

The University of Western Ontario

Level 3  
Biohazard Containment Facility  
Users Manual  
And  
Standard Operational Procedures



Occupational Health and Safety  
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# The University of Western Ontario

## Level 3 Biohazard Containment Facility

### Standard Operating Procedures and Users Manual

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## Biohazard Containment Facility

### **1.0 Introduction**

Level 3 Biohazard laboratories are unique laboratory facilities, which are designed and built to provide a safe environment for conducting research involving biological agents classified by Health Canada as requiring Containment Level 3. Containment is provided at the primary level by biological safety cabinets and at the secondary level by specially engineered features of ventilation design and facility construction.

The safe operation of the facility depends not only on the design requirements but also on strict adherence to the operating protocols and procedures outlined in this document. Only specially trained personnel authorized by the University Biohazards Subcommittee can work in the Level 3 facility.

This Users Manual contains information on access control, personnel training, medical surveillance and emergency response as well as Standard Operating Procedures for the conduct of research and waste disposal.

The following guidelines are adapted from the Public Health Agency of Canada, "Laboratory Biosafety Guidelines" 3<sup>rd</sup> edition, 2004.

## **1.1 Description of Laboratory Work**

The Level 3 Biohazard Facility at the University of Western Ontario is used by research groups working with HIV positive blood, cultured HIV and HTLV I and II, as well as for recombinant viruses containing significant genetic components of these pathogens. The viruses are cultured under Level 3 containment conditions and used in studies exploring drug sensitivity or vaccine development.

The research is essentially small scale; much less than 10 litres of cultured agent at any given time is used for experimental protocols. Occasional experimental procedures may require growth of up to 1000 mLs of infected cells. Viral culture work is performed only in rooms 6004 and 6006.

DNA, RNA and protein preparations are made from viruses or infected cells using standard extraction procedures. These extracted and decontaminated materials are then removed from the Level 3 facility for further investigations in biochemical laboratories.

There is no animal model for HIV currently in use at UWO but live HTLV may be used as a challenge to verify experimental development of the immunological properties of HTLV cellular components. Recombinant viruses such as Adenovirus and Pox viruses may be engineered to carry genes for proteins involved in the development of immunity to HIV or HTLV. This experimental work will require immunological challenge with live viruses. Level 3 animal work may be performed in room 6010A only. There is a Level 2 plus animal project involving lentiviral vectors in room 6009. The animal work in this facility involves rodents.

### **1.1.1 Level 3 Agents Stored/Handled**

In this facility, the Level 3 agents used are HIV and HTLV I and HTLV II.

## **1.2 Description of the Level 3 Containment Area**

The facility is located on the sixth floor of the Dental Sciences Building and is within the secured area of the Health Sciences Animal Care Facility. See Floor Plan, Appendix 7.

The Laboratory is kept locked – consistent with local fire and safety regulations. Only people who are authorized and have duties to perform are allowed entry to the Level 3 laboratory facilities.

By design, air flows into the laboratory and never in the reverse direction. The facility is maintained at negative pressure with respect to the surrounding areas.

### **7.1 Policy on late work and work on weekends and holidays:**

Because rapid access to an infectious disease physician cannot be guaranteed at the hospital emergency department The University Biosafety Committee has decided that work with live virus in the Level 3 facility be conducted ONLY during regular work hours when emergency medical coverage is provided by the University Workplace Health.(8:30 am- 4:30 pm Monday to Friday)

If late work is unavoidable, the Biosafety Officer and the University Occupational Health Physician (or alternate) must be notified as soon as possible and no later than noon on the day for late work. Special arrangements for occupational health coverage will be made if possible.

If special arrangements are not possible, late work in the facility will not be allowed.

#### 12.8.2 First Aid

Wash the exposed area immediately for 10 minutes with soap and water. Cleanse puncture wounds or cuts as thoroughly as possible. Use the scrub brushes provided at each sink.

- If skin penetration has occurred encourage bleeding by massaging the surrounding area to express blood.
- If wound/skin contamination is on the hand, remove the gloves on the affected hand. Remove outer glove on unaffected hand or hands and reglove for administration of first-aid treatment.

