

Guidelines for Managing a Biohazardous Work Environment



Prepared by:

Workplace Health
Personnel Administration Office
5th Floor, Peace Hills Trust Tower
10011 – 109 Street
Edmonton, Alberta T5J 3S8

*Prepared by Workplace Health, Alberta Personnel Administration Office for use in Alberta Government
Worksites*

Revised December 2004

PREFACE

This guideline provides general information to Public Service employees about the hazards and precautions to take when working in a biohazardous work environment.

Adverse health effects from accidental exposure to biohazards vary from minimal in some operations to potentially life threatening in others. Improper shipping or disposal of biohazardous material can result in environmental contamination and other associated problems. Thus employees must know and understand the potential dangers of the biohazardous materials they are working with. **It is equally important for every worksite, in which biohazards are present, to assess their operation and implement appropriate components of this guideline.**

The Guideline addresses management of a biohazardous work environment using proper handling, shipping, disposal and engineering control methods. It also outlines the precautions to take to control/prevent infections from biohazards.

For further information or clarification on this Guideline, please contact your department Occupational Health and Safety Office or Workplace Health, Personnel Administration Office at (780) 408-8413.

TABLE OF CONTENTS

INTRODUCTION	1
ROUTES OF ENTRY	1
PREVENTIVE MEASURES	2
1. Administrative Controls	2
A. Role of Supervisors	2
B. Organization of a Biohazards Safety Committee.....	2
C. Warning Signs	2
D. Medical Surveillance Program.....	3
E. Notification of Exposure	3
2. Physical Controls.....	3
A. Containment.....	3
B. Pipetting	7
C. Protective Wear	7
D. Housekeeping	8
E. Laundry	8
3. Infection Prevention and Control	9
A. General Precautions to Prevent Infection	9
B. Routine Practices	9
C. Immunization.....	9
DECONTAMINATION AND DISPOSAL	10
1. Decontamination Methods.....	10
A. Heat	10
2. Cleanup of Spills and Contaminated Surfaces	11
3. Disposal.....	11
TRANSPORTING BIOHAZARDOUS MATERIALS	15
EMERGENCY RESPONSE PLAN	18
WHMIS REQUIREMENTS	18

APPENDICES:

APPENDIX I:	CATEGORIES OF PATHOGENS
APPENDIX II:	CONTAINMENT OF BIOHAZARDS
APPENDIX III:	HANTAVIRUS
APPENDIX IV:	HEPATITIS B
APPENDIX V:	HEPATITIS C
APPENDIX VI:	HUMAN IMMUNE DEFICIENCY VIRUS (HIV)
APPENDIX VII:	INFECTIOUS DISEASES AND OCCUPATIONS
APPENDIX VIII:	RABIES
APPENDIX IX:	TUBERCULOSIS
APPENDIX X:	TETANUS
APPENDIX XI:	WEST NILE VIRUS
APPENDIX XII:	SAMPLE OF INFECTIOUS SUBSTANCE SHIPPING DOCUMENT

INTRODUCTION

Biohazards are biological substances which contain organisms or toxins that may present a health hazard. These include bacteria, fungi, viruses and many other disease-causing organisms.

A biohazardous work environment is one that has biological substances that can damage the health of employees.

ROUTES OF ENTRY

Routes of entry for biohazards are: ingestion, inhalation, skin absorption, and penetration wounds.

The criteria for classification of infective pathogens by risk group are:

- Risk Group 1 (low individual and low community risk)
A microorganism that is unlikely to cause disease in healthy workers or animals.
- Risk Group 2 (moderate individual risk, limited community risk)
A pathogen that can cause human or animal disease but, under normal circumstances, is unlikely to be a serious hazard to laboratory workers, the community, livestock, or the environment. Laboratory exposures rarely cause infection leading to serious disease; effective treatment and preventive measures are available and the risk of spread is limited.
- Risk Group 3 (high individual risk, low community risk)
A pathogen that usually causes serious human or animal disease, or which can result in serious economic consequences but does not ordinarily spread by casual contact from one individual to another, or that can be treated by antimicrobial or antiparasitic agents.
- Risk Group 4 (high individual risk, high community risk)
A pathogen that usually produces very serious human or animal disease, often untreatable, and may be readily transmitted from one individual to another, or from animal to human or vice-versa directly or indirectly, or by casual contact.

Public service employees with the highest individual risk for exposure (Group 3), include:

- Health Care Workers - especially clinical laboratory, operating room, dentistry, renal dialysis, central supply, laundry and housekeeping;
- Correctional Institution - employees in direct contact with inmates (includes Youth Assessment and Remand Centres);
- Laboratory - employees and researchers, especially biological or medical studies, pathologists, toxicologists, and medical examiner employees;
- Agriculturists, Veterinarians, Animal Researchers and Handlers;
- Custodial Staff.

Staff in these areas must receive ongoing instruction in safe work practices and procedures.

PREVENTIVE MEASURES

1. Administrative Controls

A. Role of Supervisors

Under the Alberta Occupational Health and Safety Code, the employer is required to assess the worksite and identify hazards before work begins. When a hazard exists, it is the supervisor's responsibility to eliminate the hazard, if elimination is not practicable, control the hazard.

Preventing exposure is the best way to protect health. A plan outlining elimination or control of exposures must be communicated to workers.

Supervisors should develop and regularly review safe operating procedures. They should train employees in these safe work practices. If an exposure occurs, the supervisor must:

- investigate and report the incident (as per Section 1.E);
- arrange for assessment of those exposed;
- take immediate corrective action; and
- recommend corrective measures to management to prevent future accidents.

Employees

Employees are responsible for following established safety rules, wearing and/or using recommended protective equipment or devices, and reporting all unsafe conditions or incidents to the supervisor.

B. Organization of a Biohazards Safety Committee

Departments should establish a biohazards safety committee at worksites where Risk Groups 3 and 4 exist (listed in Appendix I). Committee members should include those with expertise in microbiology or infection control. The committee is responsible for the following:

- identify and review work involving biohazardous materials;
- establish written safe work practices in consultation with, the departmental Occupational Health and Safety Coordinator; and
- arrange appropriate training for workers working with biohazardous materials.

C. Warning Signs

Worksites should post the WHMIS biohazard symbol and appropriate precautions in a conspicuous place so personnel entering the work area can take the necessary precautions. Warning signs must be readily understood.

D. Medical Surveillance Program

Departments should arrange pre-placement medicals for employees working with organisms from Risk Groups 3 and 4 (listed in Appendix I) to establish base-line data. Employees may require medical monitoring following an exposure. Wherever possible, departments should also offer immunization and special screening tests to employees who may be exposed to materials from Biohazard Risk Groups 3 and 4.

E. Notification of Exposure

- i) When an infectious disease is suspected, refer employees to their physician. The employee should inform the physician of the suspected exposure.
- ii) If an infectious disease occurs in the workplace, or when employees have been exposed to high risk biohazardous agents, contact the nearest Local Health Authority and Workplace Health, P.A.O. for assistance in environmental monitoring, health investigation, debriefing sessions, and plans for further action.
- iii) Record job related illnesses and injuries such as scratches, bites, puncture wounds, and exposure to a known or suspected source of infected blood, blood products or body fluids on a [Supervisor's Incident Investigation Report](#). Forward the report to Workplace Health, P.A.O. Also, record the incident in the First Aid Record and complete WCB forms.

2. Physical Controls

A. Containment

Containment refers to safety methods used to protect workers from exposure to biohazardous agents and to prevent escape of these agents into the environment. Two types of containment are:

- Primary Containment - to protect personnel and the immediate laboratory environment from exposure to biohazardous agents. This is provided by a combination of good microbiological laboratory procedures and the use of appropriate safety equipment (Appendix II).
- Secondary Containment - to protect the environment external to the laboratory from exposure to biohazardous agents. This is provided by a combination of facility design and work practices.

The three elements of containment include laboratory practice and technique, safety equipment and facility design.

Laboratory Practice and Technique

The most important element of containment is strict adherence to standard microbiological practices and technique. Worksites where biohazardous materials are used, must develop written standard laboratory practices. Workers handling biohazardous agents must be trained and be proficient in these practices and techniques. Worksites should review these practices annually or when there is a change in the product. Please refer to Appendix II for safety practices recommended by Health Canada.

Safety Equipment

Safety equipment includes biological safety cabinets, enclosed containers, e.g. safety centrifuge cup, and personal protective equipment (PPE). Biological safety cabinets protect workers from exposure to infectious aerosols by controlling the contamination at the source.

Workers may use personal protective equipment such as gloves, gowns, laboratory coat, shoe covers, boots, respirators, and safety glasses, in combination with biological safety cabinets and other containment devices. The type of personal protective equipment and biological safety equipment required will vary according to the hazard posed by the infectious agent.

To determine the level of containment appropriate to each of the four risk groups, refer to Chapter 4 of Health Canada's Laboratory Biosafety Guideline.

Facility Design

The design of the facility is important for protecting the environment outside of the laboratory from cross-contamination and accidental release of biohazardous agents.

i) Biological Safety Cabinets

Biological safety cabinets are the most widely used and accepted primary containment devices. The three classes of biological safety cabinets are:

- Class I

An open-fronted cabinet with inward airflow away from the worker. Exhaust air is filtered with a high efficiency particulate air (HEPA) filter (Figure 1). It protects the worker but not the material. Use only for low risk materials such as coliforms, some non-infectious fungi, etc.

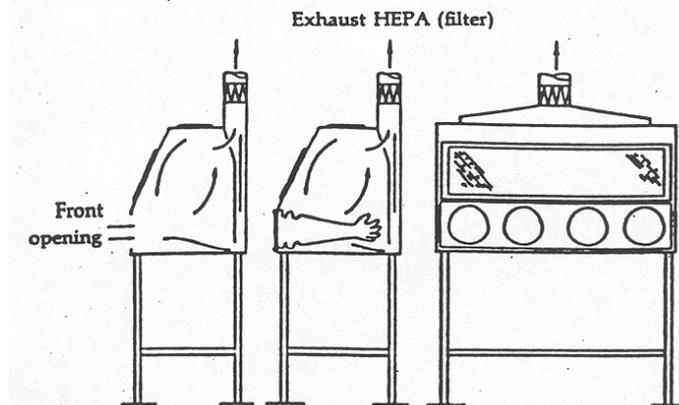


Figure 1 - Schematic Diagram of a Class I Biological Safety Cabinet

- Class II

A ventilated cabinet with an open front and inward flow for personnel protection, HEPA-filtered downward airflow for product protection, and HEPA-filtered exhaust air for environmental protection.

There are four designs of Class II cabinets:

1. Recirculates most of the air.
2. Exhausts most of the air.
3. Exhausts 100% of the air.
4. Convertible between other designs.

Use these cabinets with low to moderate risk biological agents, minute quantities of toxic chemicals, and trace quantities of radionuclides. Select the correct Class II cabinet design carefully.

