

BIOSAFETY AND PERSONAL PROTECTIVE EQUIPMENT (PPE)

Adapted by OHW-NG* from the EEIDI and PREDICT*** Standard Operating Procedures (SOPs) developed by (in alphabetical order):** Nicole Gardner, Terra Kelly, Christine Kreuder Johnson, Matthew LeBreton, Amy Morrison, PREDICT Consortium, Tierra Smiley Evans, Marcela Uhart

This document was prepared as part of the One Health Workforce – Next Generation Project to support activities conducted under One Health Workforce Academies and is intended for an audience of qualified professionals trained in standard best practices. This guide is not intended for use by untrained individuals.*

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The authors assert that animal surveillance should always occur in compliance with all applicable laws and regulations and should only be undertaken by trained wildlife professionals after securing all necessary permits and approvals, including approval by an ethics review committee.

For more information about the contents of this guide, please contact onehealthnextgen@ucdavis.edu.

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1. Learning Objectives

After studying this guide, you will be able to:

- Implement basic biosafety precautions for virus surveillance and discovery activities.
- Describe the factors to consider when assessing the biological risk of handling animals and vectors, and collecting human, animal, and vector samples, and other field activities that may have potential risk for zoonotic disease exposure. While many of these guidelines also apply to laboratory activities, biosafety and PPE for laboratory staff will be covered in full in a separate SOP.
- Understand the dual pathway of zoonotic transmission and take precautions to minimize risk of human-to-animal pathogen transmission.
- Understand factors to consider when choosing appropriate PPE based on identified risks.
- Identify and describe the functions of each component of PPE.
- Correctly put on and take off appropriate PPE for sample collection and handling activities in a non-outbreak setting. *For collecting samples from hospital and clinic patients and during human and/or animal disease outbreaks, specific PPE components and procedures to put on and take off PPE should be adapted based on the determined risk level.*
- Describe the importance of respirator fit and fit testing.
- Understand additional PPE requirements related to the COVID-19 pandemic.
- Understand additional training requirements that apply to specific high-risk activities.

2. Biosafety Overview

2a. Responsibilities

Personal Safety Responsibilities

- Individuals have the primary responsibility for their own health and safety. Nothing substitutes for good training and vigilance.
- Follow safety procedures outlined in species-specific protocols regarding each activity that involves potential exposure to infectious pathogens.
- Use appropriate safety equipment.
- Report unsafe or hazardous situations, injuries, and accidents immediately to your supervisor or instructor.
- Report any illness to your supervisor.
- Participate in required safety training and refreshers.

Follow appropriate waste disposal procedures and all local regulations. See Basic Laboratory Safety SOP and Safe Disposal of Carcasses and Infectious Waste Guide (Appendix 2) for more details.



Responsibilities of the Surveillance Leads and all Supervisory Personnel

- Provide access to and document biosafety and PPE training for all personnel who will participate in project activities.
- Ensure biosafety compliance with relevant project and/or organizational protocols.
- Ensure biosafety compliance with local permit requirements and regulations.
- Report injuries/illnesses/accidents and ensure compliance with associated mitigation. See Appendix 3 for details.
- Ensure that all field personnel are trained on the safe use of field equipment.
- Ensure that each field team has at least two team members trained in basic first aid, including cardiac resuscitation and wound management.
- Ensure that all individuals working with animals or biological samples consult with an employee health program or occupational health care provider prior to engaging in field or laboratory activities.

2b. Training, Vaccination, and Occupational Health Requirements

Required Biosafety Training

In addition to any training required by your organization/institution, consider having all field personnel obtain training in the following biosafety topics (minimum). Training of project personnel should be documented, and records kept in project database. Additionally, all surveillance and laboratory staff should undergo respirator fit testing, as described in section 6 of this document.

Human Surveillance Staff

- Bloodborne pathogen training
- Donning and doffing PPE

Vector Surveillance Staff

- Bloodborne pathogen training
- Donning and doffing PPE

Wildlife Surveillance Staff

- Bloodborne pathogen training
- Donning and doffing PPE
- Taxa-specific handling and sampling training
 - Review appropriate SOPs and undergo on-the-job training with a veterinarian experienced in all relevant procedures (capture, restraint, handling, anesthesia, sampling, etc.)
- Zoonotic disease training
 - Review taxa-specific zoonotic concerns at:
<https://safetyservices.ucdavis.edu/units/occupational-health/surveillance-system/zoonotic-diseases>



- Review material within the UC Davis Risk Analysis Tool:
https://iacuc.ucdavis.edu/iacuc_public/risktool/index.cfm

Laboratory Staff

- Training appropriate to the laboratory biosafety level and activities that will be performed. Consult each laboratory's biosafety training requirements for details.

Vaccination, Prophylactics, and Occupational Health Participation

Occupational health participation requirements will vary by country; however, all staff working with humans, animals, or biological samples should have access to occupational health services. Prior to engaging in field or laboratory activities each staff member should consult with an employee health program or occupational health care provider. These programs and providers can advise on appropriate vaccinations, health screenings, and safety precautions relative to the individual's duties and personal medical history. The taxa specific handling and sampling SOPs provide more details about requirements for working with particular animal groups.

Vaccination requirements will vary by taxa and availability in-country. Minimally, the following are recommend, plus any locally required vaccinations:

- Hepatitis A & B
- Measles, Mumps, Rubella (MMR)
- Polio
- Tetanus
- Meningococcal meningitis
- Influenza (recommended)
- COVID-19 (required where available)
- Rabies (required for all personnel working with wildlife)
- Yellow Fever (where regionally required)

Malaria chemoprophylaxis is recommended where malaria is endemic. Check CDC guidelines here: https://www.cdc.gov/malaria/travelers/country_table/a.html

All personnel who will handle live non-human primates are required to be pre-screened for tuberculosis (TB) before surveillance work begins and at regular intervals while work is underway. No staff person suspected of TB infection should work with live primates.

CDC guidelines for diseases common to specific countries can be found at:
<https://wwwnc.cdc.gov/travel/destinations/list>

2c. General Precautions to Prevent Pathogen Transmission

There is a risk of exposure to pathogens, including zoonotic pathogens, when handling animals, obtaining samples from animals and people, and when contacting human and animal samples. There is also the risk of human to animal pathogen transmission during close contact with



animals. Therefore, it is important to implement all possible measures to prevent pathogen exposure.

The following list of general precautions applies to most situations:

- Ensure all individuals participating in activities are fully trained.
- Inform all who enter potential human and zoonotic pathogen risk areas of their potential for exposure and the associated risks.
- Inform all who handle or come in close contact with animals of the potential for human-animal pathogen transmission. Project personnel with clinical signs of illness (e.g., fever) should not participate in field work and/or handle animals.
- Review information regarding the zoonotic agents likely to be found in the samples or animals to which you or others may be exposed.
- Wear the appropriate PPE based on protocols for the activity and species and as directed by the Lead Investigator or Field Supervisor.
- Use disposable supplies whenever possible.
- Wash hands and wrists after removing your gloves.
- Do not wear field or lab clothing and shoes outside of work areas where there may be zoonotic pathogen exposure. Change clothing and shoes before getting into your vehicle.
- Disinfect and launder contaminated dedicated clothing at work. Do not take your protective clothing home with you.
- Never eat, drink, or smoke in areas where human sampling, animals, their wastes, or their products (e.g., blood) are present.
- Wash your hands frequently and practice good hygiene. Avoid touching your face while working with animals, human and animal samples, or other sources of pathogens. Although a normal, healthy adult person may have only mild symptoms of a zoonotic disease, that person may unknowingly spread the disease to others. Unfortunately, animal handlers have “carried home” zoonotic pathogens to their infants with fatal consequences. Therefore, good hygiene is not only to protect the person working directly with human and animal samples; but it is also for all persons and animals with whom they have contact.
- Make sure a first aid kit is immediately available during all field and laboratory activities.
- When seeking medical advice for any illness, inform your physician that you work with humans and animals to investigate zoonotic diseases, and indicate which animal taxa you have had contact with.
- Follow universal precautions for handling needles and sharps. Do not break, bow, or directly manipulate used needles. Do not recap needles. Discard all used sharps in appropriate puncture-resistant, labeled containers.
- Follow best practices and refer to established procedures for how to respond to a bite, cut, scratch, puncture, or other injury that may result in zoonosis exposure, including seeking medical attention promptly if an injury occurs. After applying pressure to control bleeding, minor wounds should be immediately cleansed with soap and water



for at least 5 minutes. Report the accident to your supervisor, even if it seems relatively minor. See taxa-specific SOPs for additional guidance.

- Refer to established procedures for disinfecting all equipment, samples, cages, and traps in addition to the guidance provided below.

Understand Occupation-Specific Risks

Review the following materials to learn more about precautions specific to your role.

Human Health Workers

Health Information for Healthcare Workers (CDC and NIOSH):

<https://www.cdc.gov/niosh/topics/healthcare/default.html>

Sharps Safety: <https://www.cdc.gov/sharpsafety/pdf/brochure.pdf>

Veterinarians

Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention in Veterinary Personnel: National Association of State Public Health Veterinarians Veterinary Infection Control Committee 2010. <https://doi.org/10.2460/javma.237.12.1403>

Laboratory Workers

WHO Lab Biosafety Manual:

<http://www.who.int/csr/resources/publications/biosafety/en/Biosafety7.pdf>

Disinfection of Surfaces and Materials

Reusable PPE, field equipment, and work surfaces will need to be disinfected between uses (see section 5g). Dirt and organic matter can protect microbes from decontaminants (antiseptics, chemical germicides, and disinfectants). Therefore, precleaning contaminated surfaces as well as reusable supplies, equipment and PPE is important to achieve proper disinfection. Precleaning should be carried out cautiously to avoid exposure to pathogens.

Contact times for disinfectants are specific to the type of solution and the manufacturer. Therefore, it is important to follow the manufacturers' specifications. Further, solutions used for precleaning and disinfection should be the same or chemically compatible.

There are several types of disinfectants on the market and formulations should be selected for specific needs. High temperatures can degrade chemical disinfectants, so shelf-life may be decreased in areas with high ambient temperatures.

