

## University of Western Ontario: Biosafety Training

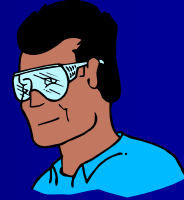
Presented by:  
Human Resources,  
Occupational Health and Safety



09/2006

## Human Resources, Occupational Health and Safety

- Biosafety
- Construction Safety
- Environmental Safety
- Laboratory Safety
- Occupational Hygiene
- Radiation Safety



## Human Resources, Occupational Health and Safety

Contact:



## Learning Objectives



- To be familiar with safety legislation
- To understand Biohazardous risks in the laboratory
- To be able to understand the difference between 4 Biological Risk Groups
- To have a good working knowledge of Containment Levels (1-4)
- To understand the application and limitations of Biological Safety Cabinets (types I, II, and III)
- To understand what to do in a spill

## Learning Objectives

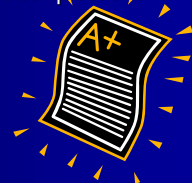


- To understand the recommended Universal Precautions techniques
- Participants will learn about UWO Sharps Management protocols
- Participants will learn the safe procedures when working with human and animal material
- To understand the risk of bloodborne pathogens
- Know who to contract if you have to transport dangerous goods
- Waste procedures

## Questions

- "Answer before course" column

First page, multiple choice questions



## Safety Legislation -The Occupational Health and Safety Act of Ontario

- Requires employers, supervisors and senior officers to take reasonable care to prevent harm to employees in the workplace.
- Both employer and worker responsibilities
- Based on the "internal responsibility system" - both workers and employers work together for health and safety in the individual workplace



## Bill C-45 - New Criminal Legislation affecting Workplace Safety

Bill C-45 establishes criminal liability for organizations and individuals when they fail to take reasonable steps to prevent workplace accidents that affect workers or the general public- conviction will result in a criminal record.

### What's New - Key Elements

- The legal duty is similar to the general duty clauses currently found in the Occupational Health and Safety Act of Ontario. However, it elevates the penalty to the of a crime with a permanent criminal record.



## Bill C-45 - New Criminal Legislation affecting Workplace Safety

### What's New (continued)

- It applies to "everyone who undertakes, or has the authority, to direct how another person does work or performs a task....". Bill C-45 extends legal duties to a new level that could potentially apply from a co-worker up to the president.
- The requirement "to prevent bodily harm to that person, or any other person, arising from that work or task" goes farther than any current OH&S legislation in Canada. Bill C-45 casts the net to include all employees as well as the public that may be affected by the work or task.



## Bill C-45 - New Criminal Legislation affecting Workplace Safety

### Practical Impact

An effective program with demonstrated clear communication helps not only to ensure compliance but helps to ensure the health and safety of employees.



The first line of defence against death and injury in the workplace remains an organization's and an individual's proactive compliance with the existing workplace health and safety regulations.

## **What is a Biohazard?**



A biohazard is a biological agent or condition that constitutes a hazard to humans, animal, plants or the environment

## **Potential Biohazards at Western**

- What biohazards do you work with?



## Potential Biohazards at Western



- Bacteria, viruses, fungi, parasites, plant or mammalian cells, including genetically modified strains
- Unfixed human tissues, blood and cell lines (*bloodborne pathogens*)
- Infected animals, carcasses and tissues
- Animals capable of carrying zoonotic diseases, their organs and tissues
- Genetically modified organisms
- All lab ware in contact with the above

## What is a Risk?

- A risk is the probability of an adverse health effect as a result of exposure to a hazardous substance.
- Risk is a function of hazard and exposure



## Personal Factors Influencing Risk

- Health Factors
  - Immunosuppression
  - Illness or disease present
  - Pregnancy
  - Allergies
- Contact Workplace Health, UCC 25, if you have concerns



## How to Assess Your Risk in the Lab

- Infectious agent?
  - Organism?
  - Pathogenicity?
  - Stability in the environment?
  - Genetically modified?
  - Well known or unknown?
  - Route of infection? (inhalation, injection, absorption, ingestion)
  - Infectious dose?
  - Medical therapy available?
  - Origin : Indigenous or imported?