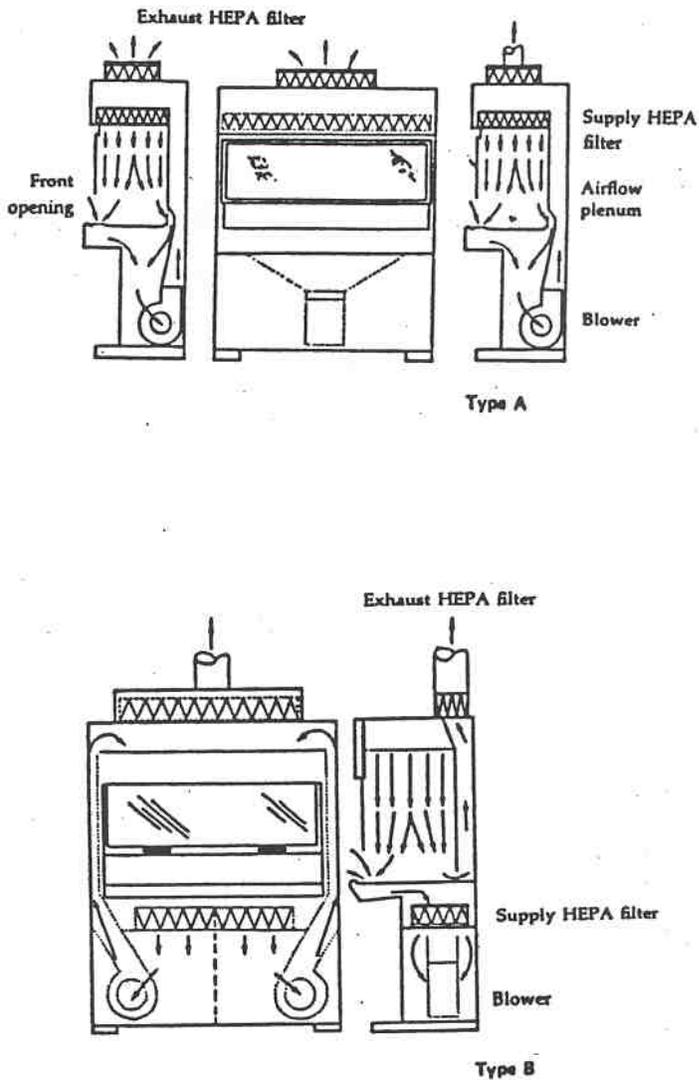


Figure 2 - Schematic Diagram of a Class II Biological Safety Cabinet

An enclosed ventilated cabinet of gas-tight construction. It is maintained under negative pressure. The HEPA-filtered supply and exhaust air provides total protection for personnel and the environment (Figure 3). The worker

performs work by inserting his/her hands and arms into long rubber gloves attached to the cabinet. Use this cabinet for handling high risk materials.

- Class III

An enclosed ventilated cabinet of gas-tight construction. It is maintained under negative pressure. The HEPA-filtered supply and exhaust air provides total protection for personnel and the environment (Figure 3). The worker performs work by inserting his/her hands and arms into long rubber gloves attached to the cabinet. Use this cabinet for handling high risk materials.

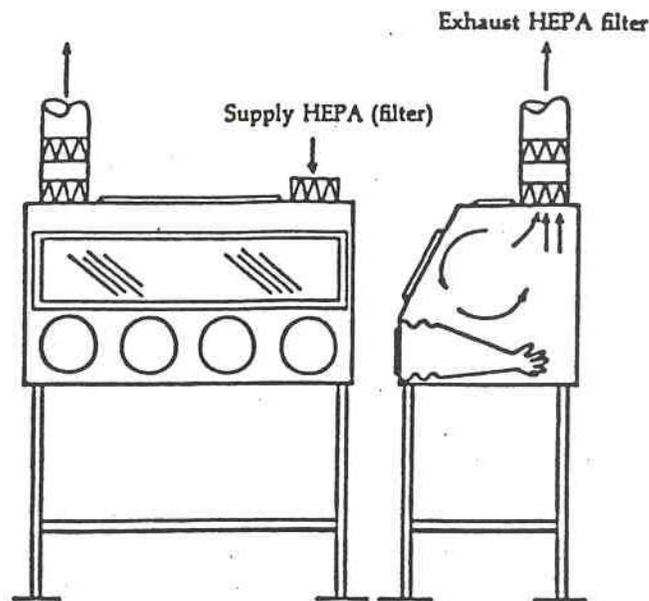


Figure 3 - Schematic Diagram of a Class III Biological Safety Cabinet

Certification Of Biological Safety Cabinets

Biological safety cabinets must be certified for containment capabilities by qualified individuals or a reputable organization. Certification should be performed in accordance with Canadian Standards Association (CSA) Standard CAN/CSA-Z316.3-M87, Biological Containment Cabinets: Installation and Field Testing.

The correct location, installation, and certification of biological safety cabinets is critical to their performance. All biological safety cabinets must be installed and field tested as per CAN/CSA-Z316.3-M87. The CSA Standard requires testing of these cabinets at least annually, and whenever HEPA filters are changed, maintenance repairs are done, or a cabinet is moved. Workers must be trained in the proper use and maintenance of these cabinets.

B. Pipetting

Due to the high potential for oral aspiration of infectious agents or transferring with a contaminated finger, mouth pipetting is **PROHIBITED** at all worksites. Always use mechanical pipetting devices.

C. Protective Wear

Employees working with hazardous chemicals, infectious materials or other dangerous materials require personal protective clothing and equipment. Workers may need protective clothing and equipment in conjunction with good laboratory practices and biological safety cabinets.

i) Body Coverings

This category includes items such as laboratory coats, gloves, hoods, hairnets, shoes (boots), and aprons. Workers should change into street clothing before leaving the laboratory or work area. Workers should not take protective clothing home to launder. The type of protective clothing used depends on the hazard present. For example:

- employees wear aprons made of rubber, plastic or other impervious materials when they expect splashes of liquids;
- workers who may be exposed to blood and body fluids wear latex gloves;
- workers handling animal cages, sharp edged or hot equipment wear canvas, leather or heat resistant gloves;
- workers performing housekeeping activities, instrument cleaning, and decontamination procedures wear neoprene or butyl rubber gloves; and
- some workers may need to wear full body suits.

ii) Face and Eye Protection

Microbiological agents may infect the eyes and facial skin. Workers who are exposed to eye or facial hazards should wear face shields, safety goggles or safety glasses.

iii) Respiratory Protection

Normally, respiratory protective equipment is used only if engineering methods are not feasible. It is also used as a secondary line of defense in areas where agents which pose a life threatening risk are handled. There are three main categories of respiratory protective equipment: air purifying, supplied air and self-contained breathing apparatus. Clean and maintain respirators as per manufacturer's specifications. Sanitize respirators as outlined below. All respirators used must be approved by the National Institute for Occupational Safety and Health (NIOSH). Also, the Alberta Occupational Health and Safety Regulation and Code, Part 18, Section 245, requires each worksite using respirators to have a Code of Practice regarding the selection, care, use and maintenance of respiratory protective equipment. Please call Workplace Health, Personnel Administration Office for more information.

Sanitizing Respirators

- At the end of each workday, soak respirators with a 500 ppm sodium hypochlorite solution with a wetting agent.
- When wiping down, it is extremely important to reach all crevices.
- Rinse respirator thoroughly with clean, warm water and then expose it to free-flowing air for at least 30 minutes before re-use.
- Check all respirator parts and replace with new parts if necessary.
- Store in a sealed plastic bag.

Select personal protective clothing and equipment based on the nature of the chemical and/or biological hazard expected. Train all staff in the proper selection, use and care of this equipment.

D. Housekeeping

Good housekeeping is an essential part of a biohazard program. Accumulation of chemical and biological wastes poses a serious hazard. To avoid confusion over multiple practices, set up housekeeping procedures based on the highest level of risk expected. All housekeeping staff in this area must be knowledgeable of the nature of the work. Select appropriate cleaning equipment and materials. Clean floors with wet mops or vacuum-clean with a HEPA filter on the exhaust. Refer to Decontamination and Disposal Section in this Guide for information.

E. Laundry

Risk of disease transmission is negligible with appropriate practices:

- i) Ensure sharps are not accidentally discarded in the laundry.
- ii) Handle contaminated laundry as little as possible.
- iii) Keep agitation of contaminated laundry to a minimum.
- iv) Place contaminated laundry in a bag to prevent soak-through. (Use water-soluble bags as long as you take precautions to prevent soak-through.)
- v) Transport laundry heavily contaminated with blood or other body fluids in bags that prevent leakage or soak-through. Tag bags with appropriate labels indicating the contents. Do not sort such articles, but unload them directly into the washing machine.
- vi) Wear gloves, aprons and other personal protective equipment, as necessary, to prevent contact with contaminated laundry. For example, when sorting or rinsing by hand.
- vii) General guidelines for laundering contaminated linen:
 - Soak contaminated laundry in a bleach solution (50 - 150 ppm);
 - Wash laundry at a water temperature of 160°F.
 - Steam iron the linen.

Each worksite should develop and review annually the written procedures for proper washing of contaminated laundry.

3. Infection Prevention and Control

A. General Precautions to Prevent Infection

Good personal hygiene practice and common sense are the first and most important factors in preventing cross-infection of any organism.

- Distinguish between clean objects/practices and those that may be contaminated.
- Do not smoke, drink or eat at an unclean worksite.
- Wear appropriate protective clothing such as waterproof gloves, aprons, disposable coveralls, etc.
- Wash hands and face thoroughly before leaving the work station to eat, drink, or smoke, as soon as possible after contamination, and before leaving the worksite.
- To wash hands, use plain soap vigorously rub together all surfaces of lathered hands for at least 10 seconds. Rinse thoroughly under running water. Avoid the use of abrasive soaps and brushes. Use hand lotions to prevent drying of skin. If water for hand-washing is not available, use liquid disinfectants and towelettes.
- Cover all open wounds properly. Employees with broken skin must prevent contact with biohazardous materials.
- Employees who come in contact with persons with skin infections, lice infestation, and poor personal hygiene, should wash thoroughly and change clothes if possible. If the employee becomes infested with lice, or infected, he/she should see a physician if symptoms occur and report the incident to the supervisor.

B. Routine Practices and Additional Practices for Preventing the Transmission of Infection in Health Care

www.hc-sc.gc.ca/pphb-dgspsp/publicat/ccdr-rmtc/99pdf/cdr25s4e.pdf

The guidelines present the principles necessary to prevent transition of microorganisms from patient to patient for acute care and long term care.

Take the same prudent precautions in other settings in which persons may be exposed to blood and other body fluids.

C. Immunization

Maintenance of immunity is an essential part of an infection and prevention control program. High hazard employees are at risk to exposure to, and possible transmission of, vaccine preventable diseases due to their contact with infectious clients, animals, and/or infective materials. Following a consistent program of immunization could eliminate the problems of susceptible personnel, occupational disease development, and unnecessary work restrictions.

Departments identify, and allow time off work for, individual employees who require special immunization. They must cover costs of immunization, vaccine purchase, and administration. They must also develop policies about immunization, in consultation with the Medical Consultant, P.A.O., and Disease Control and Prevention, Alberta Health and Wellness. These should be reviewed on a regular basis.

DECONTAMINATION AND DISPOSAL

All worksites with biohazardous materials should have effective written procedures to decontaminate equipment, surfaces and instruments. Review these procedures regularly. Disinfection serves several purposes:

- prevents contamination of research materials by the microbes;
- protects the worker and the environment from exposure to biohazardous materials.

Disinfect all biohazardous materials and all contaminated equipment before washing and storing or discarding. Do not leave biohazardous material in autoclaves overnight in anticipation of autoclaving next day.

