IMPLEMENTATION

## 3.14 BIOLOGICAL SAFETY MANAGEMENT

### 3.14.1 Objective

- To ensure that biological materials are managed safely and in accordance with this process.
- To meet the requirements of the Health, Safety and Wellbeing (HSW) Policy and relevant sections of the Occupational Health, Safety and Welfare legislation.

### 3.14.2 Scope

- This process is applicable to all persons who undertake University of Adelaide related activities, use University of Adelaide facilities and/or are employed or engaged by the University. This includes but is not limited to employees, title holders, volunteers, students, visitors or third parties engaged by the University under a contract of service or contract for service (e.g. contractors) where applicable.

Exclusions

This process does not include requirements for

(1) Australian Quarantine & Inspection Service (AQIS), gene technology or Security Sensitive Biological Agents. Contact Ethics and Compliance in Research Branch for advice.

(2) Where staff or students have an infectious or communicable disease. Further information is available in the Infectious and Communicable Diseases Information Sheet at http://www.adelaide.edu.au/hr/ohs/handbook/infectious_communicable_diseases/

### 3.14.3 Process 1: Working in a laboratory, or with plants, invertebrates or soils

| Person Responsible | | Actions |
|---|---|---|
| 3.14.3.1 | Head of School/Branch (Any or all of these tasks can be delegated to School/Branch staff (e.g. local area Manager/Supervisor or Health and Safety Officer) however the Head of School/Branch must monitor the tasks on a regular basis to ensure they take place.) | ☐ Classify microorganism in accordance with Appendix A Classification of Infective Microorganisms.<br>☐ Classify containment required in accordance with Appendix B Classification of Laboratories, Practices & Procedures.<br>☐ Implement the requirements of laboratory, users and procedures in accordance with Appendix B Classification of Laboratories, Practices & Procedures Requirements. |
| 3.14.3.2 | Manager/ Supervisors | ☐ Ensure staff and students are trained and activities conducted in accordance with Appendix B PC1 Requirements, PC2 Requirements or Working with Soils as required. |

3.14.3 Process 1: Working in a laboratory, or with plants, invertebrates or soils (Continued)

| Person Responsible | Actions |
|---|---|
| 3.14.3.3 Staff, students, titleholders, volunteers | ☐ Ensure activities are conducted in accordance with Appendix B PC1 Requirements, PC2 Requirements, or Working with Soils Requirements as required. |

3.14.4 Process 2: Working with people

| Person Responsible | Actions |
|---|---|
| 3.14.4.1 Head of School/Branch (or as delegated in 3.14.3.1) | ☐ Ensure hazards are managed in accordance with Information Sheet Working with People. |
| 3.14.4.2 Manager/ Supervisors | ☐ Ensure staff and students are trained and activities conducted in accordance with the local work practices and procedures. |
| 3.14.4.3 Staff, students, titleholders, volunteers | ☐ Ensure local area (eg University or hospital if on placement) work practices and procedures are followed. |

3.14.5 Process 3: Working with animals

| Person Responsible | Actions |
|---|---|
| 3.14.5.1 Head of School/Branch (or as delegated in 3.14.3.1) | ☐ Ensure hazards are managed in accordance with Information Sheet Working with Animals. |
| 3.14.5.2 Manager/ Supervisors | ☐ Ensure staff and students are trained and activities conducted in accordance with the local work practices and procedures. |
| 3.14.5.3 Staff, students, titleholders, volunteers | ☐ Ensure local area work practices and procedures are followed. |