Chlorine bleach or Virkon disinfectant solution are commonly used as general-purpose disinfectants. See the WHO Laboratory Biosafety Manual for frequently used classes of disinfectants, with general information on their applications and safety profiles, as well as recommended dilutions for chlorine-releasing compounds, such as chlorine bleach. Material Safety Data Sheets (MSDS) should also be reviewed for each disinfectant used.



WHO Lab Biosafety Manual: <http://www.who.int/csr/resources/publications/biosafety/en/Biosafety7.pdf>
MSDS/SDS Online: <https://www.msdsonline.com/sds-search/>

Hand Washing - Teach and Practice Good Hand Washing Technique

The importance of hand washing in preventing infection and the spread of infectious pathogens must be emphasized.

Always wash your hands before:

- Putting on PPE for handling animals or collecting or handling human and animal samples
- Contact with a sick or injured person or animal
- Treating wounds or administering medications
- Eating or drinking
- Preparing food
- Inserting or removing contact lenses

Always wash your hands after:

- Taking off PPE
- Touching an animal, human and animal samples, waste, products, or animal equipment
- Collecting and handling diagnostic samples
- Visiting field sampling sites or clinics/hospitals
- Preparing foods, especially raw meat or poultry
- Using a toilet
- Changing a diaper
- Blowing your nose, coughing, or sneezing into your hands
- Treating wounds
- Touching a sick or injured person
- Touching garbage or other potentially contaminated materials
- Finishing work in the laboratory

Plan for hand washing:

- Plan for hand washing in the field by identifying any locations with running water near the site and bringing supplies (i.e., water, soap, bucket, paper towels, hand sanitizing gels and/or germicidal wipes that contain at least 60% alcohol)
- Plan when you will need to wash to ensure supplies are ready and available
- Ensure additional washing supplies are available for first aid needs, such as washing the site of an injury.

See the World Health Organization (WHO) guidelines on the next page for proper hand washing technique. If soap and water are not available, use an alcohol-based hand sanitizing gel that contains at least 60% alcohol. These products significantly reduce the number of microbes on



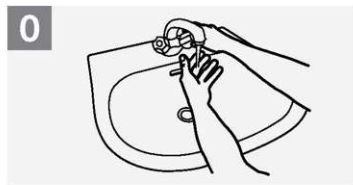
the skin and are fast acting. However, they are not effective if hands are visibly dirty. Organic matter and natural oils on hands create a barrier that blocks the effectiveness of the sanitizer. For more information, see: <http://www.cdc.gov/handwashing/show-me-the-science-hand-sanitizer.html>



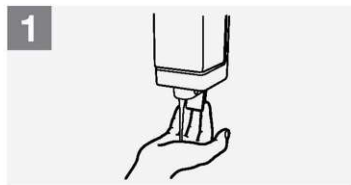
How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

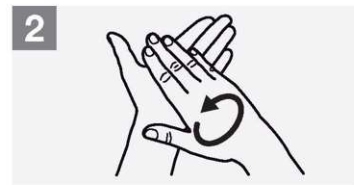
 Duration of the entire procedure: 40-60 seconds



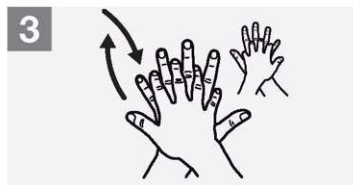
0 Wet hands with water;



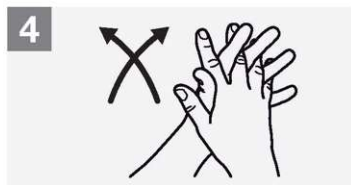
1 Apply enough soap to cover all hand surfaces;



2 Rub hands palm to palm;



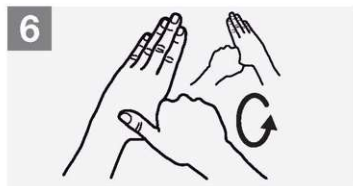
3 Right palm over left dorsum with interlaced fingers and vice versa;



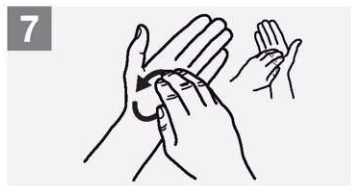
4 Palm to palm with fingers interlaced;



5 Backs of fingers to opposing palms with fingers interlocked;



6 Rotational rubbing of left thumb clasped in right palm and vice versa;



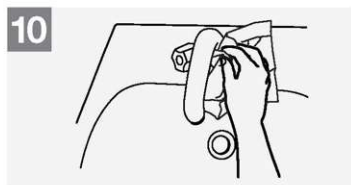
7 Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



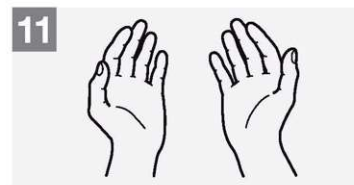
8 Rinse hands with water;



9 Dry hands thoroughly with a single use towel;



10 Use towel to turn off faucet;



11 Your hands are now safe.



World Health Organization

Patient Safety

A World Alliance for Safer Health Care

SAVE LIVES

Clean Your Hands

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3. Assessing Biosafety Risk Associated with Pathogens

Key to the practice of biosafety is assessing the risk of infection associated with a specific procedure under specific environmental conditions. There are many considerations in the assessment of risk, and it is the responsibility of project PIs and surveillance supervisors to weigh these considerations to determine the appropriate measures to protect humans and animals from infection.

Factors to Consider when Assessing Biological Risk of Procedures to Determine Necessary PPE

- 1) Species to be handled and sampled.
- 2) Pathogens likely to be present in these species/samples.
- 3) Pathogenicity of these pathogens. *See WHO classification of infective microorganisms by risk group below.*
- 4) Potential exposure opportunities and routes of infection for the pathogens given the planned activity.
- 5) Potential health risks associated with exposure to pathogens.
- 6) Estimated infectious dose and stability of the pathogens in the environment.
- 7) Information available in the literature, including animal studies and clinical reports that would help inform on risk.
- 8) Measures to reduce the risk of exposure, such as sanitary measures (e.g., food and water hygiene) and control of animal reservoirs or arthropod vectors, the movement of people or animals, and the importation of infected animals or animal products.
- 9) Local availability of effective prophylaxis and treatment. Prophylaxis may include vaccination or antisera. Treatment options may include passive immunization and post-exposure vaccination, antibiotics, and chemotherapeutic agents, taking into consideration the possibility of the emergence of resistant strains.
- 10) Potential for transmission of pathogens from humans to animals.

Based on the risk assessment considering the factors listed above, the following should be determined by project PIs and Surveillance Leads:

- 1) Hazards and risk of exposure.
- 2) Appropriate PPE required to implement the activity safely and to prevent transmission of infectious pathogens. *Components of PPE to consider are discussed later in this document.*
- 3) Special procedures, such as disinfection procedures between handling individual animals and people or between site visits, which may be required to reduce risk of transmission and provide adequate protection for humans and animals.
- 4) Vaccinations or prophylaxis required for field and lab personnel before the activity.

WHO Classification of Infective Microorganisms by Risk Group

WHO provides guidelines for classifying biological risk groups, based on pathogenicity of the organism, modes of transmission, and host range of the organism. These primary factors are affected by existing levels of immunity, density, movement of host population (human or animal), presence of appropriate vectors and environmental conditions, and availability of effective preventive measures and treatment. Countries typically adopt a similar set of risk categories. Risk groups align with Biosafety Level (BSL) ratings used in laboratories.

Risk Group 1 / BSL 1: No or low individual and community risk. A microorganism that is unlikely to cause human disease or animal disease.

Risk Group 2 / BSL 2: Moderate individual risk, low community risk. A pathogen that can cause human or animal disease but is unlikely to be a serious hazard to laboratory workers, the community, livestock, or the environment. Laboratory exposures may cause serious infection, but effective treatment and preventative measures are available and the risk of spread of infection is limited. *Examples include seasonal influenza and Zika virus.*

Risk Group 3 / BSL 3: High individual risk, low community risk. A pathogen that usually causes serious human or animal disease but does not ordinarily spread from one infected individual to another. Effective treatment and preventive measures are available. *Examples include Yellow Fever virus and Rift Valley Fever virus.*

Risk Group 4 / BSL 4: High individual and community risk. A pathogen that usually causes serious human or animal disease and that can be readily transmitted from one individual to another, directly or indirectly. Effective treatment and preventive measures are not usually available. *Examples include filoviruses such as Ebola virus and Marburg virus.*

The WHO risk group classification was developed for laboratory work but are helpful for thinking about risks outside of laboratory settings. See the following references for more information.

Risk Group Database: <https://my.absa.org/Riskgroups>

WHO Lab Biosafety Manual: <https://www.who.int/csr/resources/publications/biosafety/Biosafety7.pdf>



4. Selecting PPE Based on Risk and Surveillance Activity

While field staff will likely be working in very different environments with varying levels of biological risk, there are some tasks for which **minimum PPE requirements** have been established and detailed in Tables 4a and 4b. See Section 5d Components of PPE Kits for additional PPE specifications. **Occupational health requirements, local regulations, or the assessed level of risk based on clinical symptoms may require more protective PPE than listed here.**

4a. Animal Surveillance Table: Minimum PPE to wear for common virus surveillance tasks

Taxa and Tasks	Respirator (N95 or comparable rating, no valve)	Goggles, Face Shield, or Protective Glasses	Gloves *	Tyvek Coveralls or Dedicated Clothing with washable shoes
Handling animal specimens	Yes	Yes	Yes	Tyvek coveralls or dedicated clothing with washable shoes
Handling/sampling live wild primates, bats, or rodents	Yes	Yes	Yes	Tyvek coveralls
Non-invasive primate sampling	Yes	Yes	Yes	Dedicated clothing with washable shoes
Sampling in bat caves or beneath roosts	Yes	Yes	Yes	Tyvek coveralls
Sampling or necropsy of sick animals or animals found dead	Yes	Yes	Yes	Tyvek coveralls plus plastic apron
Sampling bushmeat carcass in public area	Yes	Yes	Yes	Dedicated clothing plus apron with washable shoes
Handling poultry or waterfowl	Yes	Yes	Yes	Tyvek coveralls or dedicated clothing with washable shoes
Handling livestock	Adapt based on the determined level of risk **	Adapt based on the determined level of risk **	Yes	Tyvek coveralls or dedicated clothing with washable shoes
Collection of animal feces or urine from the	Adapt based on the determined	Adapt based on the determined	Yes	Adapt based on the determined

environment	level of risk ***	level of risk ***		level of risk ***
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4b. Human Surveillance Table: Minimum PPE to wear for common virus surveillance tasks