If required, there are first aid boxes in room 6005 and 6011. These contain band aids and gauze to stop bleeding (see Appendix 2).

For mouth or eye splashes, rinse in eye wash or sink for 10 minutes.

Contact Workplace Health, University Community Centre room 25 (x85471) as soon as possible for follow up.

Leave facility in the usual way as outlined in Exit from Facility Upon Completion of Work (Section 5.6) and go to Workplace Health.

#### 12.8.3 Immediate Communication with Occupational Health Services

All employees must report the accident IMMEDIATELY on completion of First Aid procedures to UWO Workplace Health or have a co-worker report the incident while First Aid procedures are underway. The performance of First Aid procedures should be the first priority. Use the phone nearest to the accident site.

Workplace Health will immediately notify the Occupational Health Physician who will be available for counselling and follow-up care.

Location of Level 3 Phones: Room 6005  
Hallway outside room 6011

Workplace Health: ext. 85471

The Supervisor of the injured person must be notified as soon as possible about the accident so that an accident investigation can be conducted.

Exit from facility and go directly to Workplace Health – University Community Centre room 25.

Follow standard Exit procedures.

Go immediately to Workplace Health in University Community Centre room 25.

Identify yourself to the Workplace Health receptionist who will immediately arrange for consultation with the Occupational Health Physician.

The Workplace Health Physician will determine, in collaboration with the patient, an appropriate course of management and will arrange for the collection of a blood sample and provision of post-exposure drug therapy as indicated.

Medical history and accident particulars will be collected by the Workplace Health physician during counselling or by the Workplace Health nurse afterwards.

Follow-up medical appointments will be arranged by discussion between the Workplace Health physician and the injured person.

#### 12.8.4 Policy for Late Work in the Level 3 Facility

Work in the Level 3 Facility with live virus, virus infected clinical specimens or virus infected animals may only be conducted Monday – Friday 8:00am – 4:00pm, in order to ensure emergency access to the Occupational Health Physician and rapid prescription of triple therapy drug treatment if required.

If late work in the Level 3 facility is unavoidable due to late arrival of clinical specimens, the Occupational Health Physician must be notified (no later than 12:00 noon of the work day) and late work arrangements may be made, at the discretion of the Workplace Health Physician, up to 8:00pm. These arrangements must be confirmed by FAX from Workplace Health to the Principal Investigator in the Level 3 facility. The BSO must also be notified.

If late work arrangements for Occupational Health coverage cannot be made, late work with infectious materials in the facility will not be allowed.

#### 12.8.5 Workplace health Policy on HIV Exposure for Level 3 staff

The University of Western Ontario  
Workplace Health

Date: May 24, 1999  
Subject: HIV Exposure for Level 3 Staff (revised from September 27, 1997)  
Objective: To provide an immediate and efficient response to individuals who have sustained accidental exposure to HIV in an occupational setting.

12.8.5.1 Procedure:

Immediate Wound Care:

Please follow standard operating procedures for cutaneous. After these measures, a clean, dry dressing should be applied and the individual should report immediately for further assessment as follows:

Call or have another staff member Call Workplace Health

Reception Desk – 661-2047 or extension 82047

Medical Secretary – 679-2111 ext. 85471

Tell the Receptionist that you are a Level 3 Staff member and have been exposed to HIV. You will be advised of how to proceed.

Upon arrival at Workplace Health the staff member will be referred immediately by the receptionist to a staff nurse. The receptionist will also immediately notify the medical secretary.

The staff nurse will respond immediately to the injured individual and will obtain and enter particulars of the individual's demographics, history of the accident, past immunization history and significant past medical history. The nurse will provide reassurance to the injured individual to allay their anxiety associated with their injury.

The staff nurse will immediately refer the patient to an SHS staff physician or the Director of Student/Workplace Health for further assessment and management. In the absence of the Director, the patient will be referred to an available SHS staff Physician. In the absence of an SHS staff physician the patient will be sent immediately to the Emergency Department of University Hospital. The nurse will provide the patient with a copy of the chart entry and will contact the emergency physician to advice of the direct referral.