1. Decontamination Methods

A. Heat

Biohazardous substances are sterilized by wet or dry heat. Wet heat using steam under a pressure of about 15 p.s.i. for a minimum of 15 minutes (chamber of autoclave should be at least 121°C) is the most efficient method of sterilization. The material to be sterilized must come in contact with steam and heat. Dry heat sterilization is accomplished at approximately 165°C for about 3 hours. Perform routine quality control to assess the effectiveness of autoclaves. Keep proper records. Loads should be as close to work conditions as possible. Use extreme care when handling hot solids and liquids from the autoclaves. Steam under pressure can be a source of scalding jets.

i) Liquids

Several liquid disinfectants are used for surface treatment against specific organisms. The various categories of disinfectants are:

- Halogens (e.g. chlorine and iodine) - rapidly kill bacterial spores, viruses, rickettsiae, and fungi.
- Alcohols, such as ethyl or isopropyl alcohol 70-85% by weight in water - are effective disinfectants against certain viruses.
- Aldehydes, such as a 37% formaldehyde solution in water or paraformaldehyde; formaldehyde (0.2 - 0.4%) will inactivate viruses in the preparation of vaccines.
- Phenol is effective against some viruses, rickettsiae, fungi, and vegetative bacteria.
- Phenolics or mixtures containing phenol such as BGC3 are effective as disinfectants for bacteriostatic, tuberculostatic, sporostatic, fungistatic, and algistatic applications when the infectious agent is at a low concentration. Exercise care when handling concentrated stock solutions of disinfectants. Use proper personal protective equipment to prevent skin contact.

ii) Vapors And Gases

Formaldehyde and ethylene oxide have germicidal properties. These compounds are hazardous to workers' health. Use only in closed systems and under controlled conditions of temperature and humidity to provide disinfection and safety to staff.

Formaldehyde is the best chemical for space disinfection, but it has no effect on cockroaches and some other insects. Ethylene oxide gas is effective in destroying spores, viruses, molds, pathogenic fungi, and highly resistant thermophilic bacteria. In addition, other space decontaminants such as peracetic acid, betapropiolactone (BPL), methyl bromide, and glutaraldehyde may be used.

iii) Radiation

Ionizing radiation is another means of destroying micro-organisms, however, it is not practical in laboratories. The types of radiation used are x-rays, gamma rays, and ultra-violet (UV).

2. Cleanup of Spills and Contaminated Surfaces

Use the following procedure to clean spills contaminated by blood or body fluids such as vomit, urine, faeces or other organic matter of human or animal origin:

- Secure contaminated area so other building users are not exposed to the spill and to prevent tracking the spill to other clean areas.
- Wear appropriate personal protective clothing.
- Lightly sprinkle sand or other absorbent material over the spill for ease of cleanup.
- Pour disinfectant on the spill beginning at the outside edges and working inward. Allow 15-30 minutes for the disinfectant to soak in (if there is a danger of the spill spreading, cleanup immediately).
- Remove contaminated material with dust pan and disposable rags and dump into a heavy duty or double garbage bag. Discard all absorbent rags as biohazardous waste.
- Place broken glass or other sharp objects in a puncture proof container, seal it and dispose it as biohazardous waste.
- Perform final cleanup of the contaminated area by washing the surface thoroughly with a disinfecting solution of household chlorine bleach (one part bleach to four parts water) or other disinfectants and allow to dry.

3. Disposal

Effectively decontaminate, package in an approved bag or container, and label for transfer or immediate incineration before disposing biohazardous material. Use containers with impenetrable walls for hypodermic needles, syringes, broken glass, and sharps. Always use approved disposal methods. Alberta Health and Wellness recommends the disposal methods mentioned in Table 1 - Waste Categorization.

Every worksite that produces biohazardous waste, handles it, disposes or sends it away for disposal must establish written procedures to ensure proper and safe disposal. Alberta Health recommends the following procedures for biomedical waste¹:

- Segregate, label and colour code waste at the point of generation;
- Keep manual handling of waste to a minimum;
- Package and identify waste according to Table 1 - Waste Categorization;
- Securely close all packaged waste before moving;
- Carts or other conveyances used for movement of waste shall be:
 - constructed of durable and impervious material that will permit effective cleaning and disinfecting,
 - designed to contain waste and prevent spills, and
 - used only for that purpose.
- Wash and disinfect carts used for carrying waste on a regular schedule (at least once a week), when visibly soiled and to control odours.
- Storage
 - Waste shall be stored in designated waste storage facilities in accordance with the *Public Health Act Waste Management Regulations*.
 - Final on-site waste storage shall:
 - be totally enclosed;
 - be separate from clean supply rooms and food storage/preparation areas;
 - be labelled for the storage of waste only;
 - be accessible to authorized personnel only and be locked in the case of biomedical and chemical waste;
 - provide sufficient capacity for variation in amounts of waste generated and for delays in shipping or disposal;
 - conform to local building and fire codes and C.S.A. refrigeration standards;
 - be constructed of durable and impervious materials that will permit effective cleaning and disinfecting;
 - be constructed in a manner that will prevent the entry of pests and vermin;
 - be designed to contain spills;
 - provide ease of access for maintenance and, when required, access for carts;
 - be cleaned and disinfected on a regular basis or when visibly soiled; and
 - in the case of cold storage, have the interior temperature displayed outside of the storage compartment or room.

¹Biomedical Waste means - animal anatomical waste, animal bedding waste, blood and body fluid waste, human anatomical waste, isolation waste, laboratory waste and waste sharps that are generated at one or more of the following places: human or animal health care facilities; medical, veterinary or biological research establishments; clinical or forensic laboratories; medical, dental, veterinary or health unit offices; veterinary surveillance facilities; and funeral homes. Waste Brucella strain 19 vaccine and waste modified live rabies vaccine, that is generated by any animal health care administered by a veterinarian.

- The length of time and temperature that biomedical waste is placed in final storage shall be:
 - a maximum of 24 hours at room temperature;
 - a maximum of 42 days at 0°C to +4°C;
 - a maximum of 90 days below 0°C.(Temperatures below -10°C are not necessary.)
- Do not allow waste to accumulate to a point that the capacity of the storage space is exceeded or the waste creates a nuisance or health hazard.
- Store chemical waste in a secure and well-ventilated location.

TABLE 1 – WASTE CATEGORIZATION

(Reprinted from Waste Management Guidelines and Standards For Hospitals and Long Term Care Facilities, Alberta Health, February 1991.)

TYPE OF WASTE	EXAMPLES	IDENTIFICATION/ PACKAGING	SPECIAL INSTRUCTIONS	METHOD OF DISPOSAL
A. BIOMEDICAL WASTE				
1. INFECTIOUS WASTE				
a) Human Anatomical Waste	Human tissues, organs, body parts except hair, nails and teeth.	Red	Secure packaging, handling precautions. See facility policy and procedures manual.	Incinerate, interment crematorium.
b) Animal Anatomical Waste	Animal tissues, organs, or carcasses.	Red	Secure packaging, handling precautions. See facility policy and procedures manual for special handling precautions.	Incinerate or landfill.
c) Blood Products	Blood products, bulk blood and materials grossly soiled with blood.	Yellow	Secure packaging, handling precautions. See facility policy and procedures manual for special handling precautions.	Incinerate or decontaminate by autoclave. Disposal of bulk blood to sewage system if allowed by municipality.
d) Non Anatomical Infectious Waste	Laboratory diagnostic specimens, biologicals, live and attenuated vaccines, recombinant DNA, products of biotechnology.	Yellow	Secure packaging. See facility policy and procedures manual.	Incinerate or decontaminate by autoclave.
e) Clinical Sharps Waste	Needles, syringes, blades, clinical glass, etc.	Yellow	Secure packaging. See facility policy and procedures manual.	See above.
f) Isolation Waste	Lassa fever, Marburg virus disease, Ebola virus disease, Congo-Crimean disease, Pneumonic plague.	Yellow	Secure packaging. See facility infection control policy and procedures manual.	See above.
g) Surgical and Autopsy Waste	Grossly soiled dressings, sponges, disposable drapes, gloves, drainage sets, etc.	Yellow	Secure packaging. See facility infection control policy and procedures manual. Encourage use of reusables.	See above.
2. PHARMACEUTICAL				
a) Drugs or medicinal chemicals		Yellow	See facility policy and procedure manual. Medication, administration and pharmacy instructions. Recover, return to supplier.	Incinerate.
b) Cytotoxics		Cytotoxic symbol.	Pharmaceutical Act	Incinerate.
c) Radio-pharmaceuticals		Special packaging with radionuclide symbol.	Food and Drug Act	As per Atomic Energy of Canada Act.
B. GENERAL (Non-Infectious Waste)	Kitchen, administration and decontaminated waste, non-clinical sharps.	Black or green bags or containers.	Recover and recycle where possible: paper, non-clinical glass, pop cans, etc.	Landfill or incineration.

TRANSPORTING BIOHAZARDOUS MATERIALS

Transportation of biohazardous material must conform to the regulations set out in the *Transportation of Dangerous Goods Control Act*.

Only workers trained according to the requirements of the *Transportation of Dangerous Goods Control Act* should be responsible for transporting biohazardous materials.

Classify products or substances that are infectious organisms or are reasonably believed to be infectious to humans or animals as Class 6, Division 2 in Transportation of Dangerous Goods Regulations. The proper shipping names for the infectious substances are:

SHIPPING NAME	PIN UN NUMBER	CLASS	PACKING GROUP
Infectious Substances, affecting humans, n.o.s. (name of organism)	UN2814	6.2	I
Infectious Substances, affecting animals (name of organism)	UN2900	6.2	I

n.o.s. = - not otherwise specified.

For the purpose of the TDG Regulations, infectious substances are divided into the following three groups:

- Risk Group IV - most dangerous infectious substances;
- Risk Group III - infectious substances that are less dangerous than Group 1A;
- Risk Group II - infectious substances that are less dangerous than Group 1B.

Risk Groups Class 6 - (Infectious Substances)

(Reprinted from Canada Gazette, Part II, Vol. 128, No. 7 (94-264)).

Micro-organisms and recombinants, hybrids or mutants thereof, that affect humans or animals and that are included in Division 2 of Class 6 pursuant to paragraph 3.02(b) shall be included in:

- (a) Risk group IV if they are known to present a similar level of risk of disease as that of the infectious substances set out in Table I, II or III of Schedule VII or they could exhibit similar characteristics, including the following:
 - i) the disease they cause has serious effects that may be irreversible or lethal in humans or animals that have contracted the disease,
 - ii) they are readily transmitted from an infected human or animal to an uninfected human or animal, directly or indirectly or by casual contact, thereby representing a high individual risk and a high community risk, and
 - iii) one of the following applies:
 - (A) the disease they cause is difficult to treat and often untreatable, or
 - (B) exposure to them leads to the disease they cause;

- (b) Risk group III if they are known to present the same level of risk of disease as that of the infectious substances set out in Table IV, V or VI of Schedule VII or they exhibit similar characteristics, including the following:
 - i) the disease they cause seriously affects the health of humans or animals that have contracted the disease,
 - ii) they are not readily transmitted from an infected human or animal to an uninfected human or animal by casual contact, thereby representing a high individual risk and a low community risk, and
 - iii) one of the following cases applies:
 - (A) the disease they cause can be treated by antimicrobial or antiparasitic agents, or
 - (B) exposure to them is likely to lead to the disease they cause; and
- (c) Risk group II, if they are known to present a similar level of risk of disease as that of the infectious substances set out in any of Tables VII to X of Schedule VII or they exhibit similar characteristics, including the following:
 - i) the disease they cause does not seriously affect the health of humans or animals that have contracted the disease,
 - ii) they are rarely transmitted from an infected human or animal to an uninfected human or animal by direct contact, thereby representing a moderate individual risk and a limited community risk, and
 - iii) one of the following cases applies:
 - (A) there exists readily available treatment for humans and animals who have contracted the disease they cause, or
 - (B) exposure to them rarely leads to the disease they cause.

Please refer to TDG Regulations for more information.

Diagnostic specimens or cultures that are reasonably believed not to contain infectious substances from risk group II, III, or IV of Division 2 of Class 6, are exempt from the requirements of the TDG Regulations if:

- (a) the diagnostic specimens or cultures are contained in packaging type 1B that meets the requirements of National Standard of Canada CAN/CGSB-43,125-99; or
- (b) the diagnostic specimens are contained in a package that is designed, constructed, filled and closed so that under normal conditions of handling and transporting, there will be no discharge, emission or escape of the diagnostic specimens from the packages.