## How to Assess Your Risk in the Lab

- Animals used
- Zoonotics?
- Quantity and concentration used
- Other issues (skill level, experience)



## Risk Assessment Documents



- Biosafety Manual

<http://www.uwo.ca/humanresources/biosafety>

- Laboratory Biosafety Guidelines (Health Canada)

<http://www.hc-sc.gc.ca>

- Containment Standards for Veterinary Facilities (Canadian Food Inspection Agency)

<http://www.cfia-acia.ca/english/lab/bioe/>

## What is biosafety?



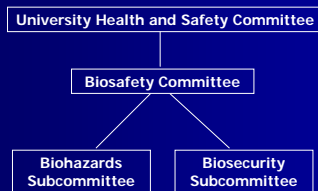
Biosafety is safety measures taken with respect to the effects of biological research on humans, animals, plants and the environment

## Biosafety Governance: outside Western

- Health Canada
- Canadian Food Inspection Agency (CFIA)
- Environment Canada, Ontario Ministry of the Environment and Energy
- Transport Canada
- Ministry of Labour
- Others



## Biosafety Governance: at Western



## Biosafety Governance in the lab

- Biosafety officer: inspections, consultations
- Supervisor: day-to-day operations



## WHMIS requirements for Biohazards



## Biological Risk Groups

- Health Canada + CFIA
- There are 4
- Lowest risk – 1
- Highest risk – 4
- Must use containment at or above the risk level



## Risk Group 1

- **Risk Group 1:** biological agents unlikely to cause disease in healthy workers or animals
- Examples:
  - non-invasive E. Coli
  - many established cell lines



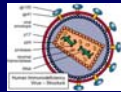
## Risk Group 2

- **Risk Group 2:** pathogens that can cause disease in humans or animals but not a serious hazard; effective treatment is available; limited risk of spread
- Example: Salmonella



## Risk Group 3

- **Risk Group 3:** pathogens that can cause serious human or animal disease but
  - do not spread by casual contact OR diseases treatable by antimicrobial or antiparasitic agents
- Examples: Rabies, HIV, tuberculosis



## Risk Group 4

- **Risk Group 4:** pathogens that produce very serious human or animal disease, often untreatable, and may be readily transmitted
- Examples: Ebola virus



## Biological Containment Levels

- Takes into account multiple factors and how organism is used in workplace
- Details PHYSICAL requirements
- Details OPERATIONAL practices



## Containment Level 1

- Containment Level (CL1)
  - No special lab design features
  - Work may be done on an open bench top.
  - Risk Group 1 agents only





## CL1 Physical Requirements include:

- No special air handling requirements
- Biological Safety Cabinet not required
- Separated from public areas by door
- Handwashing sinks
- Eyewash
- Separate hanging areas for street and lab clothes
- Windows that can be opened protected by fly screens
- Floors, walls and lab furniture must be washable



## CL1 Operational Requirements include:



- Standard microbiological techniques
- Decontamination of wastes
  - Effective disinfectants, concentrations
- Hand washing
- No eating or drinking in lab...

## Containment Level 2

- Containment Level 2 (CL2)
  - Applies to Risk Group 2 agents. Primary exposure through ingestion, injection, and mucous membranes.
  - Agents requiring CL2 are not usually transmitted by airborne route, but avoid generation of aerosols.
- Acceptable for Risk Group 1 and 2



## CL2 Physical Requirements include:

- All CL1 requirements plus:
- Centrifugation procedures must be contained
- Signage
- Doors should be self-closing
- Coat hooks for lab coats near exit
- Lab located away from public areas, general areas, patient care areas
- Floors, walls and furniture must be impervious for disinfection
- An autoclave must be in or near lab
- Inward directional airflow recommended



## CL2 Physical requirements include:

- Class II biological safety cabinets required for procedures generating aerosols
- Certified annually
- HEPA-filtered air can be re-circulated



