIIS Commodity Review Meeting in September 2007 and the USAID Decontamination Kit Review Meeting in April 2008, the USAID Avian Influenza (AI) Unit is replacing the current decontamination kit with two new kits for responding to and containing an avian influenza outbreak: the Depopulation, Decontamination, and Disposal (3-D) Kit and the Surveillance Biosecurity Kit.

In August 2008, to ensure consistency with the expert panel's recommendations and to maintain the technical integrity of the new kits—the USAID | DELIVER PROJECT, Task Order 2, implemented by John Snow, Inc.; and with support from USAID's Avian Influenza Unit; and partners, the Academy for Educational Development (AED) and the Development Alternatives, Inc. (DAI)—hosted a kit instructions development workshop. At the workshop, bio-hazard response experts, who had participated in previous focus groups, developed step-by-step instructions on how to use the 3-D and Surveillance Biosecurity Kits, based on the deployment approach outlined in USAID Decontamination Kit Review. In addition to step-by-step instructions, the biohazard response experts prepared standard operating procedures (SOPs) and operational checklists for correctly deploying the kits.



# INTENDED USE OF THE KIT

USAID’s Depopulation, Decontamination, and Disposal Kit (3-D Kit) will provide first responders with an emergency supply of the critical equipment needed to safely carry out an initial outbreak response to highly pathogenic avian influenza. To prevent the spread of the virus to humans and other susceptible species, the first responders will use the equipment to ensure biosecurity, while safely performing poultry depopulation, disposal and cleaning, and disinfection.

The USAID 3-D Kit—

complies with the U.S. Department of Agriculture’s (USDA) best practices, the European Union (EU) and World Organization for Animal Health (OIE) guidelines, and the rapid response section outlined in the Food and Agriculture Organization (FAO) document, “Preparing for Highly Pathogenic Avian Influenza.”

- supports the health and safety of a four-person response team in the infected area
- enables the depopulation of up to 200 poultry, in a reasonable amount of time
- provides for the safe containment and disposal of contaminated material
- enables staff to effectively clean and disinfect contaminated equipment, personnel, and premises.

Personnel should consistently deploy the USAID 3-D Kit, using best practices in worker safety, zoning or quarantine protocols, biosecurity methods, depopulation techniques, and cleaning and disinfecting principles.



# INTENDED USERS OF THE KIT

Users of the 3-D Kit will be restricted to personnel who enter the Infected Premise and Exclusion Zone to depopulate birds; clean and decontaminate the site and equipment; and dispose of contaminated materials, equipment, and carcasses. It should be noted that the 3-D Kit will only be deployed and used when an infected area has been identified and, to limit and control the spread of the virus, actions must be taken at the Infected Area or Exclusion Zone. In addition, all personnel that use the 3-D Kit must strictly adhere to PPE donning and doffing procedures and decontamination protocols. Furthermore, personnel will have access to the Infected Premise and Exclusion Zone only after they have received a brief training on the PPE protocols, including decontamination procedures. This requirement will ensure the continuation of biosecurity and will prevent the accidental spread of the virus to other animals and humans.



# FRAMEWORK FOR KIT DEPLOYMENT

Following the recommended practices and procedures for responding to an identified outbreak of avian influenza, as outlined in the FAO document, *Preparing for Highly Pathogenic Avian Influenza*,<sup>1</sup> the biohazard expert panel used the following framework to establish the appropriate actions required to support adequate control of the influenza A virus subtype (H5N1). This framework follows the OIE, USDA, and biohazard response industry's best practices. Because different countries and different organizations may not use the same terminology for each of the following quarantine areas, and to encourage the broadest possible understanding of the framework for deployment of the USAID AIIS kits, the panel kept the FAO and current USAID language.

After an outbreak is identified, the outbreak site becomes the center of a series of concentric zones of containment. Movement in these zones is controlled in and out of the contaminated area; and the location of disease surveillance, bird depopulation, disposal, and decontamination activities<sup>2</sup> are delineated. All the activities within the zones are intended to contain the spread of the virus to neighboring areas. Typically, the outbreak site has the following zones:

- an outside perimeter at 10 kilometers from the center of the outbreak site (furthest from the outbreak site)
- another inner perimeter at 3 kilometers from the outbreak center
- one zone within the 1 kilometer radius of the outbreak center (infected area).

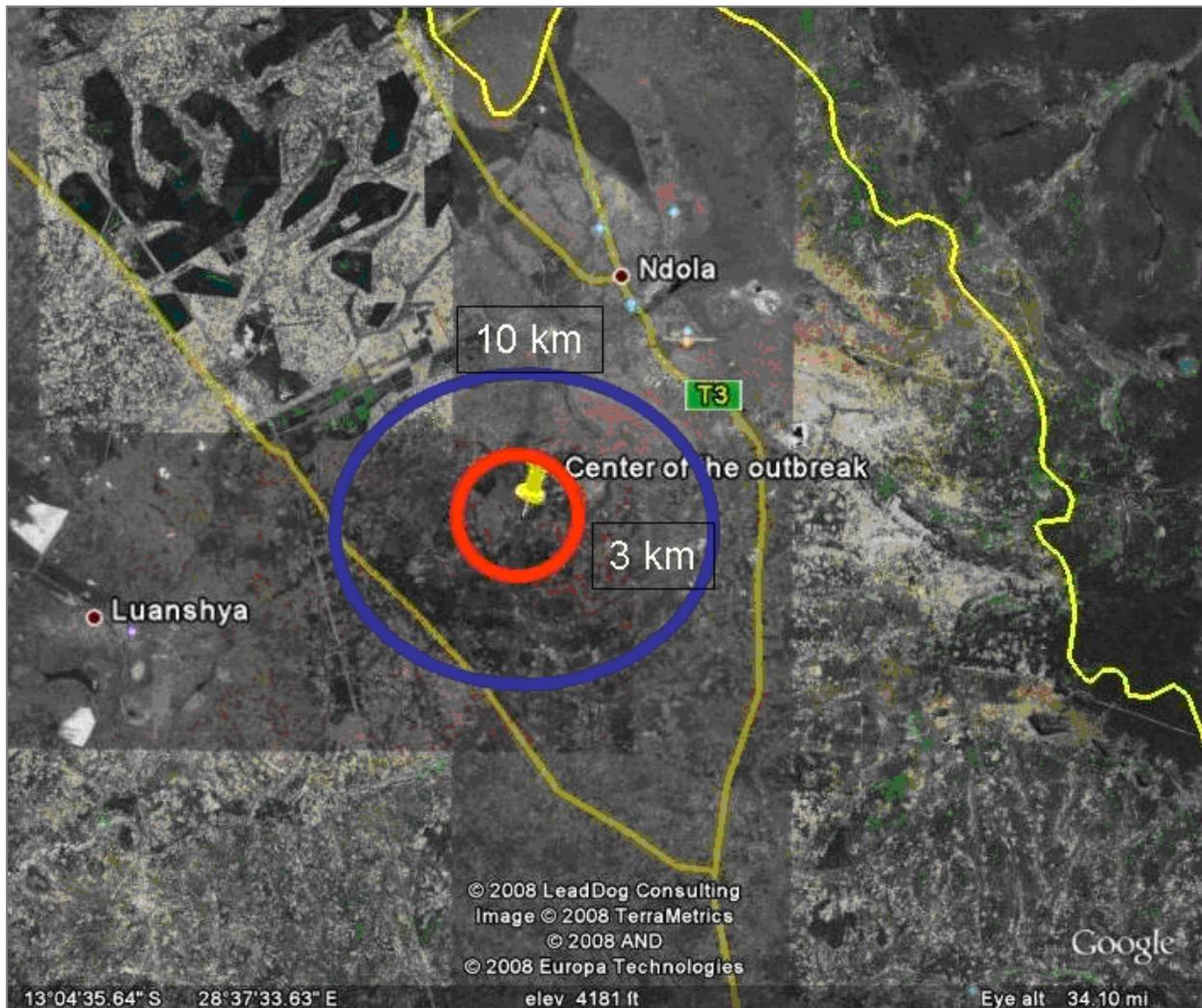
(This final zone, at the outbreak site or infected area, is where the actual depopulation and decontamination activities take place.)