Diagnostic specimen is defined as any human or animal material including, but not limited to excreta, secreta, blood and its components, tissue fluids being shipped for the purpose of diagnosis, but excluding live infected animals.

The consignor must:

- i) prepare a dangerous goods shipping document for each consignment offered for transport (blank sample is included in Appendix XII);
- ii) label it with the proper shipping name and product identification number as shown below. If the substance is a liquid, the consignor should attach an orientation label to the container (see Appendix XII for a sample);

- iii) package it according to the Canadian General Standards Board (CGSB) CAN/CGSB-43.125-99: "Packaging of Infectious and Diagnostic Specimens," dated May 1991. The packaging shall consist of the following:

Packaging of Infectious Substances

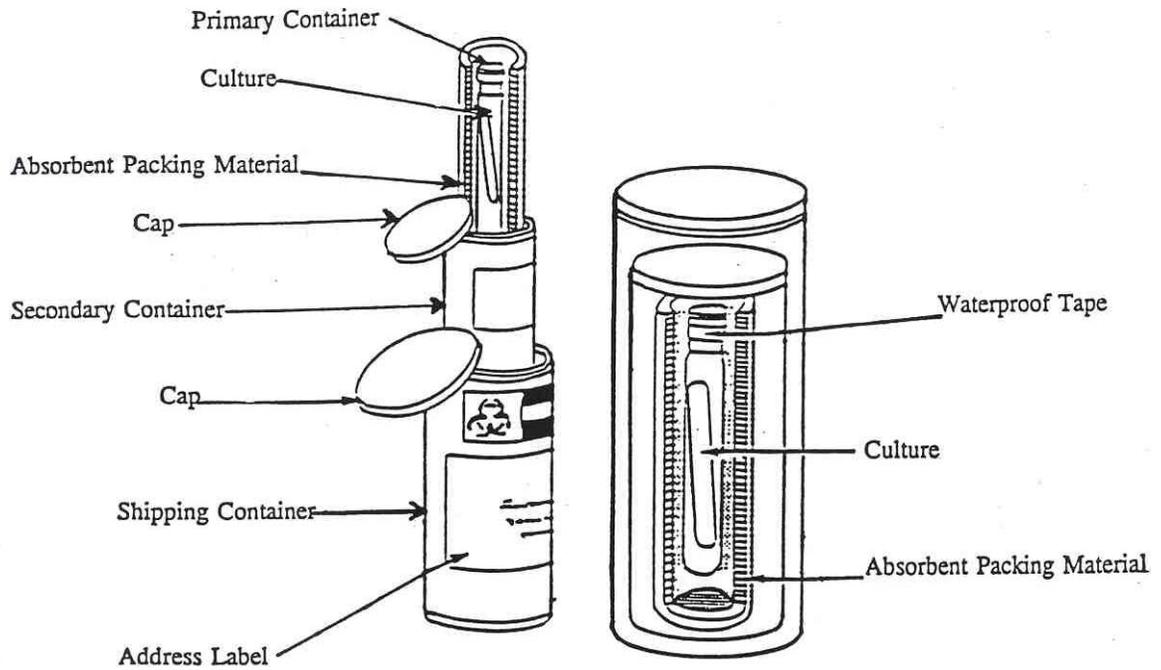


Figure 4 – Cross Section of Proper Packaging
(Municipal Affairs – Public Safety Division)

EMERGENCY RESPONSE PLAN

For all infectious substances an Emergency Response Plan must be filed with the Director General of Transport Canada (613-996-6666).

The following information is needed for this plan:

- (a) the name and address of the agent;
- (b) a brief description of his emergency response capability;
- (c) certification that an emergency response capability exists;
- (d) a brief description of the means by which the plan can be activated;
- (e) the name and address, telephone number, function and signature of the person submitting the summary of the plan; and
- (f) the name of the person on whose behalf the summary of a plan is filed.

The Emergency Response Plan must be filed and a Plan Reference Number obtained before infectious substances can be shipped.

WHMIS REQUIREMENTS

Definition: Any agent, organism or substance that has been shown to cause disease or is reasonably believed to cause disease in persons or animals, and, the toxins of such an agent or substance falls into the Biohazardous Infectious Material division of Class D - Poisonous and Infectious Materials.

To determine if an organism is biohazardous, i.e. capable of causing disease, assign the organism to one of the four risk groups² on the basis of capability of an organism to cause disease in people. Please refer to the Introduction for descriptions of risk groups and Appendix I for examples in each risk group.

Labelling, Material Safety Data Sheet and Worker Training requirements are the same as for all other WHMIS Controlled Products. Refer to Part 2 of the Chemical Hazards Regulation and Sections 9, 10, 16, 17 and 19 of the Federal Controlled Products Regulations for details.

Supplier labels of such a material must show the universally used biohazard symbol shown below.



Figure 5 – Biohazard Symbol

²Defined by the Medical Research Council of Canada and Health Canada.

APPENDICES

- APPENDIX I: CATEGORIES OF PATHOGENS
- APPENDIX II: CONTAINMENT OF BIOHAZARDS
- APPENDIX III: HANTAVIRUS
- APPENDIX IV: HEPATITIS B
- APPENDIX V: HEPATITIS C
- APPENDIX VI: HUMAN IMMUNE DEFICIENCY VIRUS (HIV)
- APPENDIX VII: INFECTIOUS DISEASES AND OCCUPATIONS
- APPENDIX VIII: RABIES
- APPENDIX IX: TUBERCULOSIS
- APPENDIX X: TETANUS
- APPENDIX XI: WEST NILE VIRUS
- APPENDIX XII: SAMPLE OF INFECTIOUS SUBSTANCE
SHIPPING DOCUMENT

APPENDIX I: CATEGORIES OF PATHOGENS

(Reprinted from: *Laboratory Biosafety Guidelines* - Health Canada, 1990)

As a general precaution, the risk group for agents should be raised when manipulation may result in the production of infectious droplets and aerosols. Agents of similar pathogenic characteristics not included in these lists should be considered in the same risk category. It must also be understood that this is not a complete list - many agents are referred to in literature by a variety of names and before assuming that an unlisted organism is classified in Risk Group 1, the laboratory worker must fully verify its characteristics.

*** Agents noted with a single asterisk require a joint importation permit from Agriculture and Agri-Food Canada and Health Canada. Agriculture and Agri-Food Canada may also require additional conditions for the use of importation of these agents.**

RISK GROUP 1 AGENTS: REQUIRING CONTAINMENT LEVEL 1

Risk Group 1 (Low Individual Risk and Low Community Risk)

This group includes those micro-organisms, bacteria, fungi, viruses and parasites, which are unlikely to cause disease in healthy workers or animals.

RISK GROUP 2 AGENTS: REQUIRING CONTAINMENT LEVEL 2

Risk Group 2 (Moderate Individual Risk, Limited Community Risk)

A pathogen that can cause human or animal disease but, under normal circumstances, is unlikely to be a serious hazard to healthy laboratory workers, the community, livestock, or the environment. Laboratory exposures rarely cause infection leading to serious disease; effective treatment and preventive measures are available and the risk of spread is limited.

Bacteria

*Actinobacillus** - all species

Bacillus cereus

Bartonella bacilliformis

Bordetella pertussis, *B. parapertussis* and *B. bronchiseptica*

Borrelia recurrentis, *B. vincentii* and *B. burgdorferi*

Campylobacter spp. (*C. fetus**, *C. jejuni**)

*Clostridium botulinum**, *Cl. chauvoei**, *Cl. difficile*, *Cl. haemolyticum**,

*Cl. histolyticum**, *Cl. novyi**, *Cl. septicum**, *Cl. sordellii**, *Cl. tetani**

Corynebacterium diphtheriae, *C. haemolyticum**, *C. pseudotuberculosis**, *C. pyogenes**

Edwardsiella tarda

*Erysipelothrix insidiosa**

Escherichia coli enterotoxigenic/invasive/hemorrhagic strains*

Francisella tularensis (Type B, biovar palaeartica) *F. novocida*

*Fusibacterium necrophorum**

Haemophilus influenzae, *H. ducreyi*

Legionella spp

*Leptospira interrogans** - all serovars

Listeria monocytogenes

Mycobacteria - all species (except *M. tuberculosis*, *M. bovis* (non-BCG strain),
M. avium which are at Level 3)

Neisseria gonorrhoeae, *N. meningitidis*

Nocardia asteroides, *N. brasiliensis*

*Pasteurella**, all species (except *P. multocida* type B in level 3)

Salmonella enterica (*S. choleraesuis*)

Salmonella enterica serovar arizonae (*Arizona hinshawii*)

Salmonella enterica ser. gallinarum-pullorum* (*S. gallinarum-pullorum*)

Salmonella enterica ser. meleagridis* (*S. meleagridis*)

Salmonella enterica ser. paratyphi B (*S. paratyphi B*) (Schottmülleri)

Salmonella enterica ser. typhi (*S. typhi*)

Salmonella enterica ser. typhimurium (*S. typhimurium*)

Shigella boydii, *S. dysenteriae*, *S. flexneri*, *S. sonnei*

*Staphylococcus aureus**

Streptobacillus moniliformis

Streptococcus spp (Lancefield Groups A, B, C, D, G)

Treponema carateum, *T. pallidum* and *T. pertenue*

Vibrio cholerae (incl. El Tor), *V. parahaemolyticus*

Yersinia enterocolitica, *Y. pseudotuberculosis*

Chlamydia

*Chlamydia psittaci**, *C. trachomatis*

Mycoplasma (except those strains pathogenic to animals*)

Mycoplasma pneumoniae, *M. hominis*

Ureaplasma urealyticum

Fungi

Cryptococcaceae

Candida albicans

Cryptococcus neoformans

Moniliaceae

Aspergillus flavus

Aspergillus fumigatus

Epidermophyton floccosum

Microsporum spp.

Sporothrix schenckii

Trichophyton spp.

Viruses

** Arthropod-borne viruses are identified with a double asterisk. Only those viruses which may be associated with human or animal disease have been included in this list.

Adenoviridae

Adenoviruses, all serotypes

Arenaviridae

Lymphocytic choriomeningitis virus (laboratory-adapted strains)

Tacaribe virus complex: Tamiami, Tacaribe, Pichinde

Bunyaviridae**

Genus Bunyavirus

Bunyamwera and related viruses

California encephalitis group, including La Crosse, Lumbo, snowshoe hare

Genus Phlebovirus

All species except Rift Valley fever virus (see Table 1)

Caliciviridae - all isolates

Coronaviridae

- Human coronavirus, all strains
- Transmissible gastroenteritis virus of swine*
- Hemagglutinating encephalomyelitis virus of swine*
- Mouse hepatitis virus
- Bovine coronavirus*
- Feline infectious peritonitis virus
- Avian infectious bronchitis virus*
- Canine, Rat and Rabbit coronaviruses*

Flaviviridae**

- Yellow fever virus (17D vaccine strain)
- Dengue virus (serotypes 1,2,3,4)
- Kunjin virus

Hepadnaviridae

- Hepatitis B virus

Herpesviridae

Alphaherpesvirinae - all isolates (except Herpes B virus, which is in Level 4 and Pseudorabies (see Table 1))

Genus Poikilovirus: all isolates

Genus Varicellavirus: all isolates

Other herpesviruses unassigned as yet: includes infectious bovine

rhinotracheitis, equine coital-exanthema virus; feline infectious rhinotracheitis, chicken infectious laryngotracheitis virus, channel catfish virus, etc.