## CL2 Operational Requirements include:

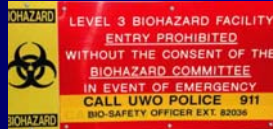
- All CL1 requirements plus:
- PPE: Gloves, lab coat, and eye protection as required
- Emergency plan (i.e. spills)
- Vacuum lines protected by HEPA filters or equivalent
- Contaminated glassware can not leave facility
- Cleaning staff aware of hazards
- Medical surveillance program as required:



<http://shsweb.shs.uwo.ca/sfhs/position.htm>

## Containment Level 3

- Containment Level (CL3)
  - Applies to research and clinical labs handling Risk Group 3 agents, can also use Risk Group 1 or 2
  - Not normally spread by casual contact or very treatable diseases



## CL3 Physical Requirements include:

- Includes CL2 requirements plus:
  - Inward directional air flow required with alarms
  - Controlled access
  - Sealed penetrations
  - Backflow prevention on utilities such as water, plumbing requirements
  - Hands free sinks
  - Windows sealable and unbreakable
  - Back-up power to critical equipment such as biological safety cabinets
  - Autoclave in facility
  - Body showers in the facility



## CL3 Operational Requirements include:

- Includes CL2 requirements plus:
  - Facility must be tested and certified annually
  - Clothing change required for entry
  - Specialized training
  - Other PPE as required (head covers, foot covers, dedicated front lab coat, respirators)
  - No personal effects



## Containment Level 4

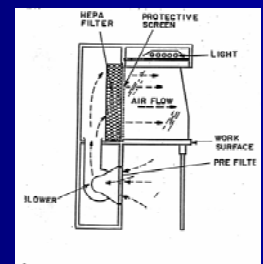
- Containment Level (CL4)
  - Is an isolated unit, sealed facility
  - Researcher wears positive pressure unit, or, contain pathogen in a class III BSC, etc.
  - Examples: Ebola virus
  - <http://www.inspection.gc.ca/english/corpaffr/newcom/2000/20000428e.shtml>

## Engineering Protection

- Clean bench
- Chemical Fume Hood
- Biological Safety Cabinets

## Clean Bench

- HEPA filtered air flow towards worker
- Provides protection for work but none for worker or environment
- NOT to be used for infectious, toxic or sensitizing material



## Chemical Fume Hood

- Offers personal protection from gases and vapors
- Ventilation is directed away from the worker
- No protection for product or environment
- No filters used and does not protect against biohazard particulates



## Biological Safety Cabinets (BSC)

- Uses HEPA filters and containment to protect worker against exposure to aerosols containing infectious agents and particulates.
- Product, worker & environment protection possible



## BSC Types

- Class 1
  - Some protection to worker and environment, no product protection. CL1, CL2, CL3 if no product protection required.
- Class 3
  - gas tight absolute containment systems offering protection to worker and environment. CL1, CL2, CL3, CL4.

## BSC Class 2

- Most common type of BSC used suitable for Risk group 1, 2, 3 agents
- Product, worker, and environmental protection
- Type A and B
- Some re-circulate air to room, not suitable for volatile chemicals, radioisotopes
- Some ducted to exhaust system, suitable for trace chemicals, radioisotopes



## BSC Safety Techniques

- Don't overload
- Locate away from doors, high traffic areas, vents
- Don't block exhaust grids
- Keep in/out movement of arms to a minimum
- Disinfect before and after use
- Window at proper level



## BSC Use and Safety

- Gas Burners are not permitted in Class II BSC. If flame is out gas build up could cause an explosion. Heat will also disrupt laminar air flow pattern breaking barrier.
- Filters must be tested and recertified annually
- Procedures for the Effective Use of Biological Safety Cabinets:  
[www.uwo.ca/humanresources](http://www.uwo.ca/humanresources)

## Biohazard Spill Control Procedure

- PROTECT people, environment property
- COVER the area with paper towel
- BLEACH
- If you and your supervisor are not comfortable handling the spill, seek help/advice