Human Tasks	Respirator (N95 or comparable rating, no valve)	Goggles, Face Shield, or Protective Glasses	Gloves	PPE Coveralls, Gowns, or Dedicated Clothing with washable shoes
Handling human specimens	Yes	Yes	Yes	Disposable gown, Tyvek coveralls, or dedicated clothing with washable shoes
Sampling or interviewing humans during the COVID-19 pandemic	Yes	Yes	Yes	Dedicated clothing or disposable gown with washable shoes
Sampling and interviewing humans during other outbreaks	See CDC or WHO outbreak specific recommendations	See CDC or WHO outbreak specific recommendations	Yes	See CDC or WHO outbreak specific recommendations
Sampling humans with acute febrile illness ****	Surgical mask	Face shield	Yes	Disposable gown or dedicated clothing with washable shoes
Interviewing humans with acute febrile illness ****	Surgical mask	No	No	Disposable gown or dedicated clothing with washable shoes
Sampling apparently healthy humans	No	No	Yes	Disposable gown or dedicated clothing with washable shoes
Interviewing apparently healthy humans	No	No	No	Dedicated clothing with washable shoes

Table Notes

* When handling live animals that pose a bite or scratch risk, it is recommended that leather gloves be worn on top of nitrile gloves for added protection. Nitrile gloves are more puncture resistant than latex and may reduce the risk of exposure from a bite or scratch. In many cases, chemical restraint (anesthesia) is recommended to prevent injury to either the handler or the animal during sample collection. Refer to taxa-specific sampling SOPs.

** It is recommended to use a respirator, full protective clothing, and eye protection when in contact with livestock suspected of harboring a biohazardous agent, pregnant livestock, livestock recently giving birth, and in abattoir settings or other locations where livestock are being slaughtered/butchered.

*** Understanding potential pathogens and transmission routes is essential to assessing risk for this activity. For example, sampling rodents in peri-domestic settings, and particularly in abandoned houses/barns where rodent



feces and urine might aerosolize easily, will require use of a N95 or better respirator, dedicated clothing, and eye protection to minimize potential hantavirus or Lassa fever virus exposure in regions where these pathogens occur.

**** Symptoms fitting certain clinical case definitions may require more protective PPE, including suspect respiratory pathogens and hemorrhagic fever. Follow CDC or WHO outbreak specific recommendations as applicable.

4c. Animals with High Zoonotic Disease Risk

Investigators should familiarize themselves with known biohazards specific to species under study and with the recommended procedures for preventing exposure to any associated zoonotic pathogens. Specific considerations for working with bats, non-human primates, and rodents are summarized below.

Rodents, bats, non-human primates, and other wild species may harbor pathogens that are transmittable to and highly pathogenic in humans. When handling these rodents, bats or non-human primates, careful consideration needs to be given to safety training, conscientious use of PPE, good personal hygiene (i.e., hand washing), and application of good animal handling and sampling techniques to prevent exposure to infection or injury.

In the event of an injury while handling animals that pose risk of zoonotic pathogen exposure, appropriate first aid must be applied immediately. The risk of infection can be significantly reduced with immediate and thorough scrubbing of the wound with soap and/or antiseptic for at least 5 minutes. Following first aid, the individual should seek medical treatment and report the exposure to their supervisor.

Post-exposure prophylaxis may be needed in the event an individual may have been exposed to a treatable pathogen. Supervisory staff should be prepared to address post-exposure prophylaxis needs should they arise.

Vaccination to prevent rabies infection: Personnel who are handling animals that are known reservoirs for rabies (i.e., bats, dogs, wild mammals) should be immunized against rabies virus according to World Health Organization and CDC recommendations.

In the event of accidental exposure to rabies, the site of potential exposure (e.g., bite, scratch, or needle-stick site) should be washed with betadine or benzalkonium chloride (if available).

Bats

Exposure to wild bat roosts (in caves or trees), handling of bats in the field or handling bat excreta (urine or feces) presents a potential for exposure to zoonotic pathogens. Rabies, Nipah virus, Ebola virus, and the fungal disease histoplasmosis are examples of zoonotic pathogens carried by some bat species. Bat bites, scratches and wound and mucous membrane exposure to bat saliva are the ways in which rabies can be transmitted. Spores of histoplasmosis can be



present in soil and debris enriched with bird and bat droppings. When this dry soil is disturbed, spores can become airborne and cause infection by inhalation.

Special Precautions:

- When working around bats in enclosed spaces, such as in a cave, wear at a minimum an N95 respirator with no exhalation valve, goggles, gloves and Tyvek coveralls (or dedicated long-sleeved clothing).
- Personnel who are handling animals such as bats should be immunized against rabies virus and be aware of appropriate post exposure prophylaxis in the case of bites according to World Health Organization and CDC recommendations.

Non-Human Primates

Non-human primates may be infected with a number of potentially serious zoonotic pathogens. For example, all macaque monkeys and their fluids should be considered to be infected with *Herpes Simian B virus*. Marmosets and other monkeys of the Americas, although they do not carry the herpes B virus, can carry other disease agents that affect humans such as lymphocytic choriomeningitis virus and *Trypanosoma cruzii*, the cause of Chagas' disease. Moreover, transmission of pathogens from humans to non-human primates can also occur (several pathogens, including metapneumovirus, measles, SARS-CoV-2), and may pose a risk for primate health and conservation. It is critical that work with non-human primates be done while wearing the appropriate personal protective equipment and following well-established safe protocols and procedures.

Special Precautions:

- Personnel must follow strict hygiene procedures. Frequent and thorough hand washing is critical to physically remove pathogen contamination and prevent exposure.
- Personnel must wear at least the minimum PPE for handling non-human primates including an N95 mask with no exhalation valve, eye-protection, gloves, and coveralls or clean dedicated clothing.
- In the event of possible pathogen exposure from a non-human primate, workers must stop work immediately and follow the details in the Non-Human Primates SOP.

Rodents

Wild rodents have the potential to carry a variety of zoonotic bacteria and viruses that can be passed on to those handling them, including hantaviruses, Lassa fever virus, and *Leptospira* bacteria. Because of the serious consequences of becoming infected, personnel must always follow good personal hygiene and animal handling procedures and use adequate PPE to protect against exposure.

Special Precautions:

- Wear at least the minimum PPE for handling rodents including an N95 mask with no exhalation valve, eye-protection, gloves and coveralls or clean dedicated clothing. Avoid closed structures (abandoned houses, barns) where rodent excreta might accumulate.
- Personnel who are handling animals should be immunized against rabies virus according to the World Health Organization and CDC recommendations.
- Where appropriate, field teams should follow all precautions for prevention of Lassa fever and hantaviruses.
 - <https://core.ac.uk/download/pdf/186935305.pdf>
 - https://www1.paho.org/Spanish/HCP/HCT/hct-98_104.htm#prefacio

PPE minimizes transmission of pathogens from humans to animals

Strict hygiene and PPE use can minimize risk of pathogen transmission from humans to animals. As a general rule, people with known transmissible diseases (e.g. tuberculosis) or with visible clinical signs of illness (e.g. fever, cough, nasal discharge) should not participate in field activities that require close contact with wildlife (particularly non-human primates). During the COVID-19 pandemic, additional preventative measures are recommended. Please refer to specific guidelines for minimizing risk of SARS-CoV-2 transmission from people to free-ranging, wild mammals developed by IUCN and OIE, available in English, French and Spanish at: <http://www.iucn-whsg.org/COVID-19GuidelinesForWildlifeResearchers>

4d. Human Surveillance and Disease Risk

Healthcare workers have a high risk of contact with infectious agents due to the various types of activities involved with their jobs and the possibilities of contamination. In carrying out their duties interviewing and sampling participants, surveillance staff will be working with people with undiagnosed acute febrile illnesses, which may include serious life-threatening diseases. Healthcare workers performing surveillance activities should be aware of the potential for exposure to bloodborne pathogens (e.g., HIV/AIDS, Hepatitis B, Hepatitis C), common respiratory pathogens (e.g., seasonal flu, SARS-CoV-2, tuberculosis), and contagious diseases that occur within the region they work. Appropriate PPE, up-to-date vaccinations, and observing universal precautions can minimize the risk of pathogen transmission from people.

CDC guidelines for diseases common to specific countries can be found at: <https://wwwnc.cdc.gov/travel/destinations/list>
<https://www.who.int/news-room/fact-sheets>

5. Use and Disposal of PPE

5a. Considerations When Using PPE

Personnel wearing PPE may experience heat stress and general discomfort in hot or humid environments. It is important to remain hydrated by drinking sufficient water before and after wearing PPE. Length of time wearing full PPE should be limited, based on environmental conditions, to avoid the risk of heat exhaustion or heat stroke. Personnel should inform their supervisor(s) if they experience severe discomfort during animal capture or sampling activities, so that they may take a break.

When workers are heat-stressed, uncomfortable, or unable to see out of their fogged goggles, they are more likely to remove their goggles or mask in risky environments, exposing themselves to potential pathogens.

Most PPE items to be worn during virus surveillance activities are designed to be used only once and should be properly disposed of as medical waste after each use. Plastic goggles and rubber boots may be re-used but must be disinfected between each use.

Designate a clean area for putting on PPE. It should ideally be a clean area away from any potentially contaminated animal equipment, such as cages, crates, or farm tools. All personnel should use this area to put on their PPE. Also, designate a decontamination and PPE removal site.

Always wear the respirator properly when you are working. Ensure that there is a tight seal formed around the mask and never hang it around your neck.

When wearing coveralls, ensure there is no exposed skin between your sleeves and gloves. If any piece of PPE is torn, it should be changed at the PPE decontamination site as soon as possible following the steps outlined in the section on how to take off PPE.

