

CHAPTER 44 - ZONOSSES CONTROL

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CHAPTER 44 - ZONOSSES CONTROL

A. INTRODUCTION

1. Zoonoses, or zoonotic diseases, are defined as infections and infestations shared by humans and other vertebrate and invertebrate animals. These include viruses, bacteria, protozoa, and other parasitic infections that can be transmitted from live animals and post-mortem specimens to humans.
2. This Chapter applies to all Smithsonian Institution (SI) tasks and operations that may expose workers to zoonotic diseases.
3. The SI aims to control the risk of employees contracting an acute or latent zoonotic disease, or from possibly transmitting a human illness to animals in the collection. Many factors play a role in this risk, and employees may be exposed during field collection, specimen preparation, or collection handling. The Smithsonian Institution considers implementation of safe work practice controls critical to those who have direct contact with, or are involved in the direct care of live animals, their living quarters, or their tissues, and encourages the appropriate prophylactic immunizations and medical surveillance to maintain good health.

B. CHAPTER-SPECIFIC ROLES AND RESPONSIBILITIES

1. Safety Coordinators shall, with assistance from the Office of Safety, Health and Environmental Management (OSHEM), help supervisors identify workers and other affiliated staff who may be exposed to zoonoses in the course of their duties, and assist in the enrollment of such workers in the Zoonoses Medical Surveillance Program for initial and periodic medical surveillance.
2. Supervisors shall:
 - a. Identify the zoonotic hazards present in their work operations, using the Job Hazard Analysis or similar process, and refer to OSHEM/OHSD all employees at risk, along with [Attachment 1 \(Zoonosis Exposure Surveillance Form\)](#)
 - b. Be responsible for ensuring that safe work practices and training pursuant to this Chapter be implemented.
 - c. Notify the OSHEM zoonosis program manager of any new employees, termination of enrolled employees, and any new volunteers, interns, or other affiliated staff working with animals or zoonotic hazards.
3. Employees shall:
 - a. Participate in all medical surveillance requirements of this Chapter, when identified as an employee having a potential zoonotic exposure based on assigned job tasks. Employees who have a compelling reason not to participate in any or all components of this program must provide written

justification to their supervisor and to the Associate Director Occupational Health Services, OSHEM, for concurrence.

- b. Follow the work practice and training requirements of this Chapter.
 - c. Provide a copy of past immunization records to the OSHEM/OHSD program manager when relevant to completing immunizations for the zoonosis exposure surveillance program.
4. Office of Safety, Health, and Environmental Management (OSHEM) shall:
- a. Enroll employees into the appropriate medical surveillance program after being identified by their supervisor as an employee involved in direct contact with animals, their living quarters, or animal tissues, as well as exposure to both fixed and non-fixed animal specimens.
 - b. Provide a pre-placement medical evaluation for the employee including an occupational medical history, the types of animal or tissue exposures, and the associated immunizations, animal allergy counseling, safety and health counseling, as well as enrollment in any other applicable medical surveillance programs based on the supervisor's job hazard analysis review.
 - c. Assist supervisors and Safety Coordinators with the development of safe work practice controls per the requirements of this Chapter.

C. HAZARD IDENTIFICATION

1. Using the ([Zoonosis Exposure Surveillance Form](#)) Attachment 1, each supervisor, with assistance from the Safety Coordinator, shall identify the sources and tasks posing a zoonotic hazard, as well as the employees at risk, based on:
 - a. Identifying the working population at risk
 - (1) Live animal handlers, zookeepers, veterinary staff
 - (2) Curators, research scientists, collections management staff
 - (3) Taxidermists / Exhibit preparators
 - (4) Public programs staff and docents
 - b. Identifying the tasks with risk.
 - (1) Handling live animals (vertebrates, invertebrates, and insects).
 - (2) Trapping, killing, handling of live specimens in the field
 - (3) Specimen collection and preservation, where specimens may be an intact carcass, tissues removed from a carcass, parasites, ingested food, feces, or associated environmental samples.
 - (4) Handling of post-mortem specimens:
 - i. Field processing of specimens for shipment to museum
 - ii. Necropsy and harvesting of organs