## Biohazard Spill Control Procedure

- Personal Protective Equipment
- Paper towel on liquid
- Bleach
- Put towel in biohazard bag
- Repeat
- Incinerate waste



## Biohazard Spill and Medical Emergency

- Call 911
- Personal Protective Equipment
- Lifesaving measures
- Send info with person to doctor/hospital
- Notify Supervisor



## Importing Biohazardous Agents

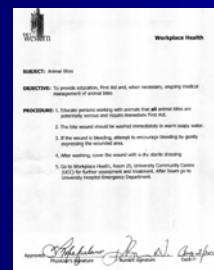


- Human Pathogens/cell lines require Health Canada import approval
- Animal Pathogens/ animal cell lines or zoonotic agents require CFIA import approval
- Transportation of Dangerous Goods requirements

## If Animals are being used:

- Animal Use Subcommittee Protocol approvals
- ACVS training on animal use

## Animal Bites: Medical Surveillance



## Universal Precautions



Occupational Health and Safety  
Human Resources

## UNIVERSAL PRECAUTIONS

- What are universal precautions?
- When are they used?



## Universal Precautions

- These are recommended physical requirements, procedural actions and precautions for safe work with human pathogenic materials or microbes in healthcare, laboratory and other work environments.
- Because the potential for infectivity of any blood and body fluids is unknown, Universal Precautions should be adhered to for all specimens regardless of evidence of infectious material.



## Universal Precautions applies to these fluids:

- Blood
- tissues
- body fluids that contain visible blood
- semen
- vaginal secretions
- cerebrospinal (brain & spinal cord)
- synovial (joint)
- pleural (lung)
- peritoneal (abdominal)
- pericardial (heart)
- amniotic
- breast milk
- Can apply to others such as feces, saliva, etc.



## Protection Techniques

- Type of barrier protection must be appropriate for the activity being performed
- It is the responsibility of supervisor staff to inform and instruct workers on the type of protective equipment required for a given situation



## 1. Hand washing

- "Handwashing is the simplest, most effective thing people can do to reduce the spread of infectious diseases"  
- Julie Gerberding, CDC
- Wash with soap and water
  - after removing gloves
  - completion of all work or procedures
  - before eating, drinking, washroom, etc.
  - if visible contamination with blood or body fluids



## Our dirty little secret...

- 2000 Study observed ~ 8,000 adults in U.S. cities
- Observed people using public restrooms
- What percentage of adults washed their hands?



## Handwashing

- 67% of adults wash their hands after using the restroom
- 75% of women, 58% of men

## Wash Up, Doc!

- Studies done from 1994-2000
- Up to 48% compliance in hospitals & ICU



## 2. Gloves

- Wear gloves if:
  - contact with blood or body fluids is expected
  - if touching mucous membranes or non-intact skin of patients is expected
  - if contact with contaminated equipment is anticipated (equipment which has been in contact with above)
- Change between clients/species
- Ensure integrity of gloves before use
- Do not reuse
- Use aseptic technique to don and remove



## 3. Eye Protection

- Mandatory in all UWO laboratories
- Safety glasses - protection of splash from the front
- Safety goggles - full protection for eyes
- Face shields - full protection for eyes, mouth and nose



## 4. Respiratory Protection

- Mandatory if risk of airborne infections
- Disposable respirator/mask
- Half face respirator and cartridges
- Full face respirator and supplied air



## Respirators: What's wrong with this picture?



## Respirator Program includes:

- Fit testing for N95 masks
- Training
- Maintenance, cleaning if required
- Variety of masks available



## 5. Protective Clothing

- Plastic aprons
- Overgowns
- Laboratory coats
- Surgical scrub suits
- Shoe covers
- Head covers
- Required in areas depending on procedures/policies of the area