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<sup>1</sup> Martin, V., Forman, A., and Lubroth, J. 2006. *Preparing for Highly Pathogenic Avian Influenza*. FAO Animal Production and Health Manuals. Rome: FAO: Animal Health and Production Division.

<sup>2</sup> The radius of these zones may vary, based on local conditions, topography, human and bird population, and density. The FAO has outlined the containment activities and other activities needed for rapid response and control. See the reference above chapter 4.

**Figure I. General Outbreak Area**



Photograph courtesy of Dr. Thomas Deeb, T&M Associates, May 2008.

The infected area comprises the outbreak site or infected point, as well as the area within a 1 km radius from the outbreak center. This is a quarantine area; all movement into and out of the infected area is restricted. The area is the staging base for deployment of response personnel and equipment, as well as the depopulation, disinfection, and disposal activities that take place within the zone. Active surveillance will probably take place in this zone. The infected area is divided into three activity zones: the Support Zone, Contamination Reduction Zone, and Exclusion Zone.

## **SUPPORT ZONE**

Of the three zones within the infected area, the Support Zone is the *cleanest* and poses the lowest relative risk of exposure to the virus and other hazards, such as exposure to decontamination chemicals. The Support Zone should be in an area upwind of the impacted farms and free of any obviously infected poultry or other materials. Management for all activities takes place in this area—including directing and supporting the personnel that are responsible for the depopulation, decontamination, and disposal activities. Equipment resupply and assembly takes place in this zone, as well as the donning of PPE.

Personnel must be given culturally appropriate changing accommodations for this activity. This zone also provides personnel with facilities for medical support and personal needs, such as eating, drinking, or bathroom use. Generally, personnel in this zone will not be required to wear PPE, handle contaminated articles or equipment, or conduct decontamination activities for simple movement within the area. At least one person must staff this area at all times.

## **CONTAMINATION REDUCTION ZONE**

Within the infected area, the Contamination Reduction Zone (CRZ) is the area where personnel complete the decontamination of equipment and where personnel exit the Exclusion Zone with a final washing/rinsing and spraying with disinfectant. The final doffing of PPE must again include accommodations for dressing in a manner consistent with the local cultural norms. Industry standards for restricting the movement of contaminated personnel and materials must be strictly enforced. In this area, at least one person usually remains in the CRZ to assist in the decontamination of those exiting the Exclusion Zone. In this high-risk environment, personnel are exposed to the avian influenza virus, as well as to the chemicals in the disinfectant. All personnel must wear full PPE in this zone.

## **EXCLUSION ZONE**

The Exclusion Zone is the actual infected point, probably an area of a farm or a group of homes within a village; it may include local markets, or roadside stands where infected birds have been stored and sold. The activities within this zone include depopulation of birds; cleaning and decontamination of the site and equipment; and disposal of contaminated materials, equipment, and carcasses (or preparation for off-site disposal).

Depopulation activities include collecting the birds in the zone, euthanizing the birds, containing the carcasses and animal body fluids, removing the eggs, and preparing the resulting material for disposal.

Decontamination in the zone includes sweeping up litter in the area and placing it in containers for disposal. Before sweeping the litter, the area may need to be sprayed with a disinfectant solution to minimize the aerosolization of particles and to reduce dust. The carcass/litter transfer bag must be decontaminated before it is transported to the contamination reduction zone for final decontamination, prior to disposal. Following removal of the litter, poultry coops and containment areas must be decontaminated by cleaning with soapy water to remove organic materials prior to applying the disinfectant. Before leaving the Exclusion Zone, equipment and personnel must be decontaminated, including boot/glove wash and gross material decontamination. For disposal activities, the litter/carcass collection bag must be decontaminated before transporting it off-site—however, transport of the litter/carcass collection bag is not encouraged because of the risk of spreading disease.

All activities in the Exclusion Zone pose a high risk to personnel of contamination with the virus or exposure to chemicals. Furthermore, adhering to PPE requirements can create a risk of heat stress because of the non-breathable PPE material and the high level of physical activity that takes place in this zone. To reduce heat stress, workers in the Exclusion Zone must be monitored physiologically and frequently rotated out of the area for rest. The frequency of rotation should be based on ambient temperature, in addition to the individual's pulse rate or oral temperature.<sup>3</sup> At least two people must staff this zone.