It is beneficial to have a colleague confirm that PPE is properly worn. Working in teams when putting on and removing PPE can help avoid mistakes and react immediately if accidents occur.

5b. Special Considerations for the COVID-19 Pandemic

- 1) Observe all local public health recommendations and regulations.
 - a. When your work requires you to travel to a different country or region, check all relevant travel restrictions and requirements as they may change unexpectedly. If local quarantine or self-isolation is required after arriving in a new area, you may not begin field work until this requirement is satisfied.
- 2) COVID-19 vaccination is highly recommended for all project personnel.
 - a. Follow administration guidelines associated with your locally available vaccines. Some may require a second, often 21 or 28 days after the first dose. Personnel are considered fully-vaccinated (protected) 14 days after the last vaccine dose.



Follow country-specific and WHO guidelines on booster vaccinations as they are recommended and available.

- 3) Check your temperature daily prior to engaging in group work and self-isolate if you suspect COVID-19 infection or have been in close contact with a positive case within the last 10 days. Human surveillance staff typically working in clinical settings should self-isolate if they have an unplanned exposure to a positive case while not wearing all required PPE within the last 10 days.
 - a. You should notify your supervisor and stay home from work if your temperature is greater than or equal to 100°F (37.8°C) per CDC guidelines.
 - b. Checking your temperature at roughly the same time each day will allow you to better estimate your normal temperature and recognize a potential fever.
- 4) An appropriate facial covering (3-layer cloth mask or surgical mask) that covers both the mouth and nose is required when working in any shared spaces, traveling in vehicles, and when outdoors within 2 meters of other people. If local regulations are more stringent, they supersede these guidelines.
 - a. Masking is required when interviewing study participants. Note that when sampling participants, an N95 or comparable respirator is required.
 - b. Whenever possible, study participants should also wear masks (cloth or surgical). Offer a disposable mask to study participants to wear during their interview if they do not have a mask of their own.
- 5) Respirator masks (e.g., N95) worn during any required activity may NOT contain an exhalation valve.
- 6) Maintain a distance of at least 2 meters between you and your colleagues when your work activities allow you do so.
 - a. When you need to remove your mask during meal periods, distance yourself from your colleagues by at least 2 meters, and eat outdoors when possible.
- 7) When your work requires you to be within 2 meters of others, take precautions to increase ventilation when safe and possible to do so. For example, open windows when traveling with others in a vehicle.
- 8) Minimize social gatherings (outside the team) during field activities to limit infection risk.
- 9) Review CDC guidance for infection control in healthcare settings.
 - a. <https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control.html>

5c. Planning and Preparations for PPE Use

- 1) Prior to going to the field, assess the level of risk associated with the field tasks and environment. Based on guidelines found within this SOP and local regulations, determine the appropriate PPE needed to safely perform the field activities.
 - a. Also consider your field clothing and precautions you can take before reaching the field site and donning PPE. In areas where vectors (e.g., mosquitoes and ticks) may transmit disease, field staff should wear long sleeve clothing and pants, and apply DEET spray per product instructions.



- 2) PPE kits should be assembled for each person who will be involved in the field tasks. Multiple kits per person may be required, based on the number of animals to be handled, the number of breaks that personnel may take, and to account for potential tears in gloves and coveralls, etc.
- 3) Prior to going to the field, PPE supplies should be organized, and durable/reusable items should be inspected to ensure they are undamaged and fully functional. Along with required sets of PPE, supplies should include disinfectants, alcohol-based hand sanitizing gel and germicidal wipes, large color coded bags for infectious waste disposal according to national codification, and collection bags for equipment (such as plastic goggles, face shields and rubber boots) that will be disinfected with a 10% bleach solution or appropriate virucide for re-use.
- 4) Abundant drinking water should be available for consumption before and after use of PPE. PPE can be very hot, and personnel are more likely to suffer heat stress if they do not consume adequate amounts of water.
- 5) Bring additional tape and extra collection and disposal bags. Tape can be used to secure shoe covers and protective clothing and seal bags.
- 6) Plan for disposing of PPE:
 - a. An area for removing PPE should be identified. This area should be away from the contaminated area and away from animals. All personnel should use this area to remove their PPE.
 - b. Remove all of your PPE carefully, following the recommended steps for PPE removal (below) and discard them (or put reusable items in bags for disinfection) before taking a break. Put on a new set after the break.
 - c. Immediately after removing PPE, place it directly into the color-coded infectious waste bag (or marked biohazard waste bag).
 - d. Color coded infectious waste bags should be sealed and properly disposed. Follow the instructions of the local officials or person supervising the work on where to dispose infectious waste bags when they are full.
 - e. Disposal methods (such as burning or burial) may differ by situation or location. Local officials and/or those supervising the work will likely decide on how best to dispose of used PPE and other disposable items that are potentially contaminated. For guidelines, Environmental Guidelines for Small-Scale Activities in Africa (EGSSAA) Ch. 8: Healthcare Waste: Generation, Handling, Treatment and Disposal (https://pdf.usaid.gov/pdf_docs/PNADK154.pdf); and WHO Safe Management of Wastes from Health-Care Activities (https://www.who.int/water_sanitation_health/publications/wastemanag/en/)

5d. Components of PPE Kits

1. Coveralls, dedicated clothing and shoes, and aprons – for high-risk tasks, full coverage may be warranted. In that case, Tyvek or Tychem coveralls, shoe covers or boots, and an apron may be used. For lower-risk tasks, just a disposable plastic apron, disposable gown, and/or dedicated clothing and shoes may be appropriate. Dedicated clothing at the work site should be

removed and laundered after each use. Dedicated clothing will consist of cotton coveralls and washable boots for wildlife surveillance activities, and scrubs or a lab coat and washable close-toed shoes for human surveillance activities.

Regarding the use of Tyvek or Tychem coveralls:

- Wear these coveralls to protect your skin and/or clothing against contamination when in contact with human samples, dust, animal urine or droppings, or animal fluids such as blood, saliva, and mucous.
- The synthetic material Tyvek is water resistant and Tychem is waterproof, so even if the coveralls get dirty or wet, they will offer protection. Tychem offers more protection from liquids and should be considered in situations with high risk of exposure to blood-borne pathogens (e.g., hemorrhagic disease, EVD outbreak investigations).
- You can wear your dedicated shoes and clothing under the coveralls.

2. Shoe Covers or Washable Rubber Boots

- Because pathogens in human and animal samples including feces, secretions, or blood can easily contaminate your footwear, it is important to have disposable shoe covers or rubber boots that can be disinfected.
- The shoe covers provided in some PPE kits fit over your coverall feet, or over your shoes.
- Rubber boots may be worn with dedicated pants pulled over the top of them. If using PPE coveralls with rubber boots, purchase the coveralls without feet (or cut the feet off) and pull the pant legs of the coveralls over the top of the boots.
- A footbath should be prepared with either chlorine bleach or Virkon disinfectant. This can be used to disinfect boots and other footwear upon leaving the field site. A boot brush should be available for scrubbing surfaces of footwear prior to using the footbath. It is critical to remove all organic material from footwear prior to disinfection to ensure effectiveness of disinfectants.

3. N95 Respirator

- See section 6 on Respirator Use and Fit Testing for more details.
- N95 respirators (masks) protect you from inhaling droplet or aerosolized pathogens into your nose and lungs. Surgical masks are not respirators. They do not protect against aerosol and small droplets. They filter out large-size particles in the air and offer protection from large droplets and direct contact.
- There are several different models, styles, and sizes of N95 and comparable respirators that fit a variety of face shapes and sizes. Each person requiring a respirator for project activities should be individually fit tested to identify a respirator that appropriately and comfortably fits her or his face.
- While generally considered more comfortable due to lower exhalation resistance, respirator masks with exhalation valves should NOT be used during outbreaks of respiratory disease (including COVID-19) or when there is concern of transmitting



potential pathogens from humans to animals. Masks with exhalation valves protect only the user, but do not filter exhaled air.

- More details on respirator use and fit testing can be found in Section 6 of this document.

4. Goggles and Face Shields

- Goggles and face shields protect your eyes from splashes and liquids.
- Goggles are adjustable to ensure the best fit. Adjust the head strap before putting on all of the PPE. The goggles should fit snugly over and around your eyes.
- Personal glasses are not a substitute for goggles or safety glasses; if you wear eyeglasses, the goggles or safety glasses should be placed over them.
- If ordering goggles, be sure to order fog-free goggles. If they are not fog-free, they are likely to fog up in a few minutes, rendering them useless. If all you have are non-fog-free (regular) goggles, you may rub a little soapy water on the inside of the lens prior to use to reduce fogging.
- Goggles (and rubber boots) are one of the few components that may be re-used if disinfected properly after each use.



5. Gloves

- Nitrile gloves are best for use for infectious agent exposure protection. **Gloves are a component of minimum PPE required for sample collection and handling tasks involving wildlife.**
- Two pairs of nitrile gloves are recommended when using sharps and are required whenever Tyvek coveralls are used.
- Heavy rubber gloves or leather gloves may be required when handling animals and can be worn over the nitrile gloves. An option are Hexarmor Hercules 400R6E gloves.



6. Disinfecting Wipes and Alcohol-based Hand Sanitizing Gel (at least 60% alcohol) -- for disinfecting gloves and hands.

- Disinfecting wipes that contain at least 60% alcohol should be used to clean your gloves and other PPE before removing them.

- Alcohol-based wipes or hand sanitizing gel can be used to clean areas of skin that may have been contaminated. It is critical to remove organic material before using sanitizers to ensure effectiveness of disinfectant.
- It is recommended that you ALWAYS disinfect and wash your hands after removing gloves, regardless of contamination.

7. Infectious Waste Bag — for the safe disposal of PPE and other medical waste.

- A color-coded infectious waste bag (or otherwise labeled biohazard bag) should be available at the field site for containing and disposing of used PPE items.
- As soon as you remove a contaminated item, place it in the infectious waste bag.
- Do not over fill bags and ensure they can be closed and tied.
- Tie the bag at the top and spray the outside of the bag with disinfectant once it is closed and tied. Wet waste should be double-bagged to prevent leakage.
- Leave it at the designated collection site or place it in a secure container for transport to a proper disposal site.
- Containers should be constructed to contain all contents and prevent leakage of fluids during handling, storage, and transport.
- It is strongly recommended that field teams do not burn or bury medical waste at the field site. Incomplete burning may leave infectious or dangerous materials, and animals or children may dig up buried waste. All biohazardous waste should be contained and returned to a medical center for autoclaving or incineration.
 - See Safe Disposal of Carcasses and Infectious Waste Guide (Appendix 2) for information regarding guidelines for waste disposal.