## Level 2 Laboratory



## Accidental Exposures

- Needlestick injuries, cuts, abrasions
- Infected animal bites, scratches
- Mucous membrane exposure to splash, splatter or spilled infectious materials
- Skin contamination through damaged gloves
- Exposure to infectious aerosols
- Indirectly through animal bedding, contaminated surfaces

## Procedures Generating Aerosols

- Pipetting liquids
- Centrifugation
- Sonicating tissues
- Vortexing or mixing liquids
- Opening pop-top tubes
- Penetrating rubber septum vials
- Others



## Pipetting Infectious Material Safely

- Never mouth pipette
- If CL2, biological safety cabinet must be used
- Pipette must be plugged with cotton to prevent aerosol transmission
- Do not mix infectious liquid cultures by expelling air through the liquid or by alternating suction and expulsion
- Discharge pipette as close to medium as possible



## Safe Procedures for Centrifugation

- Centrifugation must be carried out in closed containers
- Well balanced
- Load the tubes into the rotor in the biosafety cabinet
- Surface disinfect the containers
- Decontaminate the centrifuge

## How do Needlestick Injuries Occur?

- Disposing of needles
  - Overfilling container
  - Emptying sharps container rather than disposing once filled
- Administering injections
- Drawing blood
- Recapping needles
- Handling trash and dirty linens
- Improper disposal in regular garbage



## Needlestick Injuries

- What diseases are you at risk of getting following a needlestick injury?
- Health hazard of a needlestick injury is transmission of more than 20 pathogens
- AIDS virus (HIV), hepatitis B virus and hepatitis C virus pose a serious risk



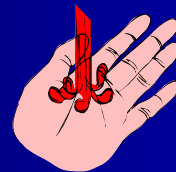
## BLOODBORNE PATHOGENS

- Bloodborne pathogens are the microorganisms that are present in human blood and can cause disease in humans.
- Blood represents a high risk of infection, however all human source material - body fluids, tissues and human cell lines, etc. can potentially transmit infection.



## Risk of infectivity with HIV, HBV and HCV

- Risk after exposure needlestick injury:
  - HBV up to 30% or 300 in 1000
  - HCV ~3% or 30 in 1000
  - HIV ~0.3% or 3 in 1000



## Human Immunodeficiency Virus (HIV)

- HIV is believed to cause AIDS, symptoms of the infection range from asymptomatic to severe immunodeficiency state
- There is no cure or immunization
- Post exposure drug treatments available (effectiveness at preventing infection unknown)
- HIV has been found in almost all body tissues, highest in blood



## Workplace transmission of HIV in Canada

- 3 reported cases of occupationally transmitted HIV in Canada\*
  - Biochemist in Ontario (1980s)
  - Quebec lab technician culturing virus (1990s)
  - Caregiver in B.C. (~ 1996)
- \*Health Canada, 1996



## Exercise 1:

- HIV in the workplace



## Transmission of HIV in the Workplace

- Cuts from contaminated sharp objects, needlestick injuries
- Bites and scratches from infected animals
- Not transmitted by casual contact
- No airborne transmission
- Risk of transmission is 0.1%
  - mucous membrane exposure to HIV (eye, nose, mouth) infected blood
  - skin exposure to HIV infected blood (greater if large area and/or damaged skin)

## Hepatitis A

- Hepatitis A (HAV):
  - transmission through fecal/oral route often through dirty water
  - Vaccine available



Liver Gall

## Hepatitis A in London, ON

- Grocery store, September, 2002
- Daycare, June, 2004



## Hepatitis B

- Hepatitis B (HBV):
  - Chronic liver disease and cancer
  - Needlestick injuries
  - Indirect transmission from surfaces
  - Splashes into mucous membranes
  - Contamination of damaged skin
  - Vaccine available
  - Post exposure treatment

## Transmission in the Workplace: Hepatitis C virus (HCV)

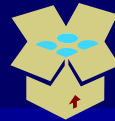
- Chronic liver disease worldwide
- Needlestick injuries are probably the most common cause of occupational HCV exposure
- No vaccine
- No effective post-exposure treatments known
- According to the CDC:
  - 1% of U.S. healthcare workers infected (1.8% in general population)
  - Occupational acquired infections unknown
  - Case reports of transmission following blood splash to eyes
  - No reports of transmission from skin exposure to blood