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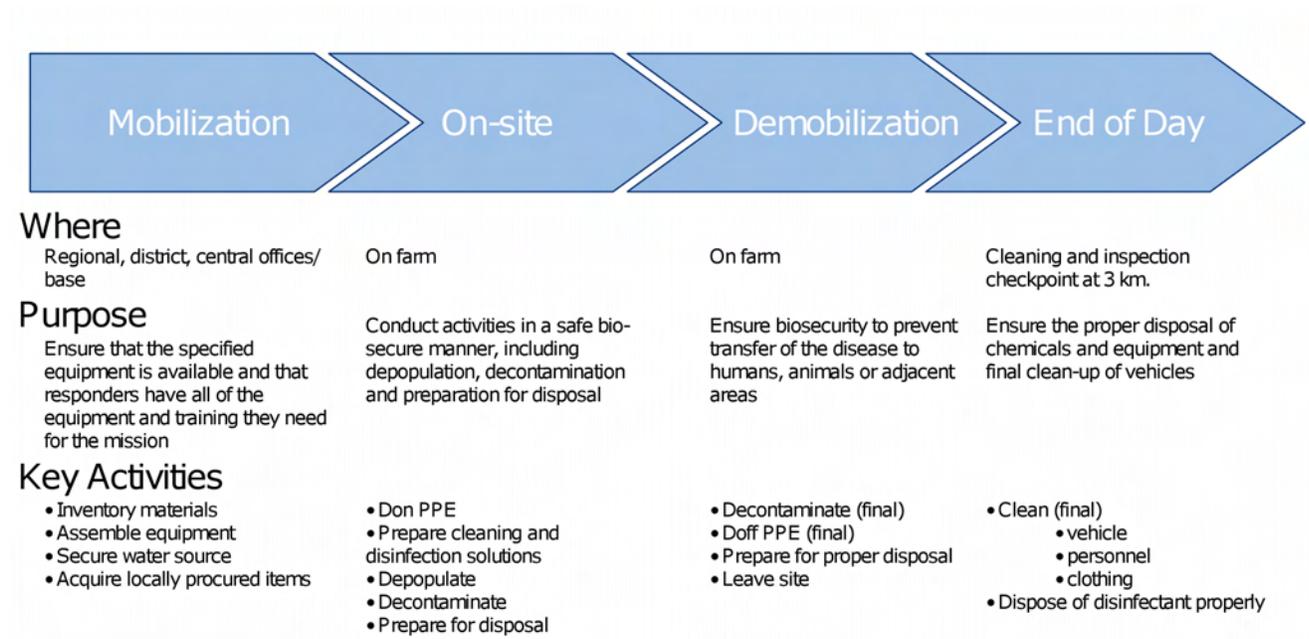
<sup>3</sup> The expert panel and USDA recommendation is an estimated minimum of 4–5 rotations per one-day shift.



# DEPLOYMENT OF THE 3-D KIT

For simplicity, the activities involved in the deployment of the 3-D Kit are divided into four stages: (1) pre-mobilization, (2) on-site, (3) de-mobilization, and (4) end of day. Figure 2 shows an overview of these stages, where they occur, the purpose of each stage, and an outline of the basic activities within each stage. Following this information is an outline of the key activities that occur in each area.

**Figure 2. Summary of 3-D Kit Activities**



## PRE-MOBILIZATION

Pre-mobilization activities ensure that all the equipment required to complete the mission is available and in good working order. This task is usually done at the central, regional, or local office, prior to departure to the outbreak site.

### ACTIVITIES

1. Open box.
2. Find and remove the packing list.
3. Remove the insert.
4. Remove each item from the kit and confirm the quantities.
5. Write down any missing items that are listed on the packing list and/or the insert; report these items to the proper authorities.

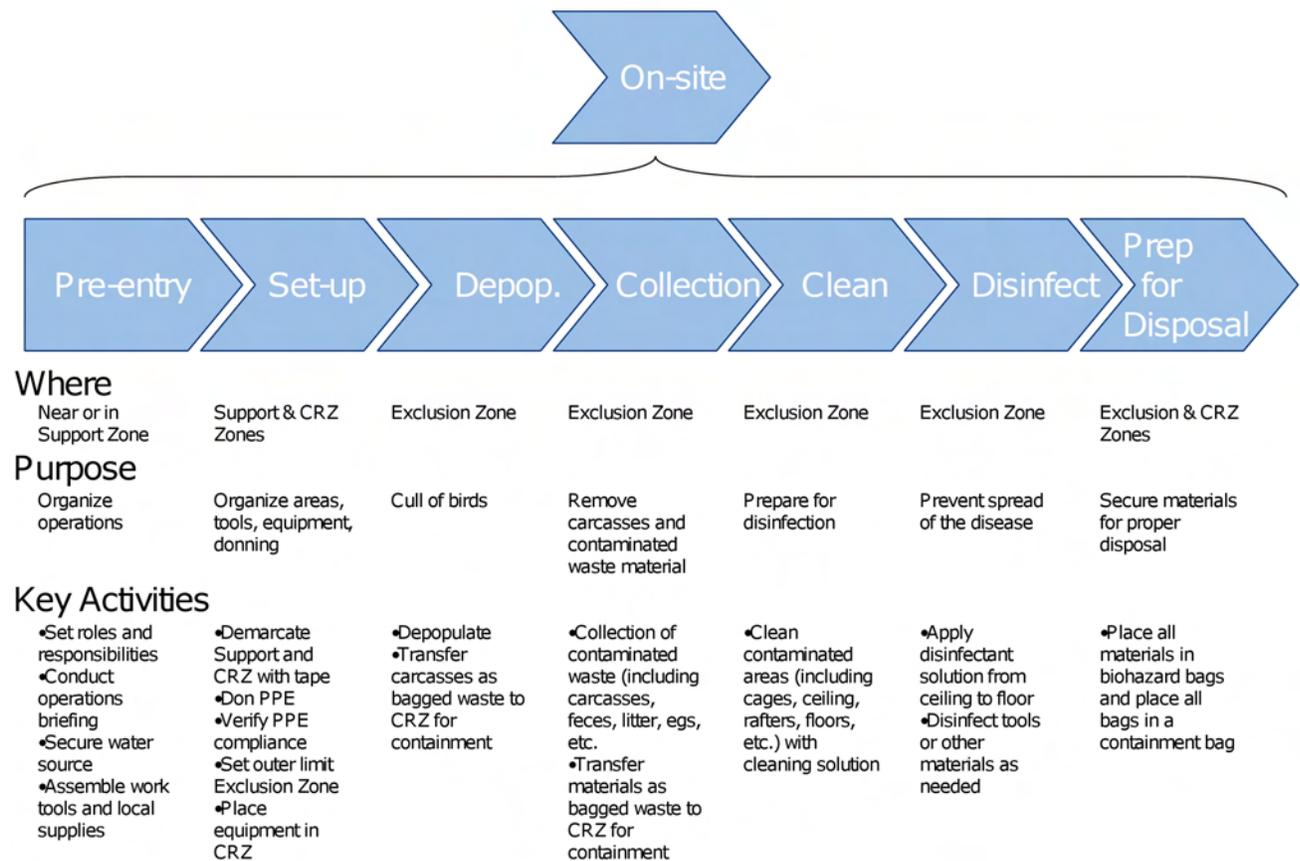
6. Assemble the sprayer. (*Note: See the insert and manufacturer's directions for assembly instructions.*)
7. Acquire locally procured items (rake, shovel, additional water containers, etc.).
8. After the materials are inventoried and the sprayer is assembled, load the transportation vehicle (truck, car, or moped).
9. Identify the site team leader.
10. Travel to the site and park at a safe distance from the animals and infected premise.