- iii. Tissue preservation
 - iv. Sorting and long-term storage preparation
 - v. Handling/curation/study of specimens in collections
 - vi. Skinning and cleaning/tanning/preservation
 - (5) Taxidermy, model-making, other exhibits preparation
 - (6) Public programs do cent handling of live animals or prepared specimens
- c. Identifying the probable species with which the employees will be working and the potential infectious agents to be encountered.
 - (1) Cause of morbidity and mortality and any associated pathology reports are to be obtained and communicated to the safety and health staff as needed.
 - (2) Resources of specimen tissue testing can be found in Appendix B: Sources of wildlife diagnostic assistance in the United States, in the National Wildlife Health Center Field *Manual*:
http://www.nwhc.usgs.gov/publications/field_Manual/appendices.pdf
- 2. Follow-up Assessments. The supervisor, through the Safety Coordinator, shall ensure that zoonotic hazards are reassessed whenever a change in work conditions, species involved, process, equipment, or controls occurs that may alter the initial assessment.

D. HAZARD CONTROL AND SAFE WORK PROCEDURES

- 1. Entry into SI Zoonosis Medical Surveillance Program
 - a. Employees at risk of zoonotic hazards are to be referred to OSHEM/Occupational Health Services Division (OHSD) before any exposure for determination of the appropriate pre-exposure medical procedures (e.g., annual tuberculin screening) and/or immunizations (e.g., tetanus and rabies) based on probable or potential infectious agents encountered. Employees will be educated on post-exposure medical response actions, related routine employee health surveillance, and given appropriate medical consultation. Refer to [Attachment 2](#).
 - b. OSHEM/OHSD will issue a report to the supervisor and employee as a result of the consultation, which will include work status clearance and/or any work restrictions for animal contact.
- 2. Safe Work Practices. Each departmental unit with an identified zoonotic hazard is to develop its own safe work procedures based on the types of zoonotic hazards expected to be encountered, the level of risk involved with each task, and the likely routes of transmission (ingestion, dermal irritation or puncture wounds, inhalation and mucous membrane contact of aerosolized particles and exposure to body fluids). These should be incorporated into the individual unit's Laboratory Safety Plan.

3. Biosafety. The basic reference for all safe work practices, safety equipment and facilities design is *Biosafety in Microbiological and Biomedical Laboratories*, 4th or latest edition, by the U. S. Department of Health and Human Services (DHHS). The guidelines describe various Biosafety and Animal Biosafety Levels (ABSL) of hazard containment corresponding to the infectious agent of risk. These agent summary lists can be found in the document which is available for download at <http://www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4toc.htm> [Attachments 3](#) & [4](#) of this Chapter describe BSL-1 and 2 level controls in more detail (as excerpted from the SI Lab Safety *Manual*).
4. Work Restrictions. No work shall be conducted at the SI which requires more than BSL 2 level controls, due to the serious health risks associated with BSL 3 & 4 organisms, and the lack of BSL 3 or 4 containment facilities within the SI.
5. Live animal handling, including field specimen collection, and animal tissue exposure will include:
 - a. Dermal protection: Infectious agents must be prevented from being transferred through the skin. The first choice, especially if the skin has cuts or open wounds, is a barrier glove (e.g, nitrile, vinyl or latex) which can be discarded or easily disinfected, clothing to cover exposed skin, and if appropriate, rubber boots. If this is impractical for handling live animals, a secondary choice would be frequent post-contact hand washing with soap and water, or a disinfectant skin cleanser.
 - b. Inhalation protection: For handling animals with potential for harboring infectious agents, a filtering face piece respirator (minimum: N95) is to be worn.
 - c. Eye/face protection: Safety goggles (indirect vented or non-vented) plus face shield are to be used for cleaning cages or other surfaces with caustic cleaners and/or power washers. Safety goggles are to be available for field collection for extra protection when handling animals with potential pathogen risk.
 - d. USDA recommended post-mortem processing methods must be employed to deactivate pathogens. These methods include: heat treatment of at least 180°C or approved disinfectant.
 - e. Animal holding areas and other work areas are to be disinfected on regular basis according to approved veterinary protocols and materials.
 - f. Before leaving an area where carcasses are being collected, double-bag used gloves and coveralls, and disinfect boots and the outside of plastic bags with a commercial disinfectant or a 5 percent solution of household chlorine bleach. Double bag specimens in plastic before removing them from the area.
 - g. Traveler's should obtain a pre-travel appointment from the OHS for official travel to receive advice, counseling, and immunizations specific to their destination. For all travel employees may obtain an OHS Returning