8. Other Components

- Bags to collect contaminated, reusable PPE items until they can be disinfected.
- First aid kit and guidelines for exposure response, including contact information for the nearest treatment facility.
- Tape, may be used to secure the coverall sleeve to the inner glove.
- Insecticide spray with DEET.
- Mosquito netting if needed to provide protection at field site.
- Common methods for preventing mosquito bites, such as long-sleeved shirt and pants. For additional information on preventing mosquito bites:
 - https://www.cdc.gov/chikungunya/pdfs/fs_mosquito_bite_prevention_us.pdf
 - <https://www.cdc.gov/nceid/dvbd/media/stopmosquitoes.html>

5e. Procedure for Putting on PPE (Donning)

All of the components of PPE discussed below are not necessary or appropriate for all viral surveillance tasks. For instance, Tyvek coveralls are not necessary for interviewing healthy people. However, when investigating disease outbreaks or other potentially high-risk situations,

the PPE and donning and doffing procedures may be substantially enhanced to reduce risk of exposure.

See CDC Guidelines for Personal Protective Equipment (PPE) Donning Procedures during management of Ebola virus disease cases at the link below. To view all videos (14 steps for donning), click through the steps in left sidebar. Note that this donning sequence uses a face shield instead of goggles as shown below.

Donning: https://www.cdc.gov/vhf/ebola/hcp/ppe-training/n95Respirator_Coveralls/donning_01.html

1. Wash your hands or disinfect them with alcohol-based hand sanitizing gel prior to putting on PPE.

2. Coveralls or dedicated clothing go on FIRST. Always start with the coveralls (which should be big and loose to fit over clothing and not restrict movement) or dedicated clothing. Be certain to zip up coveralls or button up clothing.



3. Shoe covers or boots go on SECOND. Shoe covers fit over the coverall feet. Pant legs of dedicated clothing and coveralls should fit over the boots.



4. Respirator or surgical mask goes on THIRD. Of the equipment to be worn around the head and face, the mask or respirator is always first on and last off. On a mask with a metal nose clip, be sure to form the clip around the nose for a nice fit.

Any time you put on a respirator, perform a **seal check** by inhaling sharply. If there is air leakage around the edges of the mask, readjust to ensure a proper seal.



5. **Goggles go on FOURTH**, after the respirator. Goggles should fit snugly over and around your eyes. Goggle straps should be adjusted to fit your head.



6. **Once the respirator and goggles are in place, pull the hood on your coveralls over your head.** If the coveralls do not have a hood, put on the separate head cover.



7. **Tie on the apron over the coveralls or your dedicated clothing.** Place the apron over your head and then tie it in the back.



8. Put on two pairs of gloves. The inner glove should go under the sleeve of the coverall to prevent exposed skin between the coverall and the glove. Coveralls with finger loops that secure the sleeve over the first pair of gloves are ideal to avoid exposure of the wrist area (or you can make a small cut in the coverall sleeve and introduce your thumb). Otherwise, tape the coverall sleeve to the inner glove.



Put the second pair of gloves on over the first pair and extend the gloves over the coverall cuffs.



5f. Procedure for Removing PPE (Doffing)

After completing your work, assume the exterior of the PPE is contaminated. The goal of correct removal of PPE is to minimize contact between your clothes and skin and the contaminated outer surfaces of the PPE.

See CDC Guidelines for Personal Protective Equipment (PPE) Doffing Procedures during management of Ebola virus disease cases at the link below. To view all videos (23 steps for doffing), click through the steps in left sidebar. Note that this doffing sequence uses a face shield instead of goggles as shown below.

Doffing: https://www.cdc.gov/vhf/ebola/hcp/ppe-training/n95Respirator_Coveralls/doffing_01.html

1. Wipe off any visible contamination of the PPE using germicidal or alcohol-based wipes and dispose of the used wipe in the infectious waste bag. Alternatively, use a germicidal or alcohol-based spray thoroughly misted all over PPE, using a disposable paper towel to spread the spray to any areas not easily sprayed.



2. Remove and dispose of the apron in the infectious waste bag.

3. Wipe off outer gloves with a germicidal wipe and dispose of the used wipe in the infectious waste bag.



4. Remove boots or remove shoe covers by holding the top and rolling them off of your feet. Place the shoe covers in the infectious waste bag. Place the boots in the equipment collection bag for disinfection and re-use.



5. Remove the outer gloves and place them in the infectious waste bag. Using one gloved hand, grasp the outside of the opposite glove near the wrist. Pull and peel the glove inside-out and away from the hand. Hold the removed glove in the opposite gloved hand. Then, slide one or two fingers of the ungloved hand under the wrist of the remaining glove. Peel glove off from the inside, creating a bag for both gloves. Dispose of the gloves in the infectious waste bag.



6. Disinfect your inner gloves with alcohol-based hand sanitizing gel.

7. Unzip and roll down the coveralls until they are inside out and place them in the infectious waste bag.





8. Disinfect gloves with alcohol-based hand sanitizing gel.

9. Remove the goggles by the strap and place them in the infectious waste bag or equipment collection bag for disinfection if re-usable.



10. Disinfect gloves with alcohol-based hand sanitizing gel.

11. Close the biohazard bag by tying the corners of the top of the bag together. Disinfect gloves again.



12. Remove the respirator by grabbing the top and then the bottom elastic bands, and pulling the bands up over your head or by grabbing the nose and pulling forward and then off. Place the respirator in a **second clean red infectious waste bag**.



13. Disinfect gloves with alcohol-based hand sanitizing gel.

14. Remove the inside gloves using the procedures listed in #5 above and place them in the second infectious waste bag.

Dispose of infectious waste bags according to guidelines in Section 5d, #7 above.



15. Disinfect hands with alcohol-based hand sanitizing gel.

16. Wash your hands and wrists using soap and running water (from a tap or poured) following the guidelines presented in Section 2.



If PPE is compromised, falls off, rips or is removed while you are handling or are exposed to biological hazardous materials, stop your current activity, remove PPE in the designated area, and wash and disinfect the exposed skin/surfaces. In addition, immediately inform your supervisor to determine if prophylaxis or follow-up care is indicated.

5g. Disinfecting and Laundering Reusable PPE

The following PPE items are reusable and must be disinfected between each use. Until they can be disinfected, they should be treated as contaminated, bagged, and stored separately from clean PPE items. Each field team should also prepare a similar plan for disinfecting any reusable field equipment. Appropriate PPE should be worn when handling contaminated (used) PPE while completing disinfection procedures and changed before handling items after disinfection. Minimally, PPE should include gloves and goggles to prevent injury from contact with the disinfectant, plus any additional PPE needed based on which activities were performed while wearing the used PPE. Since items soiled with organic material cannot be disinfected properly, it is important to clean items prior to disinfection (precleaning).

Minimum contact times for disinfectants are specific for each material and manufacturer; follow manufacturers' instructions when preparing and using disinfectants. Some disinfectants may produce strong odors and should only be used in well ventilated areas. Do not mix together different disinfectants and cleaning agents (including dish soap) as some combinations can create toxin fumes.

Chlorine bleach or Virkon disinfectant solution are commonly used as general-purpose disinfectants. See the WHO Laboratory Biosafety Manual, chapter 14, for frequently used classes of disinfectants, with general information on their applications and safety profiles, as well as recommended dilutions for chlorine-releasing compounds, such as chlorine bleach.

<http://www.who.int/csr/resources/publications/biosafety/en/Biosafety7.pdf>

Make sure to dispose of used disinfectants in accordance with local regulations. As these chemicals can be toxic to the environment, including food and water sources, do not pour out disinfectants in the field.

Goggles Disinfect by soaking in a chlorine bleach solution or spraying thoroughly with a chlorine bleach solution. Ensure the minimum contact time elapses before rinsing off disinfectant with clean water and allowing goggles to dry.

Rubber Boots A boot brush should be used to scrub footwear to remove soil prior to using a footbath to disinfect boots. It is critical to remove all organic material from footwear prior to disinfection to ensure the effectiveness of the disinfectants. Prepare a footbath with either chlorine bleach or Virkon disinfectant to disinfect boots and other footwear. Ensure boots remain in the disinfectant for the minimum contact time.

Dedicated Clothing Disinfect by soaking in a chlorine bleach solution for the minimum contact time. Rinse with clean water and then proceed with regular



laundering. Dedicated clothing includes items such as cotton coveralls, scrubs, and lab coats.

6. Respirator Use and Fit Testing

Using respirators alone will not fully protect you from acquiring an infection – the respirator must be used in combination with all the other PPE components.

Each person using respirators must be fit tested to identify a respirator that he or she can comfortably and securely wear. Fit testing is a process that takes approximately 15-20 minutes to complete and should be performed for each member of the field team before he or she uses any respirators in the field.



Videos on fit testing are available online at:

3M Respirator Fit Kit Test: https://www.youtube.com/watch?v=Syj_zeNtLGI

OSHA N95 and KN95 Mask Fit Testing: https://www.youtube.com/watch?v=pl_wtU-wJp0

US Department of Labor Mask Fit Testing: <https://www.youtube.com/watch?v=D38BjgUdL5U>

Qualitative fit test kits are available for purchase through 3M and other manufacturers. A fit testing kit can also be prepared using the CDC guidelines found here:

<https://www.cdc.gov/niosh/npptl/QualitativeFitTesting.html>

To perform a respirator fit test, follow the guidelines here: <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134AppA>

After passing a fit test with a respirator, you should always use the same make, model, style, and size of respirator that was found during the fit test process to create an effective seal around your face.

If you have facial hair, including stubble, it is unlikely that you can properly fit a disposable particulate respirator if any hair crosses or is beneath the respirator seal. Workers who cannot ensure a proper fit because of facial hair or other fit limitations should consider a loose-fitting (i.e., helmeted or hooded) powered air purifying respirator equipped with high-efficiency filters.