3.14.6 Process 4: Hazard Management

| Person Responsible | Actions |
|---|---|
| 3.14.6.1 Head of School/Branch (or as delegated in 3.14.3.1) | ☐ Ensure staff and students conducting activities where there is a potential to be exposed to infectious agents risk assess these activities using the online tool in the University's Risk Management Safety System (RMSS).<br>(If you require a username, password and instructions for this system contact RMSS Support (rmss.support@adelaide.edu.au).<br>☐ Ensure exposure is minimised to as low a level as is reasonably practicable using the highest level of control where possible. Examples of these controls are detailed in Information Sheet Biological Hazard Management.<br>☐ Ensure that controls are implemented as dictated by the risk assessment outcomes.<br>☐ Ensure that activities that have a residual risk of "very high" are not undertaken unless appropriate approvals have been obtained from the Vice Chancellor and President. See the Hazard Management process for further information.<br>☐ Ensure that risk assessments are reviewed:<br>• every five years; or<br>• where there are changes to a process; or<br>• following an incident. |
| 3.14.6.2 Manager/ Supervisors | ☐ Ensure that activities that have a residual risk of "high" are not undertaken unless appropriate approvals have been obtained from the Head of School/Branch. |
| 3.14.6.3 Staff, students, titleholders, volunteers | ☐ Ensure all activities where there is a potential to be exposed to infectious agents are risk assessed using RMSS.<br>☐ Report any assessments to your Manager/Supervisor and take necessary corrective action where required prior to commencement. For further information refer to the Information Sheet Biological Hazard Management. |

3.14.7 Process 5: Training

| Person Responsible | Actions |
|---|---|
| 3.14.7.1 Head of School/Branch (or as delegated in 3.14.3.1) | ☐ Ensure all staff and students who could potentially be exposed to infectious agents and their Managers/Supervisors, are identified on the Training Needs Analysis and attend training in accordance with the HSW Handbook process for Training Needs Analysis and HSW Training. (Courses are available on the HSW website http://www.adelaide.edu.au/hr/ohs/training/) |

3.14.7 Process 5: Training (Continued)

| Person Responsible | Actions |
|---|---|
| 3.14.7.2 Manager/ Supervisors | ☐ Ensure that all personnel are appropriately supervised until deemed proficient. |
| 3.14.7.7 Staff, students, titleholders, volunteers | ☐ Attend training on biological safety as instructed by your Manager/Supervisor. |

3.14.8 Process 6: Emergency contingencies

| Person Responsible | Actions |
|---|---|
| 3.14.8.1 Head of School/Branch (or as delegated in 3.14.3.1) | ☐ Ensure areas where staff and students could potentially be exposed to infectious agents develop, implement and test contingency plans in accordance with Appendix C Emergencies.<br>☐ Ensure areas where staff and students could potentially be exposed to infectious agents manage emergencies in accordance with Appendix C Emergencies.<br>☐ Ensure spill kits appropriate to the hazards in the area are made available and personnel are trained in their use. |
| 3.14.8.2 Staff, students, titleholders, volunteers | ☐ Ensure you are aware of the relevant emergency contingency arrangements, including the location and use of spill kits, emergency showers and first aid provisions in your area.<br>☐ Participate in any testing of emergency contingency arrangements where required.<br>☐ Refer to Appendix C Emergencies for guidance when managing a spill. |

3.14.9 Process 7: Transportation

| Person Responsible | Actions |
|---|---|
| 3.14.9.1 Head of School/Branch (or as delegated in 3.14.3.1) | ☐ Ensure staff, students, titleholders and volunteers who transport biological material do so in accordance with Appendix D Transportation |
| 3.14.9.2 Staff, students, titleholders, volunteers | ☐ Transport biological material in accordance with Appendix D Transportation. |

3.14.10 Process 8: Waste Disposal

| Person Responsible | | Actions |
|---|---|---|
| 3.14.10.1 | Head of School/Branch (or as delegated in 3.14.3.1) | ☐ Ensure staff, students, titleholders and volunteers dispose of biological or infective materials/ specimens in accordance with Appendix E Waste Disposal. |
| 3.14.10.2 | Staff, students, titleholders, volunteers | ☐ Dispose of biological or infective materials/ specimens in accordance with Appendix E Waste Disposal. |