Traveler Questionnaire and information sheet. These are available from OHS and on the prism web site at:

http://ofeo.si.edu/safety_health/docs/return-to-work_questionnaireapr07.pdf

- h. Recommendations from public health authorities with regard to emerging infectious diseases, travel, and avian influenza can be found on these web sites:
 - (1) http://www.who.int/csr/disease/avian_influenza/en/
 - (2) http://www.cdc.gov/travel/other/avian_influenza_se_asia_2005.htm
 - (3) http://www.cdc.gov/travel/other/avian_flu_ig_americans_abroad_032405.htm
 - (4) http://www.osha.gov/OshDoc/data_AvianFlu/avian_flu_guidance_english.pdf
 - (5) http://www.who.int/csr/disease/avian_influenza/guidelines/infectioncontrol1/en/index.html
 - (6) <http://www.cdc.gov/flu/avian/professional/infect-control.htm>
 - (7) <http://www2a.cdc.gov/han/ArchiveSys/ViewMsgV.asp?AlertNum=00246>
 - (8) http://www.who.int/csr/disease/avian_influenza/en/
6. Handling sick or dead animals associated with a mortality or stranding event.
 - a. Minimum protective clothing will include coveralls, rubber boots, impervious gloves that can be easily discarded or disinfected, minimum N95 filtering face piece respirator, and protective eyewear. For larger specimens or if the risk of bodily fluid splash is great, a face shield should also be worn.
 - b. Work areas and equipment are to be decontaminated using suitable disinfectant and methods and under the control of the local disease control specialist in the case of a disease outbreak site. For general disinfection using chlorine bleach, dilute one part bleach with 10 parts water. For disinfecting heavily contaminated areas, dilute one part bleach with 5 parts water.
 - c. All potentially infectious materials including carcasses are to be disposed as biohazardous waste. On-site carcass disposal must be in accordance with local biohazardous waste regulations. This activity must be planned and approved by SI prior to field work.
 - d. SI employees participating in an organized disease control operation are to coordinate with the operation disease control specialists. As a minimum, the guidelines of National Wildlife Health Center *Field Manual*, Chapter 4, should be followed:
http://www.nwhc.usgs.gov/publications/field_Manual/index.jsp
7. Receipt of specimens
 - a. The degree of protective controls needed to open shipment containers and handle incoming acquisitions, loans, and other shipments will depend on whether the specimen has been processed post-mortem in a manner

that effectively minimizes the zoonotic risk. The museum is to document any or all of the following information in order to make an informed decision on safe handling practices:

- i. Source of specimen (e.g., field collection, zoo, animal dealers, roadside death, and inter-museum loan)
 - ii. Geographical source of specimen and, as applicable, associated customs records
 - iii. Cause of death and, as applicable, associated pathology reports
- b. If documentation established that specimens received have been field processed using approved methods (section 5D.above), or are otherwise documented to be free of potential pathogen risk, then specimen containers can be opened and materials handled with ordinary work practices.
 - c. If processing documentation does not exist, or the specimen is suspected of being posing a zoonotic risk, then shipment packages must be opened within a biocabinet, or in a well-ventilated area, minimizing aerosolization of dust, and with appropriate personal protective equipment.(see 6. a. above)
 - d. Soil collections may contain certain zoonotic disease hazards. In order to minimize risk, contact with soil that may contain parasites, nematodes, or droppings from birds or animals, will be handled with a minimum of gloves and a high efficiency particulate respirator and stored in airtight containers. Disturbing contaminated soil can cause particles to aerosolize causing disease in unprotected persons. These may be more dangerous to a person who is receiving chemotherapy, is HIV infected, or otherwise immunocompromised. Exposure can be prevented by minimizing contact with droppings, wearing gloves, wetting down soil that may be contaminated with bird or rodent droppings before disturbing it, and always wearing adequate PPE. OSHEM is available for consultation regarding the appropriate PPE for the task.
 - e. Plants and botanical specimens should always be handled with gloves on.
 - f. When feral animals are removed from SI grounds precautions should always be taken when handling the soil associated with the area where the animal was found. Airborne spread of rabies is rare, but has occurred in caves where bats roost.
8. Handling and Investigations of post-mortem specimens
- a. Personal protective equipment (barrier gloves, safety goggles, lab coat or apron, minimum N95 filtering face piece respirator, and possibly face shield) is to be used during any tasks that may aerosolize particles from cutting, bone sawing, or dissection.
 - b. Safe work practices are to minimize direct contact with blood and tissues and protect against skin infections and puncture wounds.