Betaherpesvirinae

Genus Cytomegalovirus: all isolates

Genus Muromegalovirus: all isolates

Gammaherpesvirinae

Genus Lymphocryptovirus: all isolates (except H. ateles and H. samiri in level 3)

Genus Thetalymplocryptovirus: all isolates

Orthomyxoviridae

Genus Influenzavirus: Influenza virus type A, all isolates
 Influenza virus type B, all isolates
 Influenza virus type C, all isolates
 Papovaviridae

Genus Papillomavirus: all isolates

Genus Polyomavirus: all isolates
 Paramyxoviridae

Genus Paramyxovirus: all isolates

Genus Morbillivirus: all isolates (except Rinderpest - see Table 1)

Genus Pneumovirus: all isolates
 Parvoviridae

Genus Parvovirus: all isolates
 Picornaviridae

Genus Aphthovirus - see Table 1

Genus Enterovirus - all isolates (see Table 1 for restrictions)

Genus Cardiovirus - all isolates

Genus Rhinovirus - all isolates
 Poxviridae (see Table 1 for restrictions)

Chordopoxvirinae (poxviruses of vertebrates)

 Genus Orthopoxvirinae - all isolates (except Variola and Monkey pox in Level 4)

 Genus Leporipoxvirus - all isolates

 Genus Avipoxvirus - all isolates

 Genus Suipoxvirus: Swinepox (see Table 1 for restrictions)

 Genus Parapoxvirus - all isolates

 All other ungrouped Poxviruses of vertebrates

 Reoviridae

 Genus Orbivirus - all isolates (see Table 1 for restrictions)

 Genus Rotavirus - all isolates

 Retroviridae

Oncovirinae

 Genus Oncornavirus C

Subgenus Oncornavirus C avian - all isolates

Subgenus Oncornavirus C mammalian - all isolates including

HTLV-I, HTLV-II only as non-cultured specimens

Genus Oncornavirus B - all isolates

Lentivirinae - all isolates including HIV-I, HIV-II only as non-cultured specimens

Spumavirinae - all isolates

Rhabdoviridae

Genus Vesiculovirus - all isolates (see Table 1 for restrictions)

Genus Lyssavirus: Rabies virus (Fixed virus)

Togaviridae

Genus Alphavirus**

Semliki forest virus

Sindbis

Chikungunya (high passage strains)

O'Nyong-Nyong

Ross river virus

Venezuelan equine encephalitis (Strain TC-83 only)

Genus Rubivirus: Rubella virus

Genus Pestivirus

Bovine virus diarrhoea

Border disease virus

Genus Arterivirus

Equine arteritis virus

Unclassified viruses

Norwalk viruses

Non-A, non-B Hepatitis Viruses

Delta Hepatitis Virus

Chronic infectious neuropathic agents (CHINAs):

Kuru, Creutzfeld-Jakob agent (Special precautions & disinfectants)

Scrapie

Parasites

Infective stages of the following parasites have caused laboratory infections by ingestion, skin or mucosal penetration, or accidental injection. Preparations of these parasites known to be free of infective stages do not require this level of containment. Most of these organisms do not need to be worked on in a biological safety cabinet, but the other constraints of Level 2 containment should be observed.

Work with agents identified as (+) should be conducted in a biological safety cabinet (BSC) or its equivalent.

Protozoa

Babesia microti

Babesia divergens

Balantidium coli

Cryptosporidium spp.+

Entamoeba histolytica

Giardia spp. (mammalian)

Leishmania spp. (mammalian)+

Naegleria fowleri+

Plasmodium spp (human or simian)

Pneumocystis carinii

Toxoplasma gondii+

Trypanosoma brucei, *T. cruzi*+

Helminths Nematodes

Ancylostoma duodenale

Angiostrongylus spp.

Ascaris spp.

Brugia spp.

Loa loa

Necator americanus

Onchocerca volvulus

Strongyloides spp.

Toxocara canis

Trichinella spp.*

Trichuris trichiura

Wuchereria bancrofti

Cestodes

Echinococcus (gravid segments)+

Hymenolepis diminuta

Hymenolepis nana (human origin)

*Taenia saginata**

*Taenia solium**

Trematodes

Clonorchis sinensis

Fasciola hepatica

Opisthorchis spp.

Paragonimus westermani

Schistosoma haematobium

Schistosoma japonicum

Schistosoma mansoni

RISK GROUP 3 AGENTS: REQUIRING CONTAINMENT LEVEL 3

Risk Group 3 (High Individual Risk, Low Community Risk)

A pathogen that usually causes serious human or animal disease, or which can result in serious economic consequences but, does not ordinarily spread by casual contact from one individual to another, or that can be treated by antimicrobial or antiparasitic agents.

Bacteria

*Bacillus anthracis**

Brucella all species*

*Chlamydia psittaci** - avian strains only

*Coxiella burnetii**

Francisella tularensis, type A (biovar tularensis)

*Mycobacterium avium**; *M. bovis** (non-BCG strains); *M. tuberculosis**

Pasteurella multocida, type B*

*Pseudomonas mallei**; *P. pseudomallei**

Rickettsia - all species

Yersinia pestis

Fungi

Moniliaceae

Blastomyces dermatitidis

Coccidioides immitis

Histoplasma capsulatum including var. *duboisii*

*Paracoccidioides brasiliensis**

Viruses

Viruses are grouped within Family and/or Genus. Arthropod-borne viruses are identified with a double asterisk.

Arenaviridae

Lymphocytic choriomeningitis virus, neurotropic strains

Bunyaviridae

Unclassified Bunyavirus

Hantaan, Korean hemorrhagic fever and epidemic nephrosis viruses

Flaviviridae**

Yellow fever virus (Wild type)

St. Louis encephalitis virus

Japanese encephalitis virus

Murray Valley encephalitis virus

Powassan

Herpesviridae

Gammaherpesvirinae

Genus Rhadinovirus: *Herpesvirus ateles*; *Herpesvirus saimiri*

Retroviridae

Oncovirinae

Genus Oncornavirus C

Human T-cell leukemia/lymphoma virus (HTLV-I, HTLV-II, if cultured)

Genus Oncornavirus D

Mason-Pfizer monkey virus

Viruses from primates

Lentivirinae

Human immunodeficiency viruses (HIV - all isolates if cultured)

Rhabdoviridae

Genus Vesiculovirus (see Table 1 for restrictions)

Piry

Genus Lyssavirus

Rabies virus (Street virus)*

Togaviridae

Genus Alphavirus**

Eastern equine encephalitis virus*

Chikungunya (recent isolates)

Venezuelan encephalitis (except Strain TC-83)*

Western equine encephalitis*

Unclassified Viruses

Chronic infectious neuropathic agents (CHINA's)

Kuru, Creutzfeld-Jakob agent (also listed under Group 2; level of the suspected agent depends on the nature of the manipulations and the amount of sera, bio/necropsy materials handled).

Parasites

None.

RISK GROUP 4 AGENTS: REQUIRING CONTAINMENT LEVEL 4

Risk Group 4 (High Individual Risk, High Community Risk)

A pathogen that usually produces very serious human or animal disease, often untreatable, and may be readily transmitted from one individual to another, or from animal to human or vice-versa directly or indirectly, or by casual contact.

Bacteria

None.

Fungi

None.

Viruses

Arenaviridae

Lassa, Junin, Machupo viruses

Bunyaviridae**

Genus Nairovirus

Crimean-Congo hemorrhagic fever

Filoviridae

Marburg virus

Ebola virus

Flaviviridae**

Tick-borne encephalitis complex, including -

Russian Spring Summer Encephalitis

Kyasanur forest virus

Omsk hemorrhagic fever virus

Herpesviridae

Alphaherpesvirinae

Genus Simplexvirus: Herpes B virus (Monkey B virus)

Poxviridae

Genus Orthopoxvirinae

Variola

Monkeypox

Parasites

None.

Table 1 - Agents not indigenous to Canada

Agents not indigenous, including the following, require an importation permit from Agriculture Canada. In addition, Agriculture Canada will establish conditions under which these organisms are used and maintained.

Bacteria

Mycoplasma agalactiae

Mycoplasma mycoides

Rickettsia ruminantium

Parasites

Besnoitia besnoiti

Theileria annulata

Theileria bovis

Theileria hirci

Theileria lawrencei

Theileria parva

Trypanosoma equiperdum

Trypanosoma evansi

Trypanosoma vivax

Viruses

Bornaviridae

Borna disease virus

Bunyaviridae

Nairobi sheep disease virus

Rift Valley fever virus

Caliciviridae

Swine vesicular disease

Vesicular exanthema virus

Herpesviridae

Pseudorabies virus

Iridoviridae

African swine fever virus

Orthomyxoviridae

Fowl plague virus

Paramyxoviridae

Rinderpest, Newcastle disease virus (mesogenic, velogenic strains),

Peste des petits ruminants

Picornaviridae

Genus Aphthovirus: Foot-and-mouth disease virus

Genus Enterovirus: Teschen disease virus

Poxviridae

Chordopoxvirinae (poxviruses of vertebrates), Smallpox (Alastrim)

Genus Capripoxvirus

Sheeppox

Goatpox

Lumpy skin disease

Genus Suipoxvirus

Swinepox

Camelpox virus

Reoviridae

Genus Orbivirus

Bluetongue virus

African horse sickness virus

Rhabdoviridae

Genus Vesiculovirus

Ephemeral fever virus

Vesicular stomatitis virus (Animal inoculation)

Togaviridae

Hog Cholera virus

Louping Ill virus (Animal inoculation)

Wesselsbron disease virus

APPENDIX II: CONTAINMENT OF BIOHAZARDS

(Reprinted from: *Laboratory Biosafety Guidelines* - Health Canada, 2nd Edition, 1996.)

1. Safety Practices

The attitudes and actions of those who work in the laboratory determine their own safety, and that of their colleagues and of the community. Laboratory equipment and design can contribute to safety only if they are used properly by people who are genuinely concerned and knowledgeable about safety issues.

The Canada Labour Code requires that each employer provide safe working conditions and that employees be informed about all hazards they will face in the course of their duties. The employee is also given the right to withdraw from the workplace if faced with an unsafe condition. Other Federal Legislation (Workplace Hazardous Materials Information System – WHMIS) requires that all hazardous substances, including microorganisms, be labelled in a specified manner and that there be a Material Safety Data Sheet (MSDS) available to accompany each hazardous substance. Employers are also required to provide all training necessary to work with the hazardous substance and to keep a written record of their employee education program. For more information, contact Labour Canada (tel: 1-800-463-2493).

The following requirements are basic for any laboratory using infectious or toxic agents.

- A. All laboratory personnel and others whose work requires them to enter the laboratory must understand the chemical and biological hazards with which they will come in contact through their normal work in the laboratory, and be trained in appropriate safety precautions and procedures. A laboratory safety manual should be prepared or adopted by the laboratory director that identifies known and potential hazards and specifies practices and procedures to eliminate or minimize such risks. The manual should also contain an emergency response plan. Personnel must be required to know, understand, and follow standard practices and procedures. Training in laboratory safety should be provided by the laboratory director and competence in safe technique must be demonstrated before work is allowed with hazardous agents or toxins.
- B. The laboratory must be kept neat, orderly and clean, and storage of materials not pertinent to the work should be minimized.
- C. Protective laboratory clothing (uniforms, coats, gowns) must be available, and worn properly fastened by all personnel, including visitors, trainees, and others entering or working in the laboratory. Protective laboratory clothing must not be worn in non-laboratory areas. Suitable footwear with closed toes and heels and preferably with non-slip soles should be worn in all laboratory areas.
- D. Safety face and eyewear (e.g., glasses, goggles, face shields, or other protective devices) should be worn when necessary to protect the face and eyes from splashes, impacting objects, harmful substances, UV light, or other rays.