## UWO Medical Surveillance Program



- Administered by Workplace Health
- Position Hazard Form - to identify use of human source materials and biohazards: <http://shsweb.shs.uwo.ca/sfhs/position.htm>
- Pre-employment or new Pre-procedure check-up and immunization
- Post-exposure care and counseling

## Transportation Requirements



- Follow IATA (International Air Transport Association) or TDG (Transportation of Dangerous Goods) Regulations
- Person must have specific training to do this!
  - Classification
  - Labelling requirements & supplies
  - Documentation
  - Reporting of Dangerous Occurrences
  - Etc...
  - Contact Occupational Health and Safety

## Biohazardous Waste Disposal



## Biohazardous Waste Disposal

- Waste decontaminated before leaving the lab, then labelled & treated as regular waste
- Possible methods of decontamination
  - Chemical disinfectant
  - Autoclave
- Carcasses, sharp containers, etc. may be labelled for incineration
- Course on Laboratory Waste Disposal

## Biomedical Waste Disposal Requirements at UWO - Step 1

- Refer to UWO "Hazardous Waste Management Manual"
- [www.uwo.ca/humanresources](http://www.uwo.ca/humanresources)

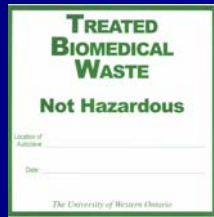


## Biomedical Waste Disposal Requirements at UWO – Step 2

- Decontaminate waste
- Validated decontamination
- Record of decontamination process

## Biomedical Waste Disposal Requirements at UWO - Step 3

- After decontamination appropriately packaged wastes may enter regular garbage stream.
- Bags of waste must be placed into a plastic bag and sealed
- Bags must be labeled as 'Treated Biomedical Waste'



## Decontamination by Incineration



### The following **MUST** be Decontaminated by Incineration

- Human tissues and organs
- Animal carcasses, animal wastes if animal is infected
- Animal carcasses and wastes if hazard of zoonotic infection exists
- Sharps excluding glass (ie. Syringes, scalpels, etc.)
- Biomedical waste from buildings on campus which do not have an autoclave

## Decontamination by Incineration

### Preparation for delivery to incinerator....

- Bag and seal waste in the lab
- Bags must be labeled as 'WASTE MATERIAL FOR INCINERATION'
- Place coloured (red/orange/yellow/blue) incinerator classification tape on outside of bag
- Take to MSB cold room, 6<sup>th</sup> floor for disposal



CLASSIFICATION FOR ON SITE WASTE DISPOSAL BY INCINERATION

WASTE MATERIAL	TAPE COLOUR	WASTE CLASS	DISPOSAL MED/SCI DBB	DISPOSAL OTHER AREAS
HUMAN ANATOMICAL PLUS SWABS ETC IN CONTACT WITH ABOVE	RED	A1	SPECIAL ARRANGEMENTS	SUBMIT TO HAZARDOUS WASTE COLLECTION SERVICE
INFECTED ANIMAL CARCASSES AND ANATOMICAL WASTES, BEDDING, AND LAB WARE IN CONTACT WITH ABOVE	ORANGE	A2	TAKE TO ROOM MSB 605	SUBMIT TO HAZARDOUS WASTE COLLECTION SERVICE
NONHAZARDOUS LAB WASTES NOT AUTOCLAVED NON ANATOMICAL PLASTIC AND PAPER NO GLASS	YELLOW	A3	TAKE TO DBB RM 6039	SUBMIT TO HAZARDOUS WASTE COLLECTION SERVICE
SHARPS IN CONTAINERS, NO GLASS	YELLOW	A3	TAKE TO DBB RM 6039	SUBMIT TO HAZARDOUS WASTE COLLECTION SERVICE
NON INFECTED ANIMAL CARCASSES AND ANATOMICAL WASTE	BLUE	B1	TAKE TO MSB RM 510A	SUBMIT TO HAZARDOUS WASTE COLLECTION SERVICE

## Decontamination by Autoclaving

- Follow Standard Operating Procedures
- Ensure you understand how the autoclave operates. Must have hands on, autoclave specific training by department.
- 'STANDARD OPERATING PROCEDURES FOR AUTOCLAVING' available from OHS
- Must post contact name for each autoclave in case of problem and/or operating concerns.