Please note that deployment of the kit requires water. The responders will need about 40–50 liters of water for each location. If water is not readily available at the outbreak site, the responders may need to bring water with them to the site.

## **ON-SITE**

Because many activities occur on-site, this stage has been structured to give the reader greater detail about the specific activities: pre-entry, setting-up, depopulating (culling), collecting, cleaning, disinfecting, and preparing for disposal. Figure 3 shows an outline of these activities.

**Figure 3. Summary of On-Site Activities**



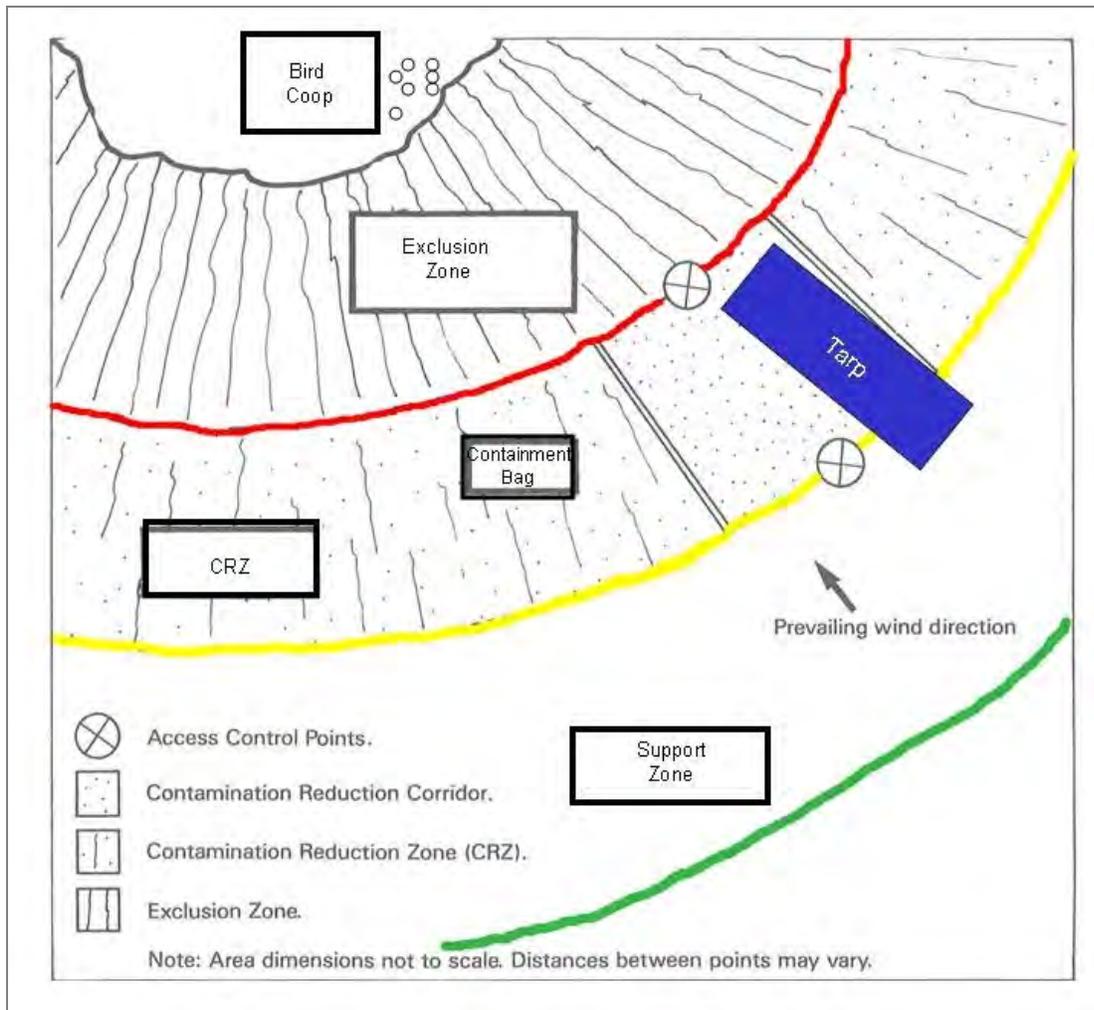
## PRE-ENTRY

Use the following activities to organize the operations.

### Activities

1. Using interviews and observations from a safe distance, conduct site surveillance (see Appendix A: Site Assessment Tool).
2. Develop an overall operations plan that includes the following steps: (A) outline the zone locations (Support, CRZ, and Exclusion); (B) identify support personnel and roles; (C) identify and secure a supply of water, if needed; (D) determine location of modesty barrier(s), if needed; and (E) determine the method of culling and method/location for disposal.
3. Conduct the operations briefing (see Appendix B: Site Operations Briefing).
4. Conduct any PPE or equipment training, as needed.
5. Assemble all kit equipment and local supplies.

**Figure 4. Generalized Site Map**



## **SET-UP**

These activities help organize the tools and equipment and prepare the personnel to enter the Containment Reduction Zone (CRZ) and Exclusion Zone.

### **Activities**

1. Demarcate the outer edge of the Support Zone with green tape. This will be a visual barrier for entry into the site. Only personnel that are a part of the operation may go beyond the green tape. All others must stay out of this area.
2. Demarcate the inner edge of the Support Zone with the yellow tape. The CRZ is beyond the yellow tape.
3. Place all tools, equipment, and water inside the Support Zone.

### **Decision Point**

- a. If the water is visually clear, go to step 4.

- b. If the water is from a surface source and is murky, discolored, or highly contaminated with organic material, refer to the standard operating procedure (SOP) for purifying the water (See Appendix C: Standard Operating Procedure for the Preparation of the Purified Water for Use with the Disinfectant). After purification, proceed to step 4.

**Figure 5. Example of Surface Water That Needs to be Purified**



**Figure 6. Example of Water after Purification and Decanting**



4. Decant the purified water into the 3-gallon sprayer.
5. Fill one plastic pail and two collapsible buckets 2/3 full with water.
6. The CRZ worker and two Exclusion Zone workers don PPE Plus using the donning procedures for PPE Plus (see Appendix D: Standard Operating Procedure for Donning the PPE Plus).  
(*Note: The CRZ worker does not need to don the leather hand gloves, but does need to don the rest of the full PPE*).
7. The Support Zone worker remains in the Support Zone; they do not need to don the PPE.
8. Before entering the CRZ, the CRZ worker verifies that the Exclusion Zone workers are in full PPE compliance.
9. To establish the Exclusion Zone, Exclusion Zone workers demarcate the area with the red tape.
10. To establish the corridor for moving between the CRZ and the Support Zone, the CRZ worker places the blue tarp on the ground. If needed, workers set up a modesty barrier for donning/doffing of PPE.
11. The CRZ and Exclusion Zone Workers transfer all required equipment from the Support Zone to the CRZ, including all equipment needed for cleaning, disinfecting, depopulating, and preparing for disposal.
12. Two Exclusion Zone Workers enter the Exclusion Zone with the items required for depopulation, including bio-hazard waste bags, duct tape, and equipment for culling.