The Director or staff physician will determine, in collaboration with the patient, an appropriate course of management and will arrange for the collection of laboratory specimens and the provision of medications as indicated. The Director will provide for the ongoing monitoring and counseling of the individual and when indicated will seek consultation with an appropriate consultant. The Director will initiate the appropriate documentation of the incident/accident.

#### 12.8.5.2 First Aid

Wash the exposed area immediately for 5 minutes with soap and water. Cleanse puncture wounds or cuts as thoroughly as possible. Use the scrub brushes provided at each sink. Try to induce bleeding.

If required, there are first aid boxes in room 6005 and 6011. These contain band aids and cotton to stop bleeding.

For mouth or eye splashes, rinse in eye wash or sink for 10 minutes.

Contact Workplace Health, University Community Centre room 25 (ext 85471) as soon as possible for follow up.

Leave facility in the usual way as outlined in section II D and go to Workplace Health.

After regular hours, holidays and weekends go to LHSC-University Hospital Emergency Department for follow up.

Since unavoidable delays may be encountered at the hospital Emergency Department, work with live virus in the Level 3 facility may be conducted ONLY during regular work hours when emergency medical coverage is provided by the university Workplace Health. If late work is unavoidable, the Biosafety Officer and the University Occupational Health Physician must be notified as soon as possible and special arrangements for occupational health coverage will be made if possible.

If special arrangements are not possible, late work in the facility will not be allowed.

## **12.9 Medical Emergencies**

It is always recommended to work in the Level 3 facility with a colleague, not alone. In case of a medical emergency, such as loss of consciousness, notify campus police by calling 911 from a phone in the facility or by pressing one of the buttons. Give as much information as possible to the operator.

The Hazmat team will be notified to manage the hazard and remove the patient from the facility as required for medical care. No emergency personnel, such as paramedics, can enter the facility without the permission of the HAZMAT Team Leader.

## **12.10 Animal Escape**

Rodents kept in microisolators rarely escape from the biological safety cabinets. If they do escape, they can be easily be corralled into a corner.

## **12.11 Accident Reporting Procedures**

After First Aid has been completed call Workplace Health and inform them of the incident and ask to see the Occupational Health Physician immediately for counseling.

Notify the Principal Investigator and Biosafety Officer as soon as possible after any incident which may have resulted in a personal exposure to infectious agent.

The Principal Investigator must complete and send the University Accident Report Form as soon as possible.

The University Accident/Incident Report Form (AIIR) can be found at [www.uwo.ca/humanresources](http://www.uwo.ca/humanresources).

The Principal Investigator and Biosafety Officer conduct an investigation into the accident/incident and reviewed by the Occupational Health Physician. Recommendations for accident prevention must be made if possible. The Safety Officer of an affiliated institute will also be involved in an accident investigation, which involved an employee from that institution.

Where appropriate, details of the accident / incident will be communicated to facility users. Incidents and accidents may be used as training tools for faculty, staff, and students.

## **13.0 Works Cited**

1. Public Health Agency of Canada, Laboratory Biosafety Guidelines, 3<sup>rd</sup> edition, 2004

## Appendix 1

### Composition of Spill Respose Kit and Tool Kit in Level 3 Facility

#### Spill Kit

- Dust pan & small broom
- Paper towel (1 roll)
- Absorbing pads
- Sponges
- Nitrile Gloves
- Rubber Gloves
- Heavy duty plastic bags
- Garbage bags
- Absorbing boom
- Masking Tape
- Scissors
- Metal tonguw
- Bleak
- Bucket
- Roll of yellow/black caution tape
- Tyvek suit
- Empty spray bottle
- Spray bottle containing Wescodyne and Alcohol (1/100 dilution)

#### Tool Box

- Small set of screwdrivers
- Long nose pliers
- Regular pliers
- Sharp cutoff pliers
- Utility knife
- Metric Hex Key set
- Complete set of Regular screwdrivers
- Hammer
- Hacksaw
- Hacksaw blades
- 10" Wrench
- electrical tape
- Teflon tape
- Socket set (Imp.&Metric)
- Extension cord (4M0
- Electrical multimeter (voltmeter)