- c. Instruments and work surfaces are to be cleaned and disinfected daily using methods based on current standards of laboratory practice and susceptible contaminant.
 - d. Hazardous exposure tasks (e.g., necropsies, osteological preparation) must be conducted under appropriate local exhaust ventilation and/or with respiratory protection, particularly for perfusions and other work involving formaldehyde solutions, must be conducted under local ventilation.
9. Laboratories or collections work areas receiving and handling tissues that have not been sterilized using approved methods or are known to contain biohazards, must be handled in a Class II or higher biocabinet until processed and rendered noninfectious.
 10. Ventilated biocabinets installed as part of a zoonotic lab safety plan are to be certified at least annually for class 2+ biohazard operations. All biocabinets will be certified in accordance with National Sanitation Foundation Standard 49 - *Class II (laminar flow) Biosafety Cabinetry* - or manufacturer's recommendations (see [Chapter 27 "Ventilation for Health Hazard Control"](#), of this *Manual*).

E. BIOHAZARDOUS WASTE DISPOSAL. Carcass residues, wrappings, any discarded specimen materials, sharps, used PPE and any other contaminated materials are to be considered as infectious waste and disposed per local regulations as a biohazardous waste.

F. TRAINING

1. Initial Medical Consultation and Information: Employees at risk from zoonotic exposure will receive an initial health consultation prior to beginning work and be provided with information regarding their specific zoonotic exposures.. Any animal allergy health concerns relative the species they will be working with will be addressed as part of their zoonoses medical surveillance examination through OSHEM/OHSD.
2. Workplace-specific safe work practice training: Prior to working with sources of zoonotic agents, all affected employees (including interns, volunteers, academic appointees) will receive, from their supervisor, training as to the specific safe work practices established for tasks involving animal contact. This may include or be incorporated into, as practical, training on Laboratory Safety Plan, Chemical Hazard Communication, and personal protective equipment.
3. Visiting researchers must be provided, by the SI sponsoring unit, information about any potential zoonotic hazards relative to the species they will be working with and any established SI safe work practices. This information must be provided in sufficient time prior to their visit to allow them to seek medical consultation through their own organizational medical program.

G. REGULATORY PERMITTING. Determine the permitting and transfer requirements for inter- and intra-national transport of specimens harboring suspected infectious agents. Transfer of biological agents to or from SI facilities shall be in accordance with Centers for Disease Control 42 CFR 72, Requirements for Facilities Transferring or Receiving Select Agents, and any applicable U.S. Department of Agriculture permit requirements.

H. REQUIRED INSPECTIONS AND SELF ASSESSMENTS

1. Safety Coordinators and supervisors shall review their operations at least annually or when a change in process, employees or materials occur to ensure that employees are properly assessed for exposures per this Chapter, and enrolled in appropriate medical surveillance programs, per this Chapter.
2. OSHEM shall evaluate the Zoonoses Control Program annually and revise the program as needed.

I. RECORDS AND REPORTS. Individual laboratory or animal areas will maintain records of training, hazard communication, and equipment inspections as per the standards set by the Safety Coordinator and any pertinent requirements of the area. Employee medical records will be maintained in OSHEM/OHSD in the Medgate medical records system in accordance with OSHA's medical records management regulations. Employees will be notified of results of any screening tests required by the Zoonosis exposure surveillance program and will be furnished with a copy of their immunization records upon request.