## **DEPOPULATION**

The activities will help to maintain biosecurity while safely culling the live birds, collecting the dead birds, and preparing the birds for appropriate disposal.

### **Activities**

1. Depopulation/culling begins in the Exclusion Zone (Note: If dead birds are already present, follow steps 3–5 to collect and dispose of the carcasses, prior to starting culling operations.)
2. The CRZ worker mixes the disinfectant (Virkon<sup>®</sup>) according to the Standard Operating Procedure for the Preparation of the Disinfectant Solution (see appendix E).
3. As depopulation proceeds, the Exclusion Zone worker places the poultry carcasses into bio-hazard bags. When the bio-hazard bag is full, the Exclusion Zone worker seals it with grey (duct) tape.
4. The Exclusion Zone worker carries the sealed bio-hazard bag containing the carcasses to the CRZ border (demarcated with red tape). The CRZ worker sprays the outside of the bag with disinfectant.
5. Following the disinfection of the bio-hazard bag, an Exclusion Zone worker transfers the bag to the CRZ worker, who then places the bag in the large containment bag.
6. This process continues until all the live birds have been culled and the carcasses have been correctly transferred to the containment bag.

### ***Decision Point***

The site team leader may decide, at this point, to give the Exclusion Zone workers a break. The decision will depend on many factors: temperature, difficulty of the activities, and the amount of

time that has passed. To exit the Exclusion Zone, the workers must use the PPE Plus doffing procedures to complete the full PPE doffing (see Appendix F: Standard Operating Procedure for Doffing the PPE Plus).

## **COLLECTION**

These activities are used to safely collect, remove, and prepare for disposal of large contaminated materials, including feces, litter, and eggs, prior to cleaning and disinfecting. As with the other activities, workers must use bio-secure procedures to conduct the collection activities.

### ***Decision Point***

- a. Is the area dry and dusty? If yes, to reduce the dust that may be produced during these activities, wet down the area prior to cleaning or collection. Spray the area with the remaining Virkon. After the wetting is complete, spray the sprayer with Virkon; then transfer the sprayer back to the CRZ worker. Proceed to step 1 under Activities.
- b. If the area is not dusty or likely to produce a significant amount of dust during the collection or cleaning activities, proceed to step 1 under Activities.

### **Activities**

1. The CRZ worker prepares the cleaning solution using the SOP for the Preparation of the Cleaning Solution (see appendix G).
2. The Exclusion Zone workers use the rake and shovel to gather the large contaminated materials, such as eggs, litter, and fecal matter, and place them into the bio-hazard bags.
3. After the bio-hazard bags are full, the Exclusion Zone workers seal the bags with grey (duct) tape.
4. The Exclusion Zone worker carries the sealed bio-hazard bag containing the contaminated materials to the CRZ border (demarcated with red tape). The CRZ worker sprays the outside of the bag with disinfectant.
5. Following the disinfection of the bio-hazard bag, the bag is transferred to another CRZ worker, who then places the bag into the large containment bag.
6. This process continues until all the contaminated material has been collected and transferred to the large containment bag.

### ***Decision Point***

The site team leader may decide that the Exclusion Zone workers should take a break. This decision will depend on many factors, such as temperature, difficulty of the activities, and the amount of time that has transpired. To exit the Exclusion Zone, the workers will need to use the PPE Plus doffing procedures to complete the full PPE doffing, (see Appendix F: Standard Operating Procedure for Doffing the PPE Plus).

## **CLEANING**

The following activities will remove as much organic material as possible, so the disinfectant can work correctly.

## **Activities**

1. The CRZ worker uses the SOP for the Preparation of the Cleaning Solution (see appendix G) to prepare the cleaning solution.
2. The CRZ workers then transfer the buckets containing the cleaning solution to the Exclusion Zone workers.
3. The CRZ workers transfer the long-handled brushes (two) to the Exclusion Zone workers.
4. The Exclusion Zone workers begin cleaning the areas, starting from the top and working their way to the floor, using the brushes to help remove the materials.
5. If workers remove large contaminated materials during this process, the materials can be gathered and placed inside the bio-hazard bag, using the collection procedure described above.
6. If additional cleaning solution is required, the inside and outside of the bucket must be cleaned and sprayed with disinfectant prior to the bucket being transferred to the CRZ worker. After the worker disinfects the bucket, it is transferred to the CRZ worker, who prepares additional cleaning solution, as needed.
7. Prior to completion of this task, the workers use the cleaning solution to clean any tools that have been used in the Exclusion Zone, until the tools are visually clean.

## ***Decision Point***

The site team leader may decide at this point that the Exclusion Zone workers should take a break. This decision will depend on many factors, such as temperature, difficulty of the activities, and the amount of time that has transpired. To exit the Exclusion Zone, the workers will need to undergo full PPE doffing, using the PPE Plus doffing procedures (see Appendix F: Standard Operating Procedure for Doffing the PPE Plus).

## **DISINFECTION**

Treating the area and equipment with an appropriate disinfectant to kill the virus will reduce the possibility that the disease will re-occur.

## **Activities**

1. The CRZ worker prepares a full sprayer of disinfectant solution according to the Standard Operating Procedure for the Preparation of the Disinfectant Solution (see appendix E).
2. The CRZ worker passes the full sprayer to an Exclusion Zone worker.
3. The Exclusion Zone workers begin to apply the disinfectant to the area, starting from the top and working their way to the floor.
4. If additional disinfectant solution is required, the Exclusion Zone workers must clean the sprayer and spray the sprayer with disinfectant before they transfer it back to the CRZ worker. After it is disinfected, the sprayer is then transferred to the CRZ worker, who prepares additional disinfectant solution, as needed.
5. After disinfecting the area, the Exclusion Zone workers use the sprayer to clean and disinfect the equipment.

6. The Exclusion Zone workers return the cleaned and disinfected equipment to the CRZ worker, who transfers the equipment to the Support Zone.
7. After the area, materials, and equipment have been disinfected, the Exclusion Zone workers must decontaminate the sprayers by removing excess dirt and spraying the sprayers with disinfectant.
8. The disinfected sprayers are transferred to the CRZ worker.
9. Following the Standard Operating Procedure for Doffing the PPE Plus (see appendix F), the Exclusion Zone workers doff the PPE Plus and exit the Exclusion Zone and CRZ.
10. When the workers exit the CRZ and enter the Support Zone, they must wash their hands with the cleaning solution.