3.14.11 Performance Measures

The HSW Team will use the performance measures listed below to assist identify areas of success and/or where corrective action is required to meet the objectives of this process. The level of compliance will be determined during the internal audit process.

| | Measure | Objective Evidence | Accountable Person(s) |
|---|---|---|---|
| 3.14.10.1 | A system for hazard management is in place. | RMSS<br>Risk Assessments in RMSS and/or hard copy. | Manager, HSW<br>Head of School/Branch |
| 3.14.10.2 | Workplace inspections include biological management. | RMSS<br>Workplace inspections in RMSS and/or hard copy | Manager, HSW<br>Head of School/Branch |
| 3.14.10.3 | All relevant personnel are training in biological management | Training Needs Analysis<br>Training attendance records | Head of School/Branch |
| 3.14.10.4 | All relevant personnel are locally trained in emergency contingencies. | Training Needs Analysis<br>Training attendance records<br>Completed contingency testing templates. | Head of School/Branch |
| 3.14.10.5 | All documents are held in accordance with this process. | Training records | Head of School/Branch |

3.14.12 Definitions

Aerosol
Suspension in air of finely dispersed solids or liquids.

Aseptic technique
The exercise of special procedures for maintaining—
(a) the sterility of equipment, media, and other materials;
(b) the purity of cultures, by eliminating accidental contamination; and
(c) protection for the operator and environment.

Biological Material, for the purpose of these guidelines includes specimens, cultures, bacteria, pathogens, viruses, fungi, infected blood products, whole animals, human and animal tissues, human and animal waste, infected (non sterilised) soil or any article that has come into contact with such material or anything discarded in the course of teaching or research that poses a health risk to a person, other research samples and the environment which may come into contact with it.

Decontamination
A physical or a chemical process which kills or removes pathogenic microorganisms, but does not necessarily result in sterility.

Infectious Agent
Any agent capable of producing infection, eg bacteria, parasites, fungi, viruses and prions existing on its own or in biological material.

Infectious microorganism
A microorganism capable of invading a susceptible host and multiplying in it, which may or may not cause a disease.

Microbiological hazard
The potential microbiological source of harm, often called a 'biohazard'.

Microorganism
Includes bacteria, parasites, fungi, viruses and prions

Pathogen
A microorganism capable of causing disease in a host.

Standard Precautions
Standard Precautions are the work practices required for the basic level of infection control when handling human blood and body fluids, secretions and excretions (excluding sweat) and for contacting non-intact skin and mucous membranes. They include the use of—
(a) good microbiological practices (e.g. aseptic techniques);
(b) good hygiene practices (particularly washing and drying hands before and after patient and specimen contact);
(c) protective barriers (including the wearing of gloves, gowns, plastic aprons, masks, eye shields and goggles);
(d) waterproof coverings over any break in skin integrity;
(e) appropriate procedures for the handling and disposal of contaminated wastes; and
(f) appropriate procedures for the handling and disposal of sharps.

3.14.12 Definitions (Continued)

Vector
An insect or other organism that transmits a pathogenic fungus, virus, bacterium, etc. Or any agent that acts as a carrier or transporter, as a virus or plasmid that conveys a genetically engineered DNA segment into a host cell.

Zoonosis
Any infectious disease that can be transmitted (in some instances, by a vector) from animals (non-human), both wild and domestic, to humans or from humans to animals (the latter is sometimes called reverse zoonosis). Many serious diseases fall under this category.