More information on respirators and respiratory protection can be found at:

<https://www.cdc.gov/niosh/npptl/hospresptoolkit/fittesting.html>

<https://www.osha.gov/SLTC/etools/respiratory/index.html>

While wearing a respirator, monitor yourself for any signs that you are having difficulty breathing. Anytime someone indicates they are having trouble breathing while wearing a respirator, they should go to the PPE removal site and remove their respirator. Do not use or provide others with respirators without instruction on the health risks associated with them. For example, workers with respiratory problems may not be able to wear these respirators.

Know when to change your respirator

- When disposable particulate respirators become wet from saliva, sweat, or respiratory secretions, they lose their protective properties and must be changed.
- If a respirator is splashed and becomes wet, it should be changed. Wear gloves to remove the soiled respirator, and then disinfect gloves and wash hands following hand washing procedures.
- Respirators should be discarded and replaced after 4-6 hours of use.
- Respirators should not be hung around your neck when working. Always wear them when working.



7. References

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- CDC Guidelines for Preparing Solutions for Qualitative Fit Testing from Available Chemicals, at: <https://www.cdc.gov/niosh/npptl/QualitativeFitTesting.html>
- CDC Guidance for Preventing Mosquito Bites:
https://www.cdc.gov/chikungunya/pdfs/fs_mosquito_bite_prevention_us.pdf
<https://www.cdc.gov/ncezid/dvbd/media/stopmosquitoes.html>
- CDC PPE Donning and Doffing Training for Ebola:
Donning: https://www.cdc.gov/vhf/ebola/hcp/ppe-training/n95Respirator_Coveralls/donning_01.html
Doffing: https://www.cdc.gov/vhf/ebola/hcp/ppe-training/n95Respirator_Coveralls/doffing_01.html
- CDC Sharps Safety for Healthcare Professionals: <https://www.cdc.gov/sharpssafety/pdf/brochure.pdf>
- Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention in Veterinary Personnel: National Association of State Public Health Veterinarians Veterinary Infection Control Committee 2010. Journal of the American Veterinary Medical Association. December 15, 2010, Vol. 237, No. 12, Pages 1403-1422. <https://doi.org/10.2460/javma.237.12.1403>
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- OSHA-Accepted Fit Test Protocols (for respirators), 1910.134 App A: <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134AppA>
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- University of California Davis PPE Policy: <https://ucdavispolicy.ellucid.com/documents/view/297/active>
- University of California Davis, Zoonotic Disease Risk Assessment Tools:
<https://safetyservices.ucdavis.edu/units/occupational-health/surveillance-system/zoonotic-diseases>
https://iacuc.ucdavis.edu/iacuc_public/risktool/index.cfm
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<http://www.who.int/csr/resources/publications/biosafety/en/Biosafety7.pdf>



A1. Appendix 1: Field Prep Checklist

Field Work Preparation Checklist

During COVID-19 Pandemic

Continuity Planning and Protocol Changes:

- Develop a contingency plan for reduced staffing, in case a team member is out sick or otherwise can't come in to work.
 - Cross-train multiple people on critical tasks and document protocols in detail.
 - Discuss how you will prioritize the most time-critical tasks, if team members can't work.
- Consider dividing staff into smaller teams that will work separately from other teams for the season. This minimizes personal interactions and the number of team members who must self-isolate if one co-worker becomes ill.
- Identify tasks that can be completed from home or while working alone to reduce time in the field and in-person interactions. For example, pre-label sample collection bags, conduct daily pre-trip briefings and training via video conferencing, or pre-assemble and repair equipment for field deployment. Note that certain research materials and data may not be taken home.
- Avoid sharing equipment. Where possible, assign each team member a personal kit of field tools and equipment, to be stored in separate labeled containers. When equipment must be shared, disinfect between users.

Required Training/Safety Brief:

Along with discussing work goals and plans, review safe work practices identified in this checklist with all participants.

- Maintaining social distancing from one another, equipment handling, disinfection procedures, signs/symptoms of COVID-19, communication options in the field check in procedures, and emergency procedures.
- Team members should have dedicated PPE, provisions, and supplies, if feasible, to minimize sharing.
- Team members have the right to refuse participation without fear of penalty if they feel the conditions are unsafe.
- Each team member should be asymptomatic for at least 10 days prior to fieldwork and will not participate should they feel ill or have reasonable cause to believe they have been exposed to someone infected with COVID-19.
- Follow CDC guidance to [Prevent Getting Sick](#).
- Maintain reliable communication to receive updates or get assistance; maintain a frequent check-in schedule.
- If working out of the visual or audible range of other team members, whether in the field, in the lab, or at a clinic, develop a safety system so that others know where you are and what you are doing, and you have someone to contact in the event of an emergency. This may include notifying someone via

call or text when you enter and leave the area in which you will work alone.

- Remain aware of project policies regarding COVID-19 and any local ordinances relevant to your field work.
- Review responsible conduct in the field and community; minimize contact with the public during pandemic.
- Maintain flexibility to alter plans at any time, self-isolate, or return home.
- If you, a colleague, or an immediate family member tests positive for COVID-19, report this as soon as possible to your supervisor.

Transportation to Worksite:

- Avoid public transportation.
- Meet at the worksite when possible (if each crewmember has their own field vehicle). When you must share a vehicle, all occupants must wear a mask and the windows should be open if it is safe to do so. Only one field team should share the same vehicle; members from different teams should travel separately.
- Depending on the history of the vehicle, all common areas should be wiped with a sanitizing agent prior to and upon completion of field transportation for the day.
- Other precautions:

Provisions:

- Each participant should be responsible for their own field provisions for the day.
- Water, food, snacks, etc., should all be prepared and brought from home, if possible.
- Each crewmember should have at least two gallons of drinking water available per workday.
- If coolers are used for provisions, each team member should have their own assigned cooler.
- For overnight trips, ensure extra lodging is available to maintain social distancing, i.e. single rooms, single tents.
- Other precautions:

Fueling Vehicles/Service Stops:

- Maintain social distancing from anybody who is at the fuel location, store, etc.
- Be cognizant of what you touch at any service stations, stores, etc., sanitize hands prior to re-entering your vehicle.
- After fueling, use a hand sanitizer with at least 60% alcohol. Wash your hands for at least 20 seconds when you get home or somewhere with soap and water.
- Other precautions:



General Safe Practices:

- Maintain social distancing of at least 2 meters, whenever feasible.
- Keep from touching face (specifically eyes, mouth, and nose).
- Wear a face covering in common areas, while in proximity to others; follow local public health requirements and campus guidance.
- Wash hands with soap and water frequently for at least 30 seconds.
- Use hand sanitizer (>60% alcohol) when soap and water are not available
- Cover coughs and sneezes; cover your mouth and nose with a tissue when you cough or sneeze, or use the inside of your elbow. Throw used tissues in the trash and immediately wash your hands.
- Clean and disinfect frequently touched surfaces.
- If cough develops, wear a face covering to prevent spread via saliva droplets; return home.

Supplies, Cleaning, & Disinfection:

Shared surfaces, equipment and gear should be cleaned, disinfected and dried before use. Any disinfecting product used should be on the [EPA List-N](#), e.g. Clorox disinfecting wipes, Lysol multi-surface cleaner, Envirocleanse-A, Peroxide Multisurface Cleaner & Disinfectant.

- Hand soap and extra water for handwashing
- Hand sanitizer (>60% alcohol)
- Single-use paper towels
- Disposable gloves
- Disinfectant:
- Extra face covers
- Personal water bottles/containers
- Carry a thermometer in your first aid kit
- Other:

Wrap-up & Debrief:

- Clean and disinfect all shared equipment, touched surfaces
- Bag up used supplies, return to an appropriate designated disposal location if possible
- Follow your team's protocol for logging access to facilities and shared equipment, in case it is needed later for contact tracing
- Other:

Emergency Medical Procedures and Communication Plan:

All participants must be able to provide clear and precise directions to the worksite.

- Cell phone service available
- If no cell service, describe communication plan and check-in procedures below, or attach project field



safety plan and map to the nearest hospital:

Notes:

Signs and Symptoms of COVID-19

Symptoms may appear 2-14 days after exposure to the virus. People with these symptoms or combinations of symptoms may have COVID-19 and should stay home, monitor symptoms, and call their medical provider:

- Cough
- Shortness of breath or difficult breathing
- Fever
- Chills
- Repeated shaking with chills
- Muscle pain
- Headache
- Sore throat
- New loss of taste or smell

Seek emergency medical care immediately if you have:

- Trouble breathing
- Persistent pain or pressure in the chest
- New confusion
- Inability to wake or stay awake
- Bluish lips or face

Review the [CDC list of COVID-19 Symptoms](#), which includes guidance on when to seek emergency medical attention.

This form is adapted from: <https://safetyservices.ucdavis.edu/units/ehs/research/field>

A2. Appendix 2: Safe Disposal of Carcasses and Infectious Waste

Improper disposal of surveillance sampling waste, animal carcasses, and necropsy waste may harm human and animal health and the environment. Prior to conducting field-sampling activities, plans should be made for safe handling and disposal of all infectious waste materials, necropsy waste and carcasses. Safe handling of infectious materials includes containment, disinfection, local burning, and burial or transport of the materials to a health institution (that has a health care waste incinerator, burial site, or operates with a licensed medical waste disposal company). The preferred procedure for most field sampling generated waste is to safely contain (i.e., with triple layered protection, see below) and transport the material to a health institution, such as a medical or veterinary facility, that has the capacity to autoclave and incinerate the waste, has a safe disposal site, or operates with a licensed company. There are exceptional circumstances for which the best option may be to dispose of the infectious waste in the field (see recommended procedure for field disposal below).

Carcass disposal is fraught with technical difficulties. Burning – if done properly (i.e., reducing the carcass to ash) is usually done using gasoil (diesel) or wood for fuel. It requires a long time to burn and uses a lot of fuel. In addition, anthrax spores (should they be present) can become airborne if the fire is not managed appropriately. Burial has the advantages of being generally less time-consuming and less expensive, but it does not guarantee destruction of all infectious organisms (e.g., anthrax spores may persist in the soil for decades). Burial also leaves open the possibility that someone could dig up and recover the meat to eat or sell. Or that a scavenger animal could access the carcass. Ultimately the field supervisor must determine the best method for disposal based on the guidance provided below, his/her judgment, and resources available.