**Standard Operating Procedures for Autoclaving**

Health Services, Occupational Health & Safety  
University of Western Ontario, October 2003

**DO NOT** autoclave liquids containing bleach, formalin, or glutaraldehyde

- CHECK THAT JACKET TEMPERATURE HAS REACHED 121 C**
- CHECK CYCLE TYPE:** Liquids or dry goods? Liquids must allow venting to avoid drying. Do not process dry goods with liquid
- SET CYCLE TIME OR SELECT PRE-SET CYCLE:** (previously verified by biological ampoules)
- LOAD AUTOCLAVE CORRECTLY:** Liquids contained MUST be inside a container to hold entire contents. Bag MUST be placed in a plastic bag. Bags should be loosely sealed or open.
- CLOSE AUTOCLAVE DOOR:** Ensure that safety interlocks engage; firmly - do not wrench.
- START CYCLE:** Wait until autoclave reaches 121 C. The autoclave may then be left unattended until the end of the cycle if door is locking secure, shut cycle to close and replace door further.
- AT COMPLETION OF CYCLE:** Ensure that the pressure in the chamber is zero before opening door. Slowly release door and lower metal arms slowly. Crack door open and wait for steam to dissipate before opening door wide. Use CAUTION when removing liquid. Ensure that the liquid have cooled so that bumping does not occur.
- SPILLS AND BREAKAGE IN THE AUTOCLAVE:** Remove any remaining spill or broken items before disposal.

Departmental Autoclave Contact: \_\_\_\_\_ UWO Est.: \_\_\_\_\_

## Validation of Autoclave Cycle Time

- Tests using biological indicator ampoules to prove that autoclaving has rendered the laboratory waste non-hazardous must be conducted on a representative load.
- Detailed instructions on UWO 'Autoclave Cycle Verification Testing using Biological Indicator Ampoules - October 2003' available from OHS@UWO.
- Waste cannot be discharged unless test negative result is obtained

**Autoclave Cycle Verification Testing Using Biological Indicator Ampoules**

Health Services, Occupational Health & Safety  
University of Western Ontario, October 2003

Test using biological indicator ampoules to prove that autoclaving has rendered the laboratory waste non-hazardous must be conducted at least every 30 days or before any waste is placed into the municipal waste stream as specified in Guidelines C, 100. Assessment techniques to be used are described in the attached table.

**INSTRUCTIONS:**

- Place ampoules in waste:** Add waste (from container in the middle of the container) Liquid waste (e.g. fluids containing highly infective agents) must be suspended in such a way that ampoules is not in the liquid.
- Autoclave wastes as per Standard Operating Procedures for Autoclaving**
- Check the Results:** After 24 hours, check for a color change in ampoules. Refer to 'Ready To Use' Chart at 55 - 59 C for 24 hours (Minimum). **Important Note:** A control ampoule (an ampoule that has not been autoclaved) MUST be included with test ampoules.
- Keeping the Records:** Document test results on Biomedical Waste Decontamination Record Sheet Provided. Save cycle printout (if available).

1.1 Negative growth in test ampoules: unclassified waste can now be discarded as non-hazardous waste.

2.1 Positive growth in test ampoules: autoclave at least 30 days to be done a run. The waste must be re-sterilized for a longer cycle time and must be re-tested with ampoules, using the procedure above, until a negative test is reached.

3.1 Control ampoules: must show positive growth. If it does not, check the upper dose of the ampoules. Re-test the waste before discarding.