J. REFERENCES

1. http://www.nwhc.usgs.gov/publications/field_Manual/index.jsp
2. <http://ehs.ucdavis.edu/animal/index.cfm>
3. <http://www.aphis.usda.gov/subjects/importing/>
4. <http://www.aaalac.org/>
5. <http://www2.gsu.edu/~wwwvir/>
6. Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition
<http://www.cdc.gov/od/ohs/biosfty/bmb15/bmb15toc.htm>

Zoonosis Exposure Surveillance Form

Employee Name _____ Date of Employment _____

Occupation _____ Location/Area _____

Supervisor Authorizing Enrollment _____

Supervisor Phone Number _____ Employee Phone _____

Explain Type of Animal or Tissue Exposures:

Will the tissues be _____ fixed, or non-fixed _____

Describe what PPE this employee will need to use: _____

In the event of an emergency, is this employee considered essential personnel? ___ Yes ___ No

Are they going to have respiratory or chemical exposures? If so,

Please describe what types: _____

Instructions:

Please have the employee bring a copy of their most recent immunization records, chest x-ray report, (if applicable) and allergy history to the occupational health clinic visit.

**Recommended Pre-Exposure Medical Procedure for
Populations at Risk, Based on Task**

Medical Procedure	Trapping/killing/handling live animals in field	Post-mortem tasks involving non-human primates or NHP Tissues	Post-mortem tasks involving vertebrates
Employee health education	m	m	m
Travel immunizations	m	n/a	n/a
Parasite Surveillance *	m	m	o
***Tuberculin Screening-Annual	m	m	m
Immunization:			
- Tetanus Prophylaxis **	m	m	m
- Rabies Prophylaxis & Titers	m	m	m
- Hepatitis B Prophylaxis	m	m	n/a

* = as directed by the Occupational Health Services Division physician

** = employee to demonstrate proof of immunization

m = mandatory

o = optional

n/a = not applicable

*** = no annual TB screening if history of positive PPD in past, demonstrates negative x-ray, then receives an annual TB health survey and Questionnaire.

Basics of Biosafety Level 1

Biosafety Level 1 (BSL1) practices represent a basic level of containment that relies on standard microbiological practices and basic safety equipment and lab design for laboratories in which work is done with defined and characterized strains of viable microorganisms not known to consistently cause disease in healthy adult humans. Many agents not ordinarily associated with disease processes in humans are, however, opportunistic pathogens and may cause infection in the young, the elderly, and immuno-deficient or immuno-suppressed individuals.

BSL-1 Standard Microbiological Practices

1. Access to work areas is limited at the discretion of the principal scientist; doors should be closed during work with research materials.
2. Hands must be washed after handling biological materials, removing gloves, or before leaving work area.
3. No eating or drinking will be allowed in the work area.
4. Only mechanical devices will be used for pipetting.
5. Safety devices or non-sharps are to be used as an alternative to sharps. Sharps used are to be handled and disposed properly.
6. Activities that are likely to create splashes, sprays, or aerosols are to be minimized.
7. Work surfaces are to be decontaminated at least daily and after any spills.
8. Waste materials are to be decontaminated before disposal, by an approved method such as autoclaving.
9. A biohazard sign is to be posted on entrances to work areas where infectious agents are present.
10. Secondary containment and a cart are to be used when transporting biohazardous materials outside of the laboratory. Avoid public areas during transport.
11. An integrated pest management program must be in effect.

BSL-1 Safety Equipment (Primary Barriers)

1. BUTTONED lab coats are to be worn to protect street clothes.
2. Barrier (preferably non-latex) gloves are to be worn, particularly if hands have broken skin or a rash.
3. Appropriate eye/face protection (safety goggles as a minimum) is to be worn if splashes or sprays are anticipated, or if wearing contact lenses during lab work.