- E. Eating, drinking, smoking, storing food or utensils, applying cosmetics, and inserting or removing contact lenses are not permitted in any laboratory work area. Contact lenses should be worn only when other forms of corrective eyewear are not suitable.
- F. Oral pipetting is prohibited in any laboratory.
- G. Long hair must be tied back or restrained.
- H. Hands must be washed before leaving the laboratory and at any time after handling materials known or suspected to be contaminated, even when gloves have been worn.
- I. Work surfaces must be cleaned and decontaminated with a suitable disinfectant at the end of the day and after any spill of potentially dangerous material. Loose or cracked work surfaces should be replaced.
- J. All technical procedures should be performed in a manner that minimizes the creation of aerosols.
- K. All contaminated or infectious liquid or solid materials must be decontaminated before disposal or reuse. Contaminated materials that are to be autoclaved or incinerated at a site away from the laboratory should have the outside disinfected chemically or be doubled-bagged and then transported to the autoclave or incinerator in durable leak proof containers which are closed and wiped on the outside with disinfectant before being removed from the laboratory.
- L. Access to the laboratory should be severely limited or restricted at Levels 3 and 4. Decisions on entry into Level 1 and 2 laboratories should be at the discretion of the laboratory director (e.g. only persons who have been advised of the potential hazards and meet any specific entry requirements such as immunization should be allowed to enter the laboratory area). Special attention should be paid to the possibility that pregnant women or immunocompromised people might work in or enter the laboratory, or that children might enter.
- M. Hazard warning signs, indicating the risk level of the agents being used, must be posted outside each laboratory. Where infectious agent(s) used in the laboratory require special provisions for entry, the relevant information must be included in the sign. The agent must be identified, and the name of the laboratory supervisor and other responsible person(s) as well as any special conditions for staff entry must be listed.
- N. Gloves should be worn for all procedures that might involve direct skin contact with toxins, blood, infectious materials, or infected animals. Gloves should be removed carefully and decontaminated with other laboratory wastes before disposal. Reusable gloves must be appropriately decontaminated.
- O. Hypodermic needles and syringes should be used only for parental injection and aspiration of fluids from laboratory animals and diaphragm bottles. Extreme caution should be used when handling needles and syringes to avoid autoinoculation and the generation of aerosols during use and disposal. Needles should not be bent or sheared by hand. They should not ordinarily be replaced in the sheath or guard. They should be

- promptly placed in a puncture-resistant container and decontaminated, preferably by incineration or autoclaving, before disposal.
- P. All spills, accidents and overt or potential exposures must be reported in writing to the laboratory supervisor or acting alternate as soon as circumstances permit; this person should file this report with the appropriate biosafety committee. Appropriate medical evaluation, surveillance, and treatment should be provided as required.
- Q. When appropriate, baseline serum or other samples for laboratory and other at-risk personnel should be collected and stored. Additional serum specimens may be collected periodically, depending on the agents handled or the function of the facility.
- R. Laboratory workers should be protected against relevant infection by immunization where possible and show immunity.

2. Use Of Laboratory Animals

Naturally occurring or experimentally induced infections in laboratory animals may be transmitted to other laboratory animals, invertebrates and laboratory workers. Animals infected or challenged experimentally with organisms in any of the risk groups may be small (e.g. mice) or large (e.g. livestock), have unique housing requirements (e.g. fish) or have uncharacterized susceptibilities (e.g. gnotobiotics, transgenics). The requirements for maintenance of the animals may differ therefore in scale and degree but the basic principles for microbiological safety will be similar to those outlined in Section on Safety Practices.

In addition to those practices, the following requirements and conditions must be satisfied:

- All aspects involved in the proposed use of animals in research must meet the standards and regulations for the care and maintenance of experimental animals as described by the Canadian Council on Animal Care, relevant provincial legislation and local animal care authorities.
- It should be clear that appropriate species have been selected for the animal experiments.
- The investigator and/or person(s) responsible for the animal experiment must ensure that all those having contact with the animals and waste materials are familiar with and aware of any special precautions and procedures that may be required. Where possible, personnel should be protected by immunization with appropriate vaccines.
- It is essential that all accidents, including animal bites and scratches or cuts from cages or other equipment, be reported and recorded.
- Small laboratory rodents or other small animals that escape from their cages should be killed when captured, their carcasses incinerated and the area should be fully decontaminated. In the event that animals escape the containment perimeter, the relevant authorities must be notified promptly and appropriate action initiated.
- Unexpected illness or deaths among animals must be reported without delay; instructions for dealing with such animals should be available. However, animals should not be touched until instructions are given by the person in charge.

APPENDIX III: HANTAVIRUS

1. Mode of Transmission

Hantavirus infection is caused by a virus found in some rodents such as the deer mouse or white-footed mouse. All rodents should be considered potential carriers. The virus is usually spread to humans in the following ways:

- When particles of infected saliva, urine or feces are inhaled through direct contact with the rodent or from breathing dust particles that are generated when rodent excreta are disturbed;
- If infected materials contact broken skin or the lining of the eyelids and eyeball;
- If contaminated rodent urine droppings or saliva contact the nose or mouth; and
- If rodent contaminated food or water is ingested.

2. Occupational Exposures

All employees

Most rodents are found in rural and semi-rural areas; however, they can be found in any building.

Locations where rodents frequent include the following:

- Outside
 - rubbish piles
 - infrequently used equipment
 - garbage
 - weeds and long grass.
- Inside
 - food storage containers
 - garbage storage areas
 - nooks and crannies.

3. Preventive Measures

Ministries

Prepare a written hazard assessment of work sites to identify existing or potential hazards and take measures to eliminate or control hazards.

Identify employees who are at risk of exposure.

Establish and regularly review written policies, procedures and plans outlining hazard communication (transmission, symptoms, actions and control measures).

Provide training before employee begins work and when changes that affect exposures are made.

Employees

Participate in hazard assessment and control as well as training on biohazardous materials, controls and procedures.

Follow precautions and procedures to minimize infection:

- Regular inspections to determine if active rodent control is required.
- Clean up open trash, open stores of papers or other areas that may serve as nesting sites.
- Store food in rodent proof containers with a tight lid.
- Close openings where rodents gain entry and establish runways.
- Place metal flashing around the base of buildings in which people work if rodents may be able to get in.
- Use gravel or raised cement foundations in new construction.
- Cut grass brush and shrubbery within 30 meters of buildings.
- Trap or poison with rodenticides.

Work Procedures

Handling Rodents

- Wear NIOSH approved half face air purifying respirators equipped with HEPA filters.
- Rubber or plastic disposable gloves.
- Disposable coveralls made of a material that will resist the penetration of dust particles, with a snug fit at the wrists and ankles.
- Eye or face protection to prevent aerosols from coming in contact with the eye.
- Disinfect traps contaminated with rodent urine or feces, with a commercial disinfectant or a bleach solution.
- Soak dead rodent in a disinfectant solution, double bag along with all cleaning materials, label and then bury or discard in an appropriate waste disposal system.
- Remove and decontaminate personal protective equipment and clothing.

Clean up of Infested Areas

- Clear all unnecessary workers from the area.
- Ventilate area by opening windows and doors, if possible.
- Use disposable rubber or plastic gloves.
- Wear a NIOSH approved respirator with a HEPA filter.
- With a heavy infestation, wear disposable coveralls, rubber boots or disposable shoe covers and protective goggles.
- Refrain from sweeping or vacuuming dry droppings, urine or feces.

- Thoroughly wet contaminated areas with detergent or liquid. A mixture of 3 tablespoons of household bleach in 1 gallon of water may be used in place of a commercial disinfectant.
- Take up the contaminated materials with a damp towel and mop or sponge the area with disinfectant.
- Dispose of dead rodents. See above.
- Dispose of contaminated materials in double plastic bags. Seal the bags and label. Bury in a hole at least two feet deep OR incinerate OR dispose with regular garbage as long as the amount of material can be safely treated by being soaked in a disinfectant solution and the material is in double plastic bags.
- Wipe or mop surfaces with a solution of disinfectant and detergent.
- Decontaminate and remove personal protective equipment and clothing. See below.

Decontamination Procedures

Do not remove respiratory protective equipment until other decontamination steps are complete.

- Remove coveralls in the perimeter of the work area and place them in disposal bag. Collapse the bag and temporarily seal it.
- Move away from the clean-up or contaminated work area to a location where there are no other workers, leaving eye and respiratory protection in place.
- Wet wipe exposed reusable respirator surfaces, eyewear and rubber footwear with a disinfectant solution.
- Rinse outside of gloves in disinfectant solution. Remove gloves and place in plastic bag for disposal.
- Place disposable respirators/cartridges in a plastic bag. Permanently seal and label bag. Clean and disinfect reusable respirators. Store in a cool clean place. Remove eyewear and dispose or disinfect before storing.
- Wash exposed skin surfaces thoroughly with soap.

Precautions for Working or Camping

- Avoid contact with rodents.
- Air and disinfect shelters before using them.
- Avoid pitching tents or sleeping bags near rodent droppings or areas that may shelter or provide food for them, e.g. garbage dumps or woodpiles.
- Avoid sleeping on bare ground. Use a cot with surface 12 inches above the ground.
- Keep food in rodent proof containers.
- Discard trash in covered containers.
- Use bottled water disinfected by filtration, boiling, chlorination or iodination for drinking, cooking, washing dishes or brushing teeth.

Action Following Possible Exposure

Report the incident to the supervisor for investigation as well as documentation on the [Supervisor's Incident Investigation Report](#) form and the First Aid Record.

APPENDIX IV: HEPATITIS B

1. Mode Of Transmission

Hepatitis B is spread by direct contact with infected blood or body secretions through non-intact skin or mucous membrane.

2. Occupational Groups At Risk

Employee groups at risk of exposure to Hepatitis B include the following:

- A. Employees in healthcare institutions who are in direct client contact and certain property management employees.
- B. Health care workers, correctional institutions workers, Medical Examiners' employees and others who are potentially exposed to blood and /or body fluids.

3. Preventive Measures

Ministries

Prepare a written hazard assessment of work sites to identify existing or potential hazards and take measures to reduce or prevent/control hazards.

Establish and regularly review written policies and procedures dealing with storage, handling, use, post exposure management and disposal of biohazardous materials that pose a work related hazard. This includes policies and procedures on the use of protective clothing, disinfection of equipment and environment, protection against needle punctures or other contaminated equipment, safe disposal of refuse and post exposure protocols.

Provide immunization through a series of 3 injections given at 0, 1 and 6 months to all individuals at risk to Hepatitis B.

Provide training before worker begins work with or in proximity to biohazardous material and when changes are made that affect exposure and verify training was provided before placed in a position where exposure may occur.

Ensure first aid and medical attention is available to the worker.

Employees

Participate in hazard assessment and control as well as training on biohazardous material, control and procedures.

Follow precautions and procedures to minimize the risk of accidental exposure and subsequent risk of infection:

- Consider sharp items (needles, scalpel blades and other sharp instruments) as potentially infective and handle them with care.

- Place used disposable syringes and needles, scalpel blades and other sharp items into puncture-resistant containers that are located as close as practical to the area in which they are used. To prevent needle stick injuries, DO NOT recap, purposefully bend, break, remove needles from disposable syringes. Dispose of them immediately.
- When the possibility of exposure to blood or other body fluids exists, follow recommended routine practices. When handling items soiled with blood, or equipment contaminated with blood or other body fluids, wear latex or rubber gloves. When performing procedures involving more extensive contact with blood or potentially infective body fluids such as in some postmortem examinations, wear gowns, masks and eye-coverings. Wash hands thoroughly and immediately if they accidentally become contaminated with blood. Wash hands after the removal of gloves.
- In autopsy rooms, wear stainless steel mesh gloves as well as goggles during removal of the rib cage and vertebrae, and when using saws, chisels or bone cutters.
- The “Decontamination and Disposal” section of this guideline provides procedures for clean up of spills of blood or other body fluids and waste management.