## **PREPARATION FOR DISPOSAL**

These activities are carried out to collect, contain, and secure materials that must be disposed of. This activity is done last, just prior to demobilization. The CRZ worker completes these activities.

### **Activities**

1. Remove the Exclusion Zone tarp and place it inside the containment bag.
2. Ensure that all equipment and materials that need to be disposed of are in the containment bag.
3. The CRZ worker sprays the outside of the containment bag, lifting the corners as needed to apply disinfectant to the outside and bottom of the bag.
4. The CRZ worker sprays the tarp with disinfectant and then places it inside the containment bag.
5. The CRZ worker seals the cover of the containment bag with the grey (duct) tape.

## **DEMobilIZATION**

During this stage, workers complete the final processes for the day— secure the site, as needed; gather tools and equipment; transfer materials to the vehicle; and leave the site.

### **ACTIVITIES**

1. The CRZ worker disinfects the sprayer; then hands over the cleaned sprayer to the Support Zone worker.
2. Using the Standard Operating Procedure for Doffing the PPE Plus (see appendix F), the CRZ worker doffs the PPE and places the PPE into the bio-hazard bag.
3. The CRZ worker secures the bio-hazard bag with the grey (duct) tape and places it on top of the containment bag.
4. After exiting the CRZ and entering the Support Zone, the CRZ workers wash their hands with the cleaning solution.
5. Remove the remaining yellow and green tape and place it into a bio-hazard bag for disposal.
6. Complete the disposal activities per local government laws and regulations.
7. Secure and return the decontaminated equipment and excess supplies to the transportation vehicle.

8. Secure the site, as needed.
9. Leave the site.

## **END OF THE DAY**

To help ensure the safety and health of the responders, several activities should occur at the end of each day. Many of these activities will occur at the infected area check point. At this stage, to prevent the spread of the disease, workers practice the correct biosecurity.

### **ACTIVITIES**

1. After the vehicle arrives at the check point, clean and disinfect it.
2. Dispose of any remaining Virkon solution, in accordance with local laws and regulations.
3. All personnel involved in the activity must shower.
4. All clothing worn during the activities must be washed.

## **APPENDIX A**

# **SITE ASSESSMENT TOOL**

This tool helps the site team leader develop an operational plan. The plan will not be all inclusive, but it should be used as a starting point for evaluating a site.

## **SITE LOCATION AND CONTACTS**

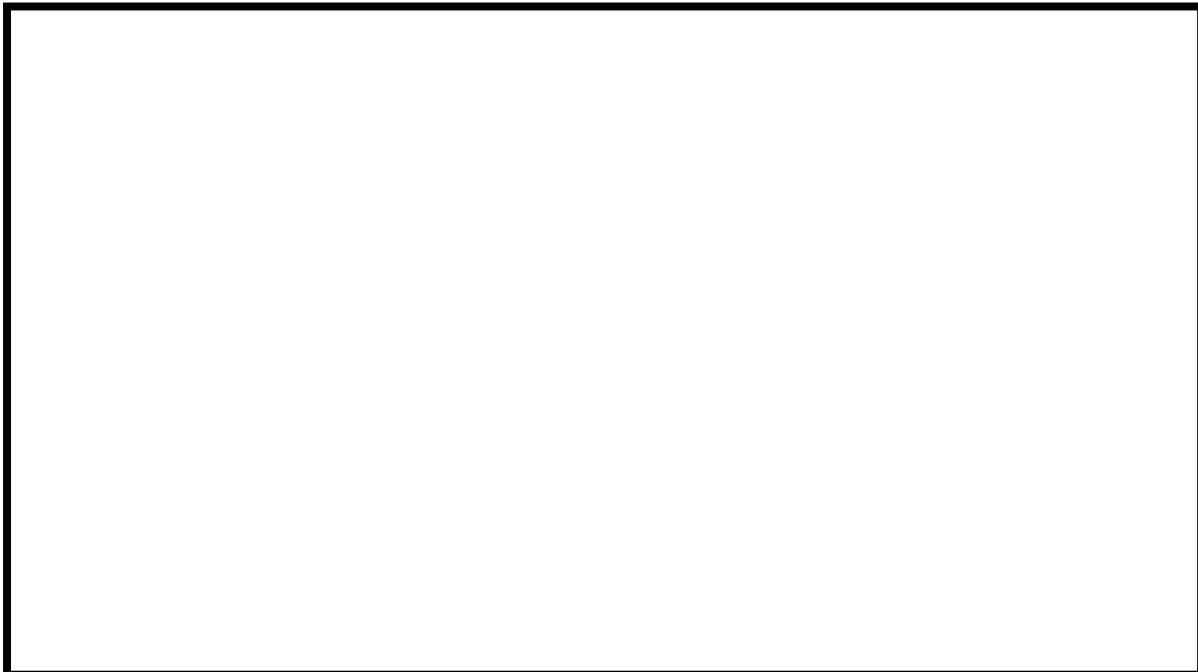
Address:

Mobile and or office number:

Owner Name:

## **SITE DIAGRAM**

This should include the location of key buildings and the locations of birds, sheds, feeding areas, access roads, hills, valleys, rivers/creeks, water sources, power sources, and weather and temperature. Mark shade trees, as well as locations for personal needs.



## TYPES OF BIRDS AND NUMBERS

Location	Type of Birds (Chickens, Ducks, etc.)	Domestic and/ or Wild	Number Alive	Number Dead

## KNOWN NEIGHBORS WITHIN 3 KILOMETERS

Name	Location	Trade Birds or Eggs with this neighbor? (Yes or No)	Type of Birds if Known	Mobile Number

## OTHER GROUPS THAT MIGHT HAVE BEEN IN CONTACT WITH THE SITE

Transporters:

Traders:

Others:

Comments:

## APPENDIX B

# SITE OPERATIONS BRIEFING

### TO BE CONDUCTED BY THE SITE TEAM LEADER PRIOR TO WORK ACTIVITIES

1. Brief personnel on how objectives will be accomplished—for example, site activities, operations sequence, what personnel will perform what duties on-site, briefing personnel on roles and responsibilities, etc.
2. Brief personnel on site hazards, including an explanation of how slips, trips, and falls could occur and how to prevent slips, trips, and falls from occurring during work
3. Perform a review of donning and doffing of PPE Plus equipment
4. Explain and point out specific site hazards, based on the site assessment (for example, electrical wiring; wandering animals; chicken coops; gathering loose, free-range birds for culling; structures to be decontaminated; mixing techniques for the cleaning and decontamination solutions, based on the SOPs, etc.).
5. Brief personnel on emergency procedures in case of a worker injury on-site; brief workers on emergency donning and doffing in case a worker get hurt in the Exclusion Zone; explain how a worker will be transported to seek medical attention, if necessary.
6. Brief personnel on worker hours spent in PPE or the rotation cycle, when to expect breaks, and how to correctly don and doff as workers exit the Exclusion Zone for breaks and lunch. Also explain how workers will be periodically monitored for heat stress, explain the hours of operations at the site (e.g. mid-day break), and symptoms of heat stress (to enable workers to monitor themselves).
7. Discuss the disposal of collected materials, including the carcasses, eggs, litter, and any other contaminated materials.
8. Perform a review of the depopulation (culling) method to be used during the day's operational period.
9. Review and discuss the methods for cleaning and disinfecting.