BSL-1 Laboratory Facilities (Secondary Barriers)

1. The lab must have a sink for hand washing.
2. The lab should have a door for access control, and, if windows open to the exterior, fly screens must be installed.
3. The lab fixtures and floors are easily cleanable (no carpets or rugs); bench tops are to be impervious to water and resistant to both moderate heat and the chemicals used to decontaminate the work surface and equipment.

Basics of Biosafety Level 2

Biosafety Level 2 is more restrictive than BSL-1 and is suitable for work involving agents of moderate potential hazard to personnel and the environment. It differs in that (1) laboratory personnel have specific training in handling pathogenic agents and are directed by competent scientists, (2) access to the laboratory is definitely limited when work is being conducted, (3) extreme precautions are taken with contaminated sharp items, and (4) certain procedures in which infectious aerosols or splashes may be created are conducted in biological safety cabinets or other physical containment equipment.

BSL-2 Standard Microbiological Practices

1. Persons wash their hands after they handle viable materials and animals, after removing gloves, and before leaving the laboratory.
2. Eating, drinking, smoking, handling contact lenses, and applying cosmetics are not permitted in the work areas. Persons who wear contact lenses in laboratories should also wear goggles or a face shield. Food is stored outside the work area in cabinets or refrigerators designated for this purpose only.
3. Mouth pipetting is prohibited; mechanical pipetting devices are used.
4. Policies for safe handling of sharps (when non-sharps are not available) are instituted.
5. All procedures are performed carefully to minimize the creation of splashes or aerosols.
6. Work surfaces are decontaminated at least once a day and after any spill of viable material.
7. All cultures, stocks, and other regulated wastes are decontaminated before disposal by an approved decontamination method, such as autoclaving. Materials to be decontaminated outside of the immediate laboratory are to be placed in a durable, leak proof container and closed for transport from the laboratory. Materials to be decontaminated at off-site locations from the laboratory are packaged in accordance with applicable local, state, and federal regulations, before removal from the facility.
8. An integrated pest management control program is in effect.

BSL-2 Special Practices

1. Access to the laboratory is limited or restricted by the laboratory director when work with infectious agents is in progress. In general, persons who are at increased risk of acquiring infection or for whom infection may be unusually hazardous are not allowed in the laboratory or animal rooms. For example, persons who are immunocompromised or immunosuppressed may be at risk of acquiring infections. The laboratory director has the final responsibility for assessing each circumstance and determining who may enter or work in the laboratory.

2. The laboratory director establishes policies and procedures whereby only persons who have been advised of the potential hazard and meet specific entry requirements (e.g., immunization) enter the laboratory or animal rooms.
3. When the infectious agent(s) in use in the laboratory require special provisions for entry (e.g., immunization), a hazard warning sign incorporating the universal biohazard symbol is posted on the access door to the laboratory work area. The hazard warning sign identifies the infectious agent, lists the name and telephone number of the laboratory director or other responsible person(s), and indicates the special requirement(s) for entering the laboratory.
4. Laboratory personnel receive appropriate immunizations or tests for the agents handled or potentially present in the laboratory (e.g., hepatitis B vaccine or TB skin testing).
5. When deemed appropriate by OSEM/OHSD, and considering the agent(s) handled, baseline serum samples for laboratory and other at-risk personnel are collected and stored. Additional serum specimens may be collected periodically, depending on the agents handled or the function of the facility.
6. A LSP with these biosafety provisions is prepared or adopted. Personnel are advised of special hazards and are required to read and to follow instructions on practices and procedures.
7. Laboratory personnel receive appropriate training on the potential hazards associated with the work involved, the necessary precautions to prevent exposures, and the exposure evaluation procedures. Personnel receive annual updates, or additional training as necessary for procedural or policy changes.
8. A high degree of precaution must always be taken with any contaminated sharp items, including needles and syringes, slides, pipettes, capillary tubes, and scalpels.
 - Needles and syringes or other sharp instruments should be restricted in the laboratory for use only when there is no alternative, such as parenteral injection, phlebotomy, or aspiration of fluids from laboratory animals and diaphragm bottles. Plastic ware should be substituted for glassware whenever possible.
 - Only needle-locking syringes or disposable syringe-needle units (i.e., needle is integral to the syringe) are used for injection or aspiration of infectious materials. Used disposable needles must not be bent, sheared, broken, recapped, removed from disposable syringes, or otherwise manipulated by hand before disposal; rather, they must be carefully placed in conveniently located puncture-resistant containers used for sharps disposal. Non-disposable sharps must be placed in a hard-walled container for transport to a processing area for decontamination, preferably by autoclaving.
 - Syringes which re-sheath the needle, needle-less systems, and other safe devices should be used when appropriate.
 - Broken glassware must not be handled directly by hand, but must be removed by mechanical means such as a brush and dustpan, tongs, or forceps. Containers of contaminated needles, sharp equipment, and broken glass are decontaminated before disposal, according to any local, state, or federal regulations.