4. Action Following Possible Exposure

- A. Allow punctures or cuts to bleed, then thoroughly wash with soap and water. Blood splashes to eyes require immediate washing. Wear disposable latex gloves when wiping up blood in the environment. Soak blood spills with a fresh 1:10 bleach solution (1part household bleach and 9 parts water) for 10 minutes prior to cleanup to disinfect.
- B. Contact your supervisor.
- C. Go to a hospital emergency for a risk assessment and blood test.
- D. The blood test will determine if you have antibodies to Hepatitis B. If you do have protective antibodies, no further treatment is needed. If you do not have protective antibodies, the prophylactic treatment will depend if you were previously immunized with hepatitis vaccine or not:
 - Previously immunized with a series of 3 doses of vaccine: One dose of vaccine is given as soon as possible and within 7 days. Test for antibody one month later. The result will define further action.
 - Not previously immunized with Hepatitis B vaccine: One dose of Hepatitis B vaccine and Hepatitis B Immune Globulin (HBIG) is administered as soon as possible after the exposure and within 7 days. The remaining 2 doses of Hepatitis B vaccine are given according to the recommended schedule (1month and 6 months after the first dose).
 - Partially immunized with Hepatitis B vaccine or a non-responder to vaccine: The decision regarding prophylactic treatment will be made on an individual basis.

Note: Hepatitis B vaccine and HBIG is administered only at hospital emergency departments after the accidental exposure to blood. If a series of Hepatitis B immunization needs to be completed after the incident, it can be provided at Public Health Clinics or by the Occupational Health Nurse at your work site (if available).

- E. Follow up blood testing for Hepatitis B is usually carried out at three- month intervals up to six months. This should be arranged through the employee's own physician.
- F. Report incident to supervisor for investigation and documentation on [Supervisor's Incident Investigation Report](#) form, WCB forms and First Aid Records.

APPENDIX V: HEPATITIS C

1. Mode Of Transmission

Hepatitis C is spread by direct contact with infected blood or body fluids through skin or mucous membrane, and with contaminated needles and syringes. It is a liver infection caused by the Hepatitis C virus (HCV) and is different from Hepatitis A and B.

2. Occupational Groups At Risk

Employee groups at risk of exposure to Hepatitis C include the following:

- A. Employees in health care institutions who are in direct client contact.
- B. Health care workers, correctional institutions workers, Medical Examiners' employees and others who are potentially exposed to blood and/or body fluids.

3. Preventive Measures

Ministries

Prepare a written hazard assessment of work sites to identify existing or potential hazards and take measures to eliminate or control hazards.

Establish and regularly review written policies and procedures dealing with storage, handling, use, post exposure management and disposal of biohazardous materials that pose a work related hazard. This includes policies and procedures on the use of protective clothing, disinfection of equipment and environment, protection against needle punctures or other contaminated equipment, safe disposal of refuse and post exposure protocols.

Provide training before worker begins work with or in proximity to biohazardous material and when changes are made that affect exposure and verify training was provided before placed in a position where exposure may occur.

Ensure First Aid and medical attention is available to the worker.

Employees

Participate in hazard assessment and control as well as training on biohazardous material, control and procedures.

Follow precautions and procedures to minimize the risk of infection:

- Consider sharp items (needles, scalpel blades, and other sharp instruments) as potentially infective and handle them with care.

- Place used disposable syringes and needles, scalpel blades and other sharp items into puncture-resistant containers that are located as close a practical to the area in which they are used. To prevent needle stick injuries, DO NOT recap, purposefully bend, break, remove needles from disposable syringes. Dispose of them immediately.
- When the possibility of exposure to blood or other body fluids exists, follow recommended routine practices. When handling items soiled with blood, or equipment contaminated with blood or other body fluids, wear latex or rubber gloves. When performing procedures involving more extensive contact with blood or potentially infective body fluids such as in some postmortem examinations, wear gowns, masks and eye-coverings. Wash hands thoroughly and immediately if they accidentally become contaminated with blood. Wash hands after glove removal.
- In the autopsy room, wear stainless steel mesh gloves as well as goggles during removal of the rib cage and vertebrae and when using saws, chisels or bone cutters.
- The “Decontamination and Disposal” section of this guideline provides procedures for clean up of spills of blood or other body fluids and waste management.

4. Action Following Possible Exposure

- A. Allow punctures or cuts to bleed, then wash thoroughly with soap and water. Blood splashes to eyes require immediate washing. Wear disposable latex gloves when wiping up blood. Soak blood spills with a fresh 1:10 bleach solution (1 part household bleach and 9 parts water) for 10 minutes prior to cleanup to disinfect.
- B. Go to hospital emergency room for a risk assessment and blood test. An individual’s personal physician does follow up blood testing at three-month intervals up to six months.
- C. Report incident to supervisor for investigation and documentation on [Supervisor's Incident Investigation Report](#) form, WCB forms and the First Aid Record.

APPENDIX VI: HUMAN IMMUNE DEFICIENCY VIRUS (HIV)

1. Mode Of Transmission

HIV can be transmitted when infected blood, blood products and body fluids come into contact with the blood stream of an uninfected person.

2. Occupational Groups At Risk

In the workplace, the kind of person-to person contact that generally occurs among workers and clients or consumers **does not pose a risk** for transmitting HIV. There is no need to restrict the use of telephones, office equipment, toilets, showers, eating facilities or water fountains.

Even for health care workers, the risk of getting HIV is low. Routine contact between workers and patients has not led to transmission.

Medical Examiner Office employees are at risk from potential contact with HIV infected blood.

3. Preventive Measures

Ministries

Prepare a written hazard assessment of work sites to identify existing or potential hazards and take measures to eliminate or control hazards.

Establish and regularly review written policies and procedures dealing with storage, handling, use, post exposure management and disposal of biohazardous materials that pose a work related hazard. This includes policies and procedures on the use of protective clothing, disinfection of equipment and environment, protection against needle punctures or other contaminated equipment, safe disposal of refuse and post exposure protocols.

Provide training before worker begins work with or in proximity to biohazardous material and when changes are made that affect exposure and verify training was provided before placed in a position where exposure may occur.

Ensure first aid and medical attention is available to the worker.

Employees

Participate in hazard assessment and control as well as training on biohazardous material, control and procedures.

Follow precautions and procedures to minimize the risk of infection:

- Consider all sharp items (needles, scalpel blades and other sharp instruments) as potentially infective. Handle these with care.
- Place used disposable syringes and needles, scalpel blades and other sharp items into puncture-resistant containers. To prevent needlestick injuries, **DO NOT** recap needles,

purposefully bend break, remove needles from disposable syringes. Dispose of them immediately.

- During patient or dead body contact, and when the possibility of exposure to blood or other body fluids exists, follow routinely recommended routine practices. Wear latex gloves when handling items soiled with blood or equipment contaminated with blood or other body fluids. When performing procedures involving more extensive contact with blood or potentially infective body fluids such as in some post mortem examinations, you may also need to wear gowns, masks and eye coverings. Wash hands thoroughly and immediately if they accidentally become contaminated with blood. Wash hands after glove removal.

4. Action Following Possible Exposure

- A. Allow punctures or cuts to bleed, then wash thoroughly with soap and water. Blood splashes to eyes require immediate washing. Wear disposable latex gloves when wiping up blood. Soak blood spills in the environment with a fresh 1:10 bleach solution (1 part household bleach and 9 parts water) for 10 minutes prior to cleanup to disinfect.
- B. Contact your supervisor.
- C. Go to a hospital emergency for a risk assessment and have a blood test for HIV antibodies. The source (if known) may need testing.
- D. If the risk for HIV in the source is high, a cocktail of 2-3 drugs is given for 24 – 48 hours until results return. It is very important to start prophylactic treatment as quickly as possible after the accidental exposure. The medications are usually taken for about one month.
- E. On return of the laboratory tests, the physician concerned will notify and counsel the employee. If results are positive, the physician will notify the appropriate authority at WCB to establish the employee's right for compensation.
- F. If the results are negative, the employee goes to his own personal physician for testing at three, at six, and at 12 months, using the same procedure. On each occasion, the employee must have both pre and post test counseling.
- G. Report the incident to the supervisor for documentation on the [Supervisor's Incident Investigation Report](#) form, WCB forms and the First Aid Record.

Non-occupational exposure to HIV or any matters pertaining to AIDS and HIV will be dealt with by departments on an individual basis.

APPENDIX VII: INFECTIOUS DISEASES AND OCCUPATIONS

DISEASES	EMPLOYEES AT RISK	MODE OF EXPOSURE
Bacterial Disease		
Anthrax	Hide processors, butchers, agricultural workers, veterinarians.	Direct contact through breaks in skin; occasionally through inhalation.
Brucellosis	Meat processing and livestock industry workers, veterinarians.	Direct contact with infected animals or their products.
Erysipelothrix	Meat processing and fishing industry workers.	Direct contact through breaks in skin; organism present in slime layer on fish and in infected swine.
Leptospirosis	Meat processing, agricultural, sewer and farm workers; veterinarians and miners.	Contact with infected animals and their excreta deposited in soil, mud, water; bites of rodents or dogs.
Tuberculosis	Medical students, physicians, nurses, laboratory personnel. Those who work with tuberculosis infected animals.	Inhalation.
Tularemia	Hunters, trappers, packing house workers; farmers, veterinarians.	Exposure to infected animals or bites of infected fleas, flies, ticks, or lice.
Chlamydial and Rickettsial Infections		
Ornithosis	Poultry processing plant, pet bird industry, and laboratory workers; poultry producers, pet bird owners, and veterinarians.	Inhalation of infected, dried bird feces; direct contact with infected birds.
Q fever	Meat processing, livestock industry, dairy and laboratory workers, veterinarians, farmers.	Airborne; direct contact with infected animals or their by-products or ingestion of un-pasteurized dairy products.
Fungal Diseases		
Histoplasmosis	Farmers, construction workers.	Inhalation.
Sporotrichosis	Farmers, horticulturists.	Direct inoculation.
Parasitic Diseases		
Echinococcosis	Ranchers, especially sheep herders, veterinarians.	Ingestion of parasite's eggs following contact with canine feces.
Toxoplasmosis	Butchers, meat processing and laboratory workers; veterinarians, pet store owners, and cat breeders, dealers and owners.	Contact with infected animals; ingestion of parasite eggs passed in feline feces or ingestion of cyst-infected, undercooked meat.
Viral Diseases		
Creutzfeldt-Jakob	Pathologists, surgeons, phlebotomists (people who take blood samples), handle human or sheep brain and/or nerve tissue, laboratory personnel, autopsy room cleaners, morticians.	Unknown, probably by direct skin contact or ingestion of infected food.
Rabies	Animal control officers, veterinarians, hunters, trappers, professional animal handlers, spelunkers (people who explore and study caves).	Direct inoculation by bite; rarely by inhalation.