## **APPENDIX C**

# **PURIFYING WATER FOR USE WITH THE DISINFECTANT**

This SOP outlines the steps required to prepare the water for use with the disinfectant. It is important to note that these instructions were specifically prepared for the PUR<sup>®</sup> tablets, which are provided in the biosecurity kit. If the materials change at any time, it may be necessary to change the instructions to reflect the change in materials.

The instructions will prepare about 10 liters of clean water.

## **SAFETY PRECAUTIONS**

- Adhere to the manufacturers recommendations for PPE, at a minimum. Because on-site personnel in full PPE, including eye protection and gloves, typically prepare these solutions, the instructions meet the recommended PPE.
- Dispose of materials in accordance with local laws and regulations.

## **MATERIALS/EQUIPMENT REQUIRED**

- 10 liters of water
- one packet of PUR
- one bucket or mixing container large enough to hold the water.

## **INSTRUCTIONS**

1. Place no more than 10 liters of water into the bucket.
2. Add one packet of PUR.
3. Stir for 5 minutes.
4. Allow the material to settle for 5 minutes.
5. Decant the purified water into the sprayer for use (filtering through a cloth is recommended to prevent premature clogging of the sprayer).



## APPENDIX D

# DONNING THE PPE PLUS

This SOP delineates the steps required for donning the PPE associated with the 3-D Kit. It is important to note that these instructions were developed specifically for the PPE included with the 3-D Kit. Donning instructions for other types and quantities of PPE will vary.

## SAFETY PRECAUTIONS

- Verify that these instructions match the types and quantities of PPE included with the 3-D Kit.
- Inspect all items of the PPE ensemble to ensure that no rips, tears, or seam separations are present in the PPE prior to donning.
- Determine the most appropriate size suit for the worker.
- During work, periodically inspect for rips, tears, punctures, and seam failures.

## MATERIALS/EQUIPMENT REQUIRED

- TYVEK™ suit with hood and attached boot pouches
- Gloves
  - one set of blue nitrile
  - one set of transparent latex
  - one set of green nitrile gloves
  - one set of heavy duty leather work gloves
- TYVEK fabric over-booties
- one set of stretchable yellow “duck” or “bio-hazard” boots
- N-95 respirator
- goggles
- TYCHEM QC™ yellow apron

## INSTRUCTIONS

1. Keeping sandals or shoes on, insert feet into TYVEK fabric over-booties, if not already donned.
2. While sitting or standing, place over-booties into the attached boot pouches of the TYVEK suit.

3. Pull TYVEK suit up over legs and torso.
4. Insert arms into sleeves and place TYVEK suit hood over head; adjust the elastic of the hood around face.
5. To reduce billowing of suit, use duct tape to stretch around midline of torso to function as a belt.
6. If suit is still too big, use duct tape in the groin area to reduce billowing and allow for easier walking with the suit.
7. Take yellow “duck” bio-hazard boots and work them over the outside of the TYVEK suit boot pouch until they fit snugly and the “duck” bio-hazard boot heel matches the heel of the worker.
8. Take duct tape and make several wraps around the interface between the top of the yellow “duck” boots and the leg, or above the ankle of the TYVEK suit, ensuring that the suit is sealed to prevent fluids entering from the outside. Leave an ample end on the final wrap and fold over it over itself, thereby creating a tab for easier removal later.
9. Put on transparent latex gloves.
10. Put on blue nitrile gloves over the transparent latex gloves.
11. Stretch arms out and wrap duct tape several times, firmly but not tightly over the sleeve of the suit and in contact with the blue glove at the wrist. Leave an ample end on the final wrap and fold over, creating a tab for easier removal later.
12. Place N-95 respirator over nose and mouth taking the two elastic bands up and over the hood.
13. Stretch lower elastic band at a downward angle across lower neck.
14. Stretch upper elastic band at an upward angle across upper back of head.
15. Pinch nosepiece across bridge of nose to seal comfortably.
16. Place goggles over eyes and stretch elastic band over head on the outside of hood. Adjust band to fit snugly.
17. Place TYCHEM QC yellow apron neck loop over head; wrap and tie waist band around waist to secure the apron snugly against the TYVEK suit.
18. Put on green nitrile gloves over the blue gloves and suit.
19. Stretch arms out and wrap duct tape several times, firmly, but not tightly, over the sleeve of the suit and in contact with the green glove at the mid-arm. Leave an ample end on the final wrap and fold it over itself, creating a tab for easier removal later.
20. Finally, pull on leather palmed work gloves over the green nitrile gloves.

## **APPENDIX E**

# **PREPARING THE DISINFECTANT SOLUTION**

This SOP outlines the steps required to prepare the disinfectant solution. It is important to note that these instructions were specifically prepared for the Virkon in the 3-D Kit. If, at any time, the materials change, it may be necessary to change the instructions to reflect the change in the materials.

The instructors will prepare a 1 percent solution of disinfection solution, with a total volume of 11 liters. It is recommended that the water used for this preparation be clean and free of organic materials.

## **SAFETY PRECAUTIONS**

- Adhere to the manufacturers recommendations for PPE, at a minimum. As these solutions are typically being prepared by on-site personnel in full PPE, including eye protection and gloves, the instructions meet the recommend PPE.
- Disposal of materials in accordance with local laws and regulations.
- Review the MSDS before using any chemical.

## **MATERIALS/EQUIPMENT REQUIRED**

- 10 liters of water, preferably drinking water quality
- at least 100 grams of Virkon
- a bucket or mixing container large enough to hold the Virkon and water.

## **INSTRUCTIONS**

1. Place the 10 liters of water into the bucket or sprayer.
2. Add 100 grams of the powdered Virkon slowly to the bucket; use the brush to stir the solution as you add the powder.
3. Stir for approximately 5 minutes, or until all the solids are in the solution.

Note: Prepare the disinfectant solution fresh every day.

To be effective, the disinfectant solution must remain on the target surface for 10 minutes.