## **Appendix 2**

### **Composition of First Aid Kits in Level 3 Facility**

(Supplied to Level 3 Biohazard Facility by Occupational Health and Safety  
First Aid Coordinator)

Kit Type #2: 1- 5 Employees

- 12 - Band aids
- 4 - Gauze Pads 3"x3"
- 12 - Safety pins
- 1 - Triangular bandage
- 2 - 2" Gauze rolls
- 2 - 4" Gauze rolls
- 2 - 4" Pressure Bandages
- 1 - Pairs of non-latex gloves
- 1 - Rescue shield
- 1 - Pair of Scissors
- 1 - 1st Aid Pocket Guide
- 9 - Antiseptic wipes

The Kits are inspected every month by Biosafety Officer (BSO).

### **Appendix 3**

#### **List of Supplies Provided for Use in Level 3 Facility**

- Surgical greens, pants and shirts.
- Disposable wrap around gowns
- Disposable gloves (non-sterile)
- Disposable shoe covers
- Surgical masks
- Paper towels
- Bleach (chlorine)
- Wescodyne
- Beaucoup
- Biohazard (autoclavable) bags
- Autoclavable trays for pipettes etc.
- Respirators (if required)
- Cleaning materials
- Goggles or face shields (for decontamination procedure)
- Garbage bags
- Ethyl alcohol (95%)

All other supplies are the responsibility of the research group.

Storage of laboratory supplies should be kept to a minimum in the facility, and particularly in the Level 3 areas, since these impede free air flow and make regular cleaning difficult. Only take what you need into the laboratory area for each week.

### **Appendix 9**

#### **Medical Surveillance Program**

##### **Basic Medical Surveillance Program for Level III Workers**

###### **Worker Identification:**

All new employees of the University of Western Ontario, whether full or part-time are referred to the Staff/Faculty Health Services by their immediate supervisor. This procedure is carefully observed in the L-3 facility. Together, the new worker and the worker's supervisor complete a Position Hazard Form. An example of this form is included in the following pages. The Position Hazard Form lists any and all potential hazardous exposures. The nature of each and every exposure is detailed on the form and a copy of the form is forwarded to Staff/Faculty Health Services.

## Medical Surveillance

### Pre-Employment Health Review:

Each employee presents for an initial pre-employment health review. At this review, a careful medical history is obtained and further details are gathered concerning the worker's potential exposure to workplace hazards. This includes a detailed description of any and all biohazards. A general clinical examination is carried out, and particular attention is drawn to any specific complaints of the worker. Following the physical examination, specific laboratory tests are obtained to establish baseline values. A reference serum is obtained and forwarded immediately to University hospital for freezing and storage. Each reference serum sample is entered into a database and a record of all samples is maintained at Staff/Faculty Health and at University Hospital. Other tests include: HIV titre, TB skin testing, stool for culture, ova and parasites, Rabies titre, Q-fever titre, Hepatitis B titre.

In addition to obtaining these serum samples, the worker's immunizations are updated if necessary to include a current TdP, Hep B, Rabies, and any other appropriate immunization.

### Annual Health Review:

Each year, worker's are recalled on or about the anniversary of their initial pre-employment health review. At this time, there is a comprehensive review of the worker's Position Hazard Form and any changes in the form are logged. Workers are encouraged to obtain updates of their Position Hazard Form as the need arises but the Annual Health Review provides an opportunity to do so on a regular basis. A careful history is obtained to detail again the nature of the patient's hazardous exposures. A clinical history is obtained and detailed concerning any significant health problems, which have presented over the course of the year. The patient's immunization history is reviewed and updated as necessary. Titres appropriate to the worker's specific exposures are obtained.

### Unscheduled Clinic Visits:

Workers are encouraged to return to the Staff/Faculty Health Service at any time, and particularly if they sustain an injury or exposure in the workplace. Obtaining a history and conducting a physical examination is guided by the specific nature of the injury or exposure. If a potential biological exposure has taken place, a reference serum is again obtained and in certain cases the reference serum may be forwarded to another facility for immediate analysis. Such is the case for workers exposed to bites, scratches or mucous membrane exposure to Macaque monkeys. A specific protocol has been developed for workers exposed to this particular biohazard. Please the attached detail reference.