DISEASES	EMPLOYEES AT RISK	MODE OF EXPOSURE
Human Diseases		
Hepatitis B (HBV) Hepatitis A Hepatitis C Human Immunodeficiency Virus (HIV)	Workers in hemodialysis units, physicians, surgeons, laboratory workers, dentists, hospital housekeeping staff. Tattoo and body piercing parlours, barbers.	Direct contact with infected blood and body fluids by puncture, through abraded skin, or onto mucous membrane surfaces.
Tetanus	Workers in contact with soils, groundwater, refuse, sewage or animals; others with greater than usual risk of traumatic injury; trades personnel subject to cuts and puncture wounds.	Enters body through broken skin, particularly puncture wounds.
Diphtheria	Health care workers. Employees on overseas assignments.	Contact with a patient or carrier, or rarely with articles soiled with discharges from lesion of infected persons; raw milk.
Polio myelitis (not occurred in Canada in recent years)	Health care workers. Laboratory workers handling specimens which may contain polio virus. Employees on assignments to developing countries.	Direct person-to-person contact.
Rubella (German measles)	Female employees in child bearing years who are at risk of contact, such as health care, child care, educational and other institution workers; social workers.	Droplet spread or direct contact with patient or indirect contact with infected articles.
Measles (Red Measles)	Institutional staff in contact with residents/patients, and who were born after 1956 and have no documented history of measles or vaccination with live measles vaccine.	Droplet spread or direct contact with secretion of infected person; airborne spread.
Typhoid	Laboratory workers doing reference enteric microbiology.	Food or water contaminated by feces or urine of a patient or carrier.
Influenza	Health care personnel and Institutional staff. All staff.	Direct contact through droplet infection.
Severe Acute Respiratory Syndrome (SARS)	Health care personnel, Institutional staff and all who travel where SARS has been identified.	Direct contact through droplet infection. Indirect contact through environment. Possibly airborne.
West Nile Virus	Outdoor workers. All staff.	Enters body through bite from infected mosquitos.

NOTE: Frequency of immunization, clarification or questions regarding other communicable diseases and recommended immunization including requirements for overseas assignments may be directed to personal physicians, the Local Public Health Authority or Workplace Health, Personnel Administration Office.

APPENDIX VIII: RABIES

1. Mode Of Transmission

The rabies virus is transmitted through infected saliva and blood. Humans are infected through bites or scratches by rabid animals.

2. Occupational Groups At Risk

Employee groups at risk of exposure include the following:

- A. Veterinarians
- B. Animal handlers
- C. Certain laboratory workers
- D. Those in contact with wildlife

3. Preventive Measures

Ministries

Prepare a written hazard assessment of work sites to identify existing or potential hazards and take measures to eliminate or control hazards.

Identify employees who are at risk of exposure.

Establish and regularly review written policies and procedures.

Provide training before employee begins work and when changes are made that affect exposure. Verify training was provided before placing employee where exposure may occur.

Ensure first aid and medical attention is available to the employee.

Employees

Participate in hazard assessment and control as well as training on biohazardous material, controls and procedures.

Follow precautions and procedures to minimize the risk of infection.

The rabies vaccine is available free of charge through the local Public Health Centre. For pre-exposure immunization, it is necessary to make appointments in advance. If possible, employees should attend in groups since one vaccine vial immunizes several people. The vaccine is expensive and open vials are discarded if not used within 24 hours.

Employees at risk of exposure should have the following:

- An initial series of three injections (day 0, 7, and 21) of human diploid cell rabies vaccine.
- A rabies antibody titre blood test every 2 years and a booster dose should be given if the titre is less than 1:32.

Post Exposure Prophylaxis

- If the person has a documented positive titre following immunization, two booster doses should be given if exposed to a proven rabid animal.
- In certain circumstances, a series of 5 doses of rabies vaccine is given at day 0, 3, 7, 14, and 28 after exposure. In addition to the vaccine Rabies Immune Globulin (RIG) is given on day 0. For maximum protection, the rabies vaccine should be given exactly as recommended.

4. Action Following Possible Exposure

- A. When a bite or scratch is evident, wash the area thoroughly with soap and water.
- B. The employee goes IMMEDIATELY to a medical facility for assessment and treatment (above).
- C. Collect suspect animals carefully. Ship to one of the following locations:
 - Agriculture Canada
 - Fish and Wildlife Officer, Alberta Sustainable Resources Development
 - Veterinary Practitioner
 - Police

Use Agriculture Canada's containers to prevent direct contact and to avoid damaging the brain.

- D. Report the incident to the supervisor for investigation and documentation on the [Supervisor's Incident Investigation Report](#) form, WCB forms and the First Aid Record.

APPENDIX IX: TUBERCULOSIS

1. Mode Of Transmission

Tuberculosis is spread by an infectious person who coughs or sneezes or by the aerosolization of the tubercle bacillus. Tuberculosis can affect any part of the body, but most commonly affects the lungs.

2. Occupational Groups At Risk

Employees at risk of exposure are those who work with the following populations:

- A. Persons who have respiratory symptoms, especially aboriginal persons, the homeless or those born in tuberculosis endemic areas outside Canada.
- B. Individuals in residential settings such as Correctional Institutions, Youth Assessment Centers, Remand Centers and in any long stay residences.
- C. Tuberculosis infected animals or carcasses.

3. Preventive Measures

Ministries

Prepare a written hazard assessment of work sites to identify existing or potential hazards and take measures to eliminate or control hazards.

Identify employees who are at risk of exposure.

Establish and regularly review written policies and procedures.

Provide training before employees begin work and when changes that affect exposure are made.

Ensure first aid and medical attention is available to the employee.

Employees

Participate in hazard assessment and control as well as training on biohazardous material, controls and procedures.

Follow precautions and procedures to minimize the risk of infection.

Tuberculin Skin Tests

The purpose of the tuberculin skin test is to identify the individual who has been infected by the tubercle bacillus.

For occupational groups at risk, Alberta Health & Wellness and the Personnel Administration Office (PAO) recommend the tuberculin skin test at pre-placement.

- For employees who work with people who have respiratory symptoms: retest only after exposure or more frequently according to the risk of TB exposure in a given setting (as assessed according to the Guidelines for Preventing the Transmission of Tuberculosis in Health Care Facilities and Other Institutions).
- For long stay institutional care staff: retest after exposure.
- For employees who work with tuberculosis infected animals or carcasses: retest following documented exposure.

Medical Assessment Following Positive Skin Tests

For pre-employment screening purposes, a skin test greater than 10 mm is considered significant and may mean that infection has taken place. Approximately 10% of those infected, develop active tuberculosis.

Notify the TB Coordinator from the appropriate regional health authority when employees have significant reactions because they may need preventive treatment with drugs. The regional TB Coordinator will assist with arrangements for any necessary follow-up.

This includes those with significant tuberculin skin tests AND who also meet the following conditions:

- Are close contacts of smear positive cases.
- Are tuberculin converters (conversion from negative to positive within 2 years).
- Have lung scars suggestive of old tuberculosis and never previously treated.
- Have a serious underlying disease or immune suppression (i.e. HIV infection, sarcoidosis, malnutrition, diabetes).

4. Action Following Possible Exposure

- A. An employee who suspects exposure to tuberculosis should call the local regional health authority to arrange a tuberculin skin test and assessment. The health authority must read the test in 48 – 72 hours.
- B. If the skin test is significant, the health authority will repeat the test in three months.
- C. If the skin test is significant, the local health authority, in conjunction with Tuberculosis Control, Alberta Health & Wellness will order a sputum test and a chest x-ray. IF those tests are positive, the employee requires follow-up and treatment. See 3 (b). Clients re generally referred to their family physician for a physical examination.
- D. Report the incident to the supervisor for investigation as well as documentation on the [Supervisor's Incident Investigation Report](#) form, WCB forms and the First Aid Record.

APPENDIX X: TETANUS

1. Mode Of Transmission

The tetanus bacillus enters the body through broken skin, particularly a puncture wound that is contaminated with soil, dust or excreta.

2. Occupational Groups At Risk

Employee groups at risk of exposure include the following:

- Workers in contact with soils, groundwater, refuse, sewage, or animals.
- Enforcement personnel, i.e. fish and wildlife officers, forest officers, etc.
- Trades personnel subject to cuts and puncture wounds.
- Laboratory animal technicians who handle rodents.

3. Preventive Measures

Ministries

Prepare a written hazard assessment of work sites to identify existing or potential hazards and take measures to eliminate or control hazards.

Identify employees who are at risk of exposure.

Establish and regularly review written policies and procedures.

Provide training before employee begins work and when changes that affect exposure are made.

Ensure first aid and medical attention is available to the employee.

Employees

Participate in hazard assessment and control as well as training on biohazardous material, controls and procedures.

Follow precautions and procedures to minimize the risk of infection.

Immunization

The tetanus vaccine is available free of charge through the local Public Health Centre. After childhood immunization with tetanus vaccine, the tetanus vaccine booster is generally administered in combination with diphtheria toxoid. In Alberta, the last booster for school children is in grade 9. Boosters are recommended every 10 years for previously immunized adults.

All individuals should maintain active protection by obtaining a tetanus booster every 10 years.

4. Action Following Possible Exposure

- A. Wash the area thoroughly with soap and water.
- B. Employees who have been completely immunized and have sustained a minor or uncontaminated wound, require a booster dose of tetanus toxoid only if 10 years have lapsed since the last dose was given.
- C. Those who have not completed a full primary series of tetanus toxoid, require a dose of toxoid as soon as possible following the injury and may require passive immunization with Tetanus Immune Globulin (TIG) if the wound is a major or if it is contaminated.
- D. Report the incident to the supervisor for investigation as well as documentation on the [Supervisor's Incident Investigation Report](#) form, WCB forms and the First Aid Record.

APPENDIX XI: WEST NILE VIRUS

1. Mode Of Transmission

West Nile Virus is a mosquito borne virus that can cause a range of symptoms of varying severity in humans. Mosquitos transmit the virus to humans after becoming infected by feeding on the blood of birds, which carry the virus. Transmission occurs mostly during warm weather when mosquito populations are active.

2. Occupational Groups At Risk

Employee groups at risk of exposure to West Nile include the following:

- A. Employees who work outdoors: fish and wildlife officers, forest officers, agricultural workers, etc.
- B. Health care workers, laboratory workers, public safety personnel. Sharps contaminated with blood and body fluids are sources of infection.
- C. All employees.

3. Preventive Measures

Ministries

Prepare a written hazard assessment of work sites to identify existing or potential hazards and take measures to eliminate or control hazards.

Identify employees who are at risk of exposure.

Establish and regularly review written policies, procedures and plans outlining hazard communication (transmission, symptoms, actions, control measures).

Provide training before employee begins work and when changes that affect exposures are made.

Employees

Participate in hazard assessment and control as well as training on biohazardous materials, controls and procedures.

Follow precautions and procedures to minimize infection:

- Consider staying indoors during peak mosquito biting periods (dawn, dusk and early evenings).
- Wear long sleeved shirts, pants and a hat when outdoors. Light coloured clothing is best.
- Use mosquito repellent containing DEET or other approved ingredients on exposed skin: apply to clothing as well, because mosquitos may bit through fabric.

- Repair window and door screens so mosquitos cannot get indoors.
- Adult females of some mosquito species will lay their eggs in shallow pools of warm, sunlit standing water. Take steps to prevent this on property.

Action Following Possible Exposure

Report the incident to the supervisor for investigation as well as documentation on the [Supervisor's Incident Investigation Report](#) form, WCB forms and the First Aid Record.

Contact your personal physician. Employees who develop a serious infection may need to be hospitalized.

APPENDIX XII: SAMPLE OF INFECTIOUS SUBSTANCE SHIPPING DOCUMENT

DATE: _____	DOCUMENT NUMBER: _____
SHIPPER:	SHIP TO:
Name: _____	Name: _____
Address: _____	Address: _____
_____	_____
_____	_____
Carrier's Name: _____	

DG	Shipping Name*	Class	PIN	Packing Group	Mass or Volume	Number of Pieces

* Indicate the name of the organism or the word "Diagnostic Specimen" in parentheses whichever is applicable.

Emergency Information

Shipper's 24 Hour Emergency Telephone Number: _____
SUMMARY OF EMERGENCY PLAN
Plan Reference Number: _____
Plan Activation Telephone Number: _____
If package damaged, immediately telephone CANUTEC (613) 996-6666.

Permit Number (if applicable): _____

Shipper's Signature or Mark: _____