9. Cultures, tissues, or specimens of body fluids are placed in a container that prevents leakage during collection, handling, processing, storage, transport, or shipping.
10. Laboratory equipment and work surfaces should be decontaminated with an appropriate disinfectant on a routine basis, after work with infectious materials is finished, and especially after overt spills, splashes, or other contamination by infectious materials. Contaminated equipment must be decontaminated according to any local, state, or federal regulations before it is sent for repair or maintenance or packaged for transport in accordance with applicable local, state, or federal regulations, before removal from the facility.
11. Spills and accidents which result in overt exposures to infectious materials are immediately reported to the laboratory director. Medical evaluation, surveillance, and treatment are provided as appropriate and written records are maintained.
12. Animals not involved in the work being performed are not permitted in the lab.

BSL-2 Safety Equipment (Primary Barriers)

1. Properly maintained biological safety cabinets, preferably Class II, or other appropriate personal protective equipment or physical containment devices are used whenever:
 - Procedures with a potential for creating infectious aerosols or splashes are conducted. These may include centrifuging, grinding, blending, vigorous shaking or mixing, sonic disruption, opening containers of infectious materials whose internal pressures may be different from ambient pressures, inoculating animals intranasally, and harvesting infected tissues from animals or eggs.
 - High concentrations or large volumes of infectious agents are used. Such materials may be centrifuged in the open laboratory if sealed rotor heads or centrifuge safety cups are used, and if these rotors or safety cups are opened only in a biological safety cabinet.
2. Face protection (goggles, mask, face shield or other splatter guards) is used for anticipated splashes or sprays of infectious or other hazardous materials to the face, when the microorganisms must be manipulated outside the biosafety cabinet.
3. Protective laboratory coats, gowns, smocks, or uniforms designated for lab use are worn while in the laboratory. This protective clothing is removed and left in the laboratory before leaving for non-laboratory areas (e.g., cafeteria, library, administrative offices). All protective clothing is either disposed of in the laboratory or laundered by the institution; it should never be taken home by personnel.
4. Gloves are worn when handling infected animals and when hands may contact infectious materials, contaminated surfaces or equipment. Wearing two pairs of gloves may be appropriate; if a spill or splatter occurs, the hand will be protected after the contaminated glove is removed. Gloves are disposed of when contaminated, removed when work with infectious materials is completed, and are not worn outside the laboratory. Disposable gloves are not washed or reused.

BSL-2 Laboratory Facilities (Secondary Barriers)

1. Each laboratory contains a sink for hand washing.
2. The laboratory is designed so that it can be easily cleaned. Rugs in laboratories are not appropriate, and should not be used because proper decontamination following a spill is extremely difficult to achieve.
3. Bench tops are impervious to water and resistant to acids, alkalis, organic solvents, and moderate heat.
4. Laboratory furniture is sturdy, and spaces between benches, cabinets, and equipment are accessible for cleaning.
5. If the laboratory has windows that open, they are fitted with fly screens.
6. A method for decontamination of infectious or regulated laboratory wastes is available (e.g., autoclave, chemical disinfection, incinerator, or other approved decontamination system).
7. An eyewash facility is readily available.
8. The laboratory should be at negative pressure with respect to areas outside the lab. Hoods and biosafety cabinets should be positioned away from doors, supply vents, windows, heavy traffic patterns and other cross drafts.