### Documentation in the case of all worker visits to SFHS:

A clinical note is entered into the file system. All details concerning any exposure or potential exposure are logged. All testing, including the obtaining and banking the reference serum and the testing of other samples is entered into the patient's record.

### Emergency Procedures:

All workers sustaining injury by needle stick/puncture wound/or exposure to concentrated cell cultures involving HIV or HTLV1 viruses are referred to the Staff/Faculty Health Services. Specific procedures have been developed for dealing with workers who have been exposed to these agents in a prompt and effective manner. A current description of these procedures is included under the memo of October 2, 1997 "Needlestick and Puncture Wound Injuries".

The goals of these post-exposure procedures are (i) to provide immediate attention to the worker and (ii) to provide immediate access to medications or post-exposure prophylaxis (currently triple therapy as endorsed by the Centre for Disease Control (CDC). Patient information sheets and protocol information are contained in packages, which have been assembled and placed along with the medications in a central location in the Health Services complex. These packages and medications are readily accessible by the clinic physicians. The procedures guarantee that the worker will be referred within minutes to the facility. The prior organization of the information sheets and medications makes it possible to provide post-exposure prophylaxis well within the proposed two hour window for treatment. These procedures are regularly reviewed in the clinic. Presently, the in clinic response time including the dispensing of medication, obtaining of necessary samples and patient education takes place within 40 minutes of telephone notification of an exposure.

Following immediate post-exposure prophylaxis the worker returns to the clinic for follow-up on a regular basis. The initial follow-up visit is the following day. In these follow-up visits, any reaction to the medication is carefully monitored. Additional blood samples are obtained at timely intervals. There is a careful ongoing examination of the wound or exposure site and careful attention is paid to the worker's concerns and anxieties about their exposure. This ongoing monitoring of patient progress continues as long as required to obtain the necessary samples and medical data and as importantly to address the patient's anxieties and concerns. The Staff/Faculty Health Services staff, including an Occupational Health Nurse and Physician/Director, may also make use of the skills and services of infectious disease experts and other health professionals in the ongoing care for the worker.

Subject: Pre-Placement Health Assessment

Objectives: To determine that the employee's new position will not adversely effect the health of the employee.  
To carry out appropriate health teaching for any known hazards of the position.  
To obtain a good history for application of any future health care or first aid.  
To advise employee of any appropriate preventative health measures and encourage consultation between employee and family physician.

Procedure:

1. A letter outlining the objectives of Staff Faculty Health Service is given to the employee during documentation – in employee relations (exhibit a).
1. Staff Faculty Health Services receptionist has the employee complete the chart front and records the employee's height and weight and obtains a urine sample from the employee.
2. The occupational health nurse reassures the patient and explains the procedure to follow and answers any questions. The nurse explains that any information is confidential and the only information that leaves the department is if the employee is "fit", "fit with limitations" or "unfit". This information is sent to employee relations on a standard form (exhibit b)
3. The nurse completes the health assessment on the employee paying particular attention to any present or past illness that could be adversely affected by the job.
4. The nurse discusses the findings and advises the employee. If there are any negative or questionable findings the employee is referred to the consulting physician. The nurse explains the reasoning and procedure of the referral to the employee.
5. Any immediate health problems with the employee, the nurse refers the employee to the family physician and encloses a health status form with the employee's signed release of information (exhibit c).
6. If the consulting physician decides on any restrictions, he/she discusses these with the employee that day.
7. The nurse will provide healthy teaching regarding particular hazards outlines on the position hazard form (exhibit d).
8. Any hazard exposure that has an existing annual screening program, the nurse makes out appropriate forms for recall (exhibit e) and carries out appropriate tests and examinations.  
e.g. -animal handler program  
-human biohazard program.

- rabies immunization
  - designated substances
  - hepatitis B immunization
9. The nurse will advise the employee of any known preventative health measures and encourage consultation between employee and family physician.
  10. Upon completion of the preplacement health assessment the nurse completes the "Medical Department Report" (exhibit a) and sends to employee relations.

Approved:

\_\_\_\_\_  
Physician's signature

\_\_\_\_\_  
Nurse's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Date