Collecting and Containing Infectious Materials for Transport

Guidelines for collecting and transporting infectious waste:

1. Use appropriate PPE to handle and move infectious waste – At a minimum, gloves, respirators/masks (N95, N100, or P100), goggles, and an apron or dedicated clothing should be worn when packaging, handling, or moving infectious waste bags or containers. (See Section 4. Biosafety and PPE Use for more details regarding PPE).
2. Collect infectious waste in strong plastic bags (preferably red or orange colored bags). Bags should not be filled more than $\frac{3}{4}$ full so they can easily be tied or taped closed without spillage or over stretching the bag. Once sealed, the exterior of the bag should be sprayed with a disinfectant.
3. Use containers with tight lids and secure them on the vehicle – The preferred way to contain bags of infectious waste for transport is in plastic buckets, barrels, or boxes with lids that may be secured tightly. These containers should be lined with plastic bags that are tied or otherwise sealed. Infectious waste containers should be strapped securely on a roof cargo rack or in the cargo compartment of a vehicle. Loose containers are more



likely to be damaged or tossed from the vehicle.

4. Disinfect waste bags and containers – Prior to moving infectious waste bags or containers the exterior should be sprayed with a disinfectant. After transporting infectious waste containers, all containers that will be reused must be cleaned and disinfected.
5. Wash and disinfect all vehicles surfaces where infectious waste containers were stowed.
6. Use a disinfectant known to kill the pathogens likely to be found in the waste.

Options for Disposal of Infectious Materials and Carcasses

The best option for disposal of infectious material must be carefully evaluated, including consultation with local environmental and health authorities. Local permits may be required for disposal of necropsy or infectious waste. Options for infectious waste or carcass disposal and the rationale for each option are described below.

OPTION 1: DELIVERY OF WASTE TO A HEALTH FACILITY FOR SAFE DISPOSAL

This is generally the best option when:

1. The volume of infectious waste is limited to the number of plastic bags or containers that can be properly secured on the available transport vehicle. The volume of waste associated with most daily field sampling activities fits in this category. (Necropsy waste from medium to large-sized animals may not fit in this category).
2. The waste can be delivered to the health facility for disposal within 48 hours. The longer waste is temporarily stored, the greater the risk that the containment bags or containers will break and expose humans and other animals to infectious materials.
3. The local health facility has agreed to dispose of the waste and is expecting your delivery of infectious waste.
4. A transport vehicle is available with either a roof rack or outside bed in which to transport the infectious waste containers. Do not transport infectious waste bags or containers in the passenger compartment of a vehicle. All materials transported must be securely attached to the vehicle so that containers will not break or spill from the vehicle.

To Deliver Infectious Waste to a Health Facility for Disposal:

1. Secure an agreement with the facility to accept waste. This agreement should include the costs, delivery times, and infectious waste containment requirements.
2. Be sure to have available the required PPE, disinfection and containment materials necessary to safely contain and transport waste: masks, gloves, coveralls, sharps containers, sturdy plastic bags and ties, disinfectant spray, buckets with tight fitting lids, and/or liquid waste containers as needed.
3. Check vehicle and vehicle cargo space requirements for anticipated waste bags and containers. Sealed bagged or bottled waste should be transported in outside racks or



cargo areas rather than inside vehicle passenger compartments. All such materials should be secured so they are unlikely to break open or fall off the vehicle.

4. Notify the authorities of the facility to which the infectious material will be delivered in advance of the scheduled sampling activities, so they may anticipate your delivery of infectious materials.
5. Contain and deliver the waste to the facility in accordance with the guidelines of the facility. It is recommended that high-risk waste be triple-bagged and sprayed with 10% sodium hypochlorite solution to disinfect the outside of the bags. Contaminated waste may include gloves, mask, face shield, Tyvek suits and other soiled and disposable materials. The triple-bagged materials are delivered to a facility for appropriate disposal.
6. Wash and disinfect the transport vehicle immediately after each delivery.

OPTION 2: FIELD DISPOSAL—BURNING AND BURYING OF INFECTIOUS MATERIALS

Under certain circumstances, field disposal may be the best (safest and most practical) option for disposing of carcasses, necropsy waste and other infectious materials as long as field disposal (burning and burying) can occur in the vicinity of the site where the waste was generated. Burying waste contained in plastic bags, without burning, will likely allow pathogens to survive longer, posing greater risk of exposing people and animals. The best option for carcass disposal may be burning and burying, just burying, or just leaving the carcass where it is found.

Criteria for Choosing a Field Disposal (Burn and Bury) Method

Field disposal may be the best option when:

1. The volume of infectious waste exceeds what can be safely contained and transported to a health facility for disposal. This may include large amounts of necropsy waste or liquid waste, or animal carcasses. Moving the infectious materials poses great risk of spreading the infection to other areas.
2. It is not possible to transport the waste to a facility for disposal within 48 hours.
3. There is no vehicle with adequate cargo space for the waste bags or containers.
4. There are places nearby where waste can be safely buried.

Considerations for Determining the Best Site to Burn and Bury Infectious Materials

1. Nature and amount of material for disposal (size and quantities of waste).
2. Availability of sites nearby suitable for digging a waste pit and burning waste, away from houses and other structures that constitute human communities.
3. Accessibility of site by the vehicle used to move the waste.
4. Features of the soil (i.e., easy to dig), low to no slope.
5. Depth of groundwater: water table level should be at least 1.5 meters below the bottom of the pit.
6. At least 50 meters from water catchments, bore holes and wells.
7. Away from livestock, poultry or dogs.
8. Away from wildlife that may dig up the material.



9. Risk that humans may dig up the material.
10. Subsequent plans for use of the area.
11. Whether or not fencing will be required to exclude animals.

Procedure for Burning and Burying Infectious Waste and Necropsy Waste

1. The pit placement should not be dug in wet (swampy) soil and should be at least 50 m from any water source or human habitation.
2. Wear PPE (gloves, masks, goggles and apron or dedicated clothing) when handling or moving a carcass for burial, and while burning and burying the waste.
3. Contain infectious necropsy waste and other infectious materials in sealed plastic bags. Spray the exterior of the bags with disinfectant prior to handling or moving to the burn-burial pit.
4. Dig a hole, generally at least 1.5 m to 2 m deep-- enough to allow the waste to be covered with soil to a depth of 1m. Place wood fuel in the pit prior to placing the waste bags in the pit. (See the Illustration below for dimensions of a burn-burial pit).
5. Pour a cup of diesel fuel (gasoil) over the waste material and wood fuel and ignite carefully with a torch on a stick, while staying clear of the fire pit. If burning waste repeatedly at a site, consider building a 220-liter (55-gallon) steel drum waste incinerator as specified by WHO-CDC and IFRC (see next page).
6. The fire should be tended with a long stick to move burning contents to ensure all is burned. Fuel may need to be added to completely burn all waste.
7. Wash and disinfect shovels and any other reusable equipment or containers used to move and bury the waste. Disinfect with 70% ethanol (metal items like the shovel) or 10% bleach (plastic or rubber items like boots).

Procedure for Burning and Burying Carcasses

1. Place the animal material in a safe place, at least 100 meters from human settlements, and at least 50 m from any water source (stream, well, etc.).
2. If diesel fuel (gasoil) is being used, place the carcass/parts in a shallow (10 cm) deep hole to help contain the burn.
3. If using brush or wood as fuel, make sure that it is dry enough to burn easily.
4. A pyre is constructed, with the carcass/parts placed on top of a large pile of fuel.
5. In either case, the carcass/parts should be burned until reduced to ashes.
6. Shovel dirt over the remaining ashes to completely cover them.
7. Wash and disinfect shovels and any other reusable equipment or containers used to move and bury the waste. Disinfect, with 70% ethanol, metal items like the shovel or with 10% bleach for plastic or rubber items like boots.

Procedures for Burying Carcasses

1. Wear PPE (gloves, masks, goggles and apron or dedicated clothing) when handling or moving a carcass for burial.
2. The pit should not be dug in wet (swampy) soil and should be at least 50 m from any

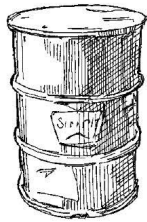


water sources.

3. Dig a pit, generally at least 1 m (and ideally 2 m) deep, enough to allow the carcass to be covered with at least 60 cm of soil.
4. Wash and disinfect shovels and any other reusable equipment or containers used to move and bury the waste. Disinfect with 70% ethanol metal items like the shovel or with 10% bleach for plastic or rubber items like boots.

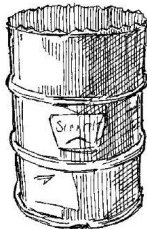
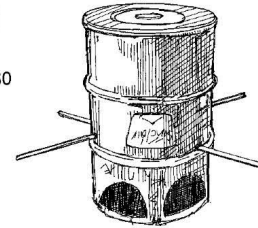


STEPS FOR BUILDING AN INCINERATOR



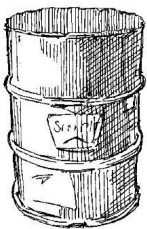
1. Find a 220 litre (55 gallon) drum.

6. Cut 4 holes in the sides of the drum. Thread 2 metal rods through these holes so that they cross inside the drum.



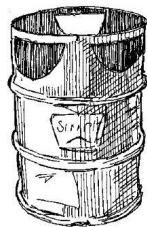
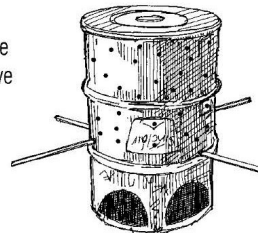
2. Cut open the drum. Remove and save the top cutaway piece.

7. Punch holes in the top cutaway piece to make a platform.



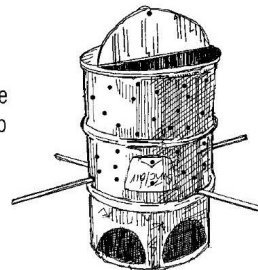
3. Hammer the edges of the drum so that they are no longer sharp.