## Final Disposal of Autoclaved Waste (after verification)

- Bags of waste cannot be discharged unless results indicate no growth.
- Records must be kept.
- Bags must be stored in appropriate place until test completed.
- Place validated autoclave bags into garbage bags and seal with tape.
- Label as 'Treated Biomedical Waste'
- Place in garbage.



## Chemical Disinfection: Step 1

- Choose valid disinfectant



## Disinfectants

- **Guarg®**
- liquid pine disinfectant cleaner • sanitizer • deodorizer
- DISINFECTANTS - DIN
- Excellent for PREVENTING AND DESTROYING ODOURS caused by the growth of bacteria, mold, mildew and fungi. A fresh pine odour permeates the area as it cleans. Truly a unique, broad spectrum disinfectant cleaner - sanitizer - deodorizer. Specifically designed to kill the following organisms: Staphylococcus aureus - Pseudomonas aeruginosa - Salmonella choleraesuis - Aspergillus niger - Salmonella typhi - Escherichia coli - Trichophyton interdigitale - Streptococcus faecalis - Salmonella Schottmuelleri - Klebsiella pneumoniae - Proteus mirabilis - Enterobacter aerogenes - Shigella flexneri - Bacillus cereus - Brevibacterium ammoniagenes - Herpes simplex - Vaccinia - Influenza A2 (Honn-Kong 68)



## Chemical Disinfection: Step 2

- Disinfectant must be proven to be effective against organism or cells in use
- Correct dilution must be used
- Allow sufficient contact time
- Disinfectants are not as effective in presence of heavy soil or protein

## When to Use a Chemical Disinfectant

- To decontaminate growth medium at CL1
- To decontaminate pipettes before disposal or reuse
- To decontaminate equipment that cannot be autoclaved
- Liquid wastes

## Exercise 2:

- Case Study



## Helpful documents & Information

- Website: [www.uwo.ca/humanresources](http://www.uwo.ca/humanresources)
  - [Procedures for the Effective Use of Biological Safety Cabinets](#)
  - [Containment Level 1 Safety Practices](#)
  - [Containment Level 2 Safety Practices](#)
  - [Biohazardous Agents Report Form](#)
  - [Biosafety manual](#)



## UWO Biosafety Program Components

- Biosafety Database
- Laboratory Biosafety Manual
- Containment Level 2 and 3 Inspections & Permits
- Animal Use Subcommittee Safety Forms & Biohazardous Agents Registry Forms
- Purchasing
- Biohazardous Waste Management
- Medical Surveillance
- Biosecurity Plan
- Training



## Summary

- Know risk of biohazard you are working with
- Treat all material as if infectious
- Use appropriate containment level
- Assume accidents will occur and plan for managing the events safely
- Use appropriate disinfectants
- Medical surveillance
- Follow regulations/procedures



## Additional Information

- Biosafety web site  
<http://www.uwo.ca/humanresources/biosafety>
- Health Canada <http://www.hc-sc.gc.ca>
- Canadian Food Inspection Agency (CFIA)  
<http://www.cfia-acia.ca/english/lab/bioe/>

## Personal Action Plan



- Check out our website for information & courses available
- Location of first aid kit & contact
  - Mike Mosley X 84747, [scimjm@uwo.ca](mailto:scimjm@uwo.ca)
- BSC is certified
  - Jennifer Stanley X81135, [jstanle2@uwo.ca](mailto:jstanle2@uwo.ca)
- Signage on the lab door
  - Supervisor, Jennifer Stanley
- Biohazardous Agent Registry Form
  - Jennifer Stanley, Biohazardous Sub-committee
- Position Hazard Form
  - Staff/Faculty Health Services
- Location of MSDS
  - Supervisor
- Spill Kit or Bite Kit location
  - Supervisor, OHS

## Biosafety training test

- Wait 3 days
- Open book
- WebCT (UWO)
  - <https://vista.uwo.ca/webct/cobaltMainFrame.dowebct>
- Print off certificate



## Questions and Discussion