## **APPENDIX F**

# **DOFFING THE PPE PLUS**

This SOP delineates the steps required for doffing the PPE associated with the 3-D Kit. It is important to note that these instructions were developed specifically for the PPE included with the 3DK. Doffing instructions for other types and quantities of PPE will vary.

## **SAFETY PRECAUTIONS**

- Verify that these instructions match the types and quantities of PPE included with the 3DK.

## **MATERIALS/EQUIPMENT REQUIRED**

- TYVEK suit with hood and attached boot pouches
- gloves— one set of blue nitrile and one set of transparent latex, and one set of green nitrile gloves and one set of leather and fabric work gloves
- TYVEK fabric over-booties
- one set of stretchable yellow “duck” boots
- N-95 respirator
- goggles
- TYCHEM QC yellow apron

## **INSTRUCTIONS**

1. While still in the Exclusion Zone and while still wearing all items, do a dry decontamination of the PPE Plus ensemble.
2. After completing the dry decontamination, cross the red tape, leave the Exclusion Zone, and enter the CRZ. Begin the sequenced doffing of the PPE Plus ensemble in the CRZ.
3. Using blunt-nosed scissors, or undoing the knot on the TYCHEM QC yellow apron, remove the apron and place it in the red bio-hazard bag.
4. Remove the leather palmed work gloves and place them in the red bio-hazard bag.
5. With assistance from a CRZ worker, use the blunt nose scissors to remove the yellow “duck” boots, and place them in the red bio-hazard bag.
6. Remove (using the tab) the duct tape that sealed the suit sleeve and the green nitrile gloves.
7. Remove the green nitrile gloves using the same technique specified in the PPE doffing SOP for the SBS.

8. Lean over and, reaching over your head, grab the elastic band of the goggles, and pull the hood straight down toward the ground, allowing the goggles' elastic band to slip off of the TYVEK hood. You can also use blunt-nosed scissors to cut the goggles elastic band.
9. Place the goggles in the red bio-hazard bag.
10. While still bent over, use the same action to remove the N-95 respirator. If blunt-nose scissors are available, use them to cut off the elastic bands.
11. Place the respirator in the red bio-hazard bag.
12. Using the tab on the duct tape, unwrap the duct tape from around the blue nitrile gloves, using the same technique described in the doffing SOP for the SBS kit.
13. Dispose of the gloves in the red bio-hazard bag.
14. While still wearing the transparent latex gloves, remove the TYVEK hood; begin to exit and doff the TYVEK suit by turning it inside out, keeping the inner TYVEK booties on while removing them from the suit boot pouches.
15. Dispose of the suit in the red bio-hazard bag.
16. Remove the inner booties and dispose of them on the red bio-hazard bag.
17. Finally, remove the transparent latex gloves using the same technique as described in the doffing SOP for the SBS; dispose of them in the red bag.
18. Seal the bag with duct tape and exit the CRZ; in the Support Zone, immediately wash your hands with soapy water.

# APPENDIX G

3-D PROTOTYPE KIT COMPONENTS			
Equipment	Quantity	Justification	Risk
Sprayer with strap (2–3 gal)	1	Application of disinfectant to control vectors of transmission (vehicles, equipment, personnel, facilities).	Reduce the risk of recrudescence (reappearance of a disease) & cross-contamination.
Brush (20" handle)	2	Facility, equipment, and vehicle decontamination of impervious surfaces in exclusion zone. Improve effectiveness of disinfectant by removing organic material, dirt, and grime.	Prevent recrudescence & cross-contamination.
Brush (short handle)	1	Personnel decontamination in CRZ. Improve effectiveness of disinfectant by removing organic material, dirt, and grime.	Prevent recrudescence & cross-contamination.
Large biohazard bag	25	Contain and transfer infected carcasses and contaminated materials.	Reduce risk of cross-contamination between the exclusion zone and CRZ.
Bucket (5 gal, collapsible)	3	1 in exclusion zone, 1–2 in CRZ	
Bucket (5 gal, hard plastic)	1	Exclusion zone	
Poly sheeting, opaque, minimum 6 mil thickness, 10'x10'	2	Multi-use: ground cover, protective barrier, decontamination mat, modesty barrier.	Maintain integrity of site & reduce risk of cross-contamination between the zones.
Containment bag with top (½ cubic meter size)	2 bags	Contain & transfer red biohazard bags (of infected carcasses & contaminated materials). Provide controlled on-site storage & secure, sanitary secondary container.	Prevent recrudescence & cross-contamination.
Outer gloves (leather palm, unlined)	10 pair	Prevent punctures & cuts during depopulation and decontamination.	Reduce risk of injury & infection for personnel. Maintain inner glove integrity.
Blunt-nosed scissors	1 pair		
Duct Tape Model 8979 (Slate Blue – 48mm x 22.8 m)	2 rolls		
Flocculent tablets (e.g., PUR® by P&G)	20 tabs	Maximize efficacy of disinfectant through pre-treatment of water.	Prevent inactivation of disinfectant by organic material found in dirty water.

<b>Equipment</b>	<b>Quantity</b>	<b>Justification</b>	<b>Risk</b>
Flagging tape, 20 m/60 ft (orange w/biohazard symbol, yellow, green)	3 rolls (1 of each color)	Zone delineation/demarcation.	
Suitable disinfectant (e.g., Virkon®)	5 kg (1 pail)		Prevent recrudescence & cross-contamination.
Powdered anionic soap (e.g., Tide® with bleach, other laundry detergent)	2 plastic tubs (14 oz each)	Remove organic material, dirt and grime from equipment & personnel (1 exclusion zone, 1 CRZ). Must contain surfactants suitable for cold and hard water use.	Prevent recrudescence & cross-contamination.
<b>PPE Plus (components below to be kitted together)</b>			
PPE Tyvek Size XXL	10 kits		
Green nitrile gloves (9", e.g., Sol-Vex®)	10 pair	Fluid barrier & chemical resistance.	Reduce risk of injury & infection among personnel. Reduce risk of exposure to decontamination chemicals.
Apron (QC, yellow, e.g., DuPont Tychem®)	10	Fluid barrier. Limit exposure to fluids and enhances integrity of the coverall performance. Prolong use of coverall and eliminate the need for more expensive, less comfortable suit.	Reduce risk of injury, infection, and heat stress among personnel. Reduce risk of exposure to decontamination chemicals.
Disposable Hazmat boots	10 pair	Fluid barrier. Limit personnel exposure & maintain integrity of coverall. Prevent punctures & cuts during depopulation, decontamination, and disposal. Traction prevents slips & falls. Allow broader use of footwear under PPE.	Reduce risk of injury and infection among personnel. Reduce risk of exposure to decontamination chemicals.

For more information, please visit [deliver.jsi.com](http://deliver.jsi.com).

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