8. Pierce a series of holes in the side of the drum, above the crossed rods to improve the draw of the fire.



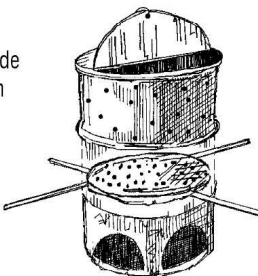
4. Cut 3 half-moon openings just above the top end of the drum.

9. Cut away half of the top. Attach the wire loops to the cutaway half to make a trap door. Attach another loop for a handle to open the trap door.



5. Turn the drum upside down. The bottom of the drum becomes the top.

10. Place the platform (7) inside the drum so that it rests on the crossed rods.



IFRC ACTION TOOL 40: Building an incinerator for medical waste

<https://ifrcgo.org/ecv-toolkit/action/building-an-incinerator-for-medical-waste/>

OPTION 3: LEAVE AN INFECTIOUS CARCASS WHERE IT IS FOUND

Leaving a carcass where it is found may be the best option when:

1. The carcass is not near people or domestic animals
2. The animal carcasses are large or numerous such that it is not safe or practical to move and bury them. For example, there may be numerous large animals during a disease outbreak. In this case, local authorities will decide how to deal with the carcasses.

Considerations to Leave Infectious Carcasses Where They are Found

The safest and most practical option for handling an infectious animal carcass or numerous carcasses may be to leave them where they are found. If the decision is made to not move a carcass that may be infected with a dangerous pathogen, local public health and animal health officials should be notified of the location and suspected infectious risk of the carcasses.

A3. Appendix 3: Reporting of Injuries and Illnesses

All accidents, injuries, illnesses, and medical emergencies must be documented.

Before reporting, follow guidelines for first aid and seek medical treatment.

The steps for most minor injuries include:

- Basic first aid:
 - Apply continuous pressure to control bleeding, about 5-10 minutes. If bleeding is not controlled, seek medical assistance immediately.
 - Wash wounds with soap and a high volume of water for at least 5 minutes, and up to 10 minutes if the wound is extensive or extremely dirty. If available, an antiseptic wash may be used, e.g., betadine (povidone-iodine), benzalkonium chloride, or chlorhexidine scrub.
 - Primate bites require special care, see Non-Human Primate SOP.
- Seeking medical attention promptly.
- Report injury to your supervisor.

Records: the employee and their supervisor should fill out the reporting templates designed by the Occupational Safety and Health Administration (OSHA), provided on the following pages. For serious illnesses/injuries, the Incident Investigation Report should also be completed in consultation with the employee, supervisor, and a project PI. These forms contain information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Reporting templates adapted from: https://www.osha.gov/sites/default/files/2018-12/fy11_sh-22224-11_3_Accident_Investigation_Form.pdf



Employee's Report of Injury Form

Instructions: Employees shall use this form to report all work-related injuries, illnesses, or “near miss” events (which could have caused an injury or illness) – *no matter how minor*. This helps us to identify and correct hazards before they cause serious injuries. This form shall be completed by employees as soon as possible and given to their supervisor for further action.

I am reporting a work related: <input type="checkbox"/> Injury <input type="checkbox"/> Illness <input type="checkbox"/> Near miss	
Your Name:	
Job title:	
Supervisor:	
Have you told your supervisor about this injury/near miss? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Date of injury/illness/near miss:	Time of injury/illness/near miss:
Names of witnesses (if any):	
Where, exactly, did it happen?	
What were you doing at the time?	
If the injury/illness involved an animal or animal specimen, indicate the species and animal ID:	
If the injury/illness involved a human participant or specimen, indicate the participant ID:	
Describe step by step what led up to the injury/illness/near miss. (continue on the back if necessary):	
What could have been done to prevent this injury/illness/near miss?	
What parts of your body were injured? If a near miss, how could you have been hurt?	
Did you see a doctor about this injury/illness? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, whom did you see?	Doctor's phone number: Medical facility:
Visit Date:	Visit Time:
Has this part of your body been injured before? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, when?	

Your signature: _____	Date: _____
-----------------------	-------------

Supervisor's Accident Investigation Form

Name of Injured Person _____ Male Female

Date of Birth _____ Telephone Number _____

Full Address _____

What part of the body was injured? Describe in detail. _____

What was the nature of the injury? Describe in detail. _____

Describe fully how the accident happened? What was employee doing prior to the event? What equipment, tools were being using? _____

Names of all witnesses: _____

Date of Event _____ Time of Event _____

Exact location of event: _____

What caused the event? _____

Were safety regulations in place and used? If not, what was wrong? _____

Employee went to doctor/hospital? Doctor's Name: _____

Hospital Name: _____

Treated in Emergency Room Hospitalized Overnight

Recommended preventive action to take in the future to prevent reoccurrence: _____



Supervisor Signature

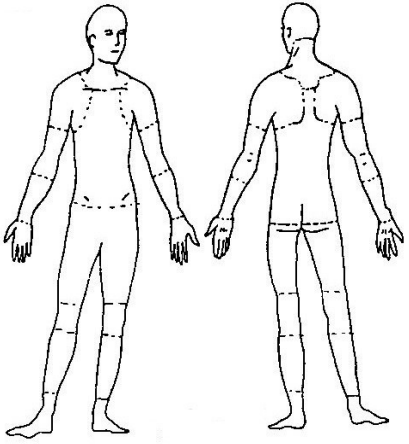
Date

Incident Investigation Report

Instructions: Complete this form as soon as possible after an incident that results in serious injury or illness. (Optional: Use to investigate a minor injury or near miss that *could have resulted in a serious injury or illness.*)

This is a report of a: <input type="checkbox"/> Death <input type="checkbox"/> Lost Time <input type="checkbox"/> Dr. Visit Only <input type="checkbox"/> First Aid Only <input type="checkbox"/> Near Miss	
Date of incident:	This report is made by: <input type="checkbox"/> Employee <input type="checkbox"/> Supervisor <input type="checkbox"/> Team <input type="checkbox"/> Other _____

Step 1: Injured employee (complete this part for each injured employee)

Name:	Sex: <input type="checkbox"/> Male <input type="checkbox"/> Female	Age:
Department:	Job title at time of incident:	
Part of body affected: (shade all that apply) 	Nature of injury: (most serious one) <input type="checkbox"/> Abrasion, scrapes <input type="checkbox"/> Amputation <input type="checkbox"/> Broken bone <input type="checkbox"/> Bruise <input type="checkbox"/> Burn (heat) <input type="checkbox"/> Burn (chemical) <input type="checkbox"/> Concussion (to the head) <input type="checkbox"/> Crushing Injury <input type="checkbox"/> Cut, laceration, puncture <input type="checkbox"/> Hernia <input type="checkbox"/> Illness <input type="checkbox"/> Sprain, strain <input type="checkbox"/> Damage to a body system: <input type="checkbox"/> Other _____	This employee works: <input type="checkbox"/> Regular full time <input type="checkbox"/> Regular part time <input type="checkbox"/> Seasonal <input type="checkbox"/> Temporary
		Months with this employer:
		Months doing this job:

Step 2: Describe the incident

Exact location of the incident:	Exact time:
What part of employee's workday? <input type="checkbox"/> Entering or leaving work <input type="checkbox"/> Doing normal work activities <input type="checkbox"/> During meal period <input type="checkbox"/> During break <input type="checkbox"/> Working overtime <input type="checkbox"/> Other _____	



Names of witnesses (if any):			
Number of attachments:	Written witness statements:	Photographs:	Maps / drawings:
What personal protective equipment was being used (if any)?			
Describe, step-by-step the events that led up to the injury. Include names of any machines, parts, objects, tools, materials and other important details.			
Description continued on attached sheets: <input type="checkbox"/>			

Step 3: Why did the incident happen?	
<p>Unsafe workplace conditions: (Check all that apply)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Inadequate guard <input type="checkbox"/> Unguarded hazard <input type="checkbox"/> Safety device is defective <input type="checkbox"/> Tool or equipment defective <input type="checkbox"/> Workstation layout is hazardous <input type="checkbox"/> Unsafe lighting <input type="checkbox"/> Unsafe ventilation <input type="checkbox"/> Lack of needed personal protective equipment <input type="checkbox"/> Lack of appropriate equipment / tools <input type="checkbox"/> Unsafe clothing <input type="checkbox"/> No training or insufficient training <input type="checkbox"/> Other: _____ 	<p>Unsafe acts by people: (Check all that apply)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Operating without permission <input type="checkbox"/> Operating at unsafe speed <input type="checkbox"/> Servicing equipment that has power to it <input type="checkbox"/> Making a safety device inoperative <input type="checkbox"/> Using defective equipment <input type="checkbox"/> Using equipment in an unapproved way <input type="checkbox"/> Unsafe lifting <input type="checkbox"/> Taking an unsafe position or posture <input type="checkbox"/> Distraction, teasing, horseplay <input type="checkbox"/> Failure to wear personal protective equipment <input type="checkbox"/> Failure to use the available equipment / tools <input type="checkbox"/> Other: _____
Why did the unsafe conditions exist?	

Why did the unsafe acts occur?

Is there a reward (such as “the job can be done more quickly”, or “the product is less likely to be damaged”) that may have encouraged the unsafe conditions or acts? Yes No If yes, describe:

Were the unsafe acts or conditions reported prior to the incident? Yes No

Have there been similar incidents or near misses prior to this one? Yes No

Step 4: How can future incidents be prevented?

What changes do you suggest to prevent this incident/near miss from happening again?

- Stop this activity
- Guard the hazard
- Train the employee(s)
- Train the supervisor(s)
- Redesign task steps
- Redesign work station
- Write a new policy/rule
- Enforce existing policy
- Routinely inspect for the hazard
- Personal Protective Equipment
- Other: _____

What should be (or has been) done to carry out the suggestion(s) checked above?

Description continued on attached sheets:

Step 5: Who completed and reviewed this form? (Please Print)

Written by:	Title:
Department:	Date:

Names of investigation team members:

Reviewed by:	Title: Date:
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