3.14.13 Useful information and resources

| | |
|---|---|
| 3.19.13.1 | University related documents and resources<br>• HSW handbook: Hazard Management<br>• HSW handbook: Training Needs Analysis and Training Plan<br>• HSW handbook: HSW Training<br>• HSW Training Program<br>• RMSS |
| 3.19.13.2 | Related Legislation<br>• Occupational Health, Safety and Welfare Act 1986.<br>• Occupational Health, Safety and Welfare Regulations 2010.<br>Approved Codes of Practice and Australian Standards "called up in the OHSW Regulations"<br>• AS 1319 (1994) Safety Signs for the Occupational Environment. |
| 3.19.13.2 | Australian Standards not "called up"<br>• Australian/New Zealand Standard AS/NZS2243.3:2002, Safety in Laboratories Part 3: Microbiological aspects and containment facilities.<br>• AS 2639<br>• Australian Code of Practice for the Care and Use of Animals for Scientific Purposes NHMRC http://www.nhmrc.gov.au/publications/synopses/ea16syn.htm |
| 3.19.13.3 | Resources<br>• SA Department of Health South Australian Infection Control Guidelines http://www.health.sa.gov.au/INFECTIONCONTROL/LinkClick.aspx?link=http%3a%2f%2fwww.health.sa.gov.au%2fINFECTIONCONTROL%2fDefault.aspx%3ftabid%3d157&mid=1095&PortalID=0<br>• American Biological Safety Association Risk Group Classification database: http://www.absa.org/riskgroups/index.html<br>• MSDSs for infectious microorganisms: http://www.phac-aspc.gc.ca/msds-ftss/index.html<br>• The Travel Doctor: http://www.traveldoctor.com.au<br>• Guidance Notes for the Transport of Class 6.2 (Infectious Substances Dangerous Goods available at http://www.infrastructure.gov.au/transport/australia/dangerous/pdf/guidnote-class62.pdf<br>• Ethics and Compliance in Research Branch http://www.adelaide.edu.au/ethics/ |

CLASSIFICATION OF INFECTIVE MICROORGANISMS

A microorganism or microbe is an organism that is microscopic (too small to be seen by the naked human eye). Microorganisms (including bacteria, parasites, fungi, viruses and prions) can be isolated from or be infecting people or animals, diagnostic specimens from people or animals or from plants or soils.

## Risk Group of Microorganisms

Microorganisms are classified into risk groups. The following four classifications of infective microorganisms are based on the pathogenicity of the agent, the mode of transmission and host range of the agent, the availability of effective preventative measures, and the availability of effective treatment:

- Risk Group 1 (low individual and community risk) - a microorganism that is unlikely to cause human, plant or animal disease (eg *Acetobactor aceti*)
- Risk Group 2 (moderate individual risk, limited community risk) - a pathogen that can cause human, plant or animal disease, but is unlikely to be a serious hazard to laboratory workers, the community, livestock, or the environment; laboratory exposures may cause serious infection, but effective treatment and preventative measures are available, and the risk of spread is limited (eg Hepatitis B).
- Risk Group 3 (high individual risk, limited community risk) - a pathogen that usually causes serious human or animal disease and may present a serious hazard to laboratory workers. It could present a risk if spread in the community, but there is usually effective preventative measures or treatment available (eg *Bacillus anthracis*).
- Risk Group 4 (high individual and community risk) - a pathogen that usually produces life-threatening human or animal disease, represents a serious hazard to laboratory workers, and is readily transmissible from one individual to another. Effective treatment and preventative measures are not usually available (eg Hendra virus).

## Determining the Risk Group

Before using a microorganism for the first time you must determine which risk group (1-4) it has been classified in.

Examples of microorganisms according to risk groups 2, 3 and 4 are available in clauses 3.2 – 3.10 in AS/NZS 2243.3:2002 Safety in laboratories - Microbiological aspects and containment facilities.

To find a microorganism's classified Risk Group, the American Biological Safety Association has a useful database at http://www.absa.org/riskgroups/index.html.

Diagnostic specimens from humans or animals would normally be regarded as Risk Group 2 (if a microorganism from a highr risk group is identified then it must be regarded as that higher risk group).

CLASSIFICATION OF LABORATORIES, PRACTICES & PROCEDURES

## What is 'physical containment'?

There are four levels of physical containment (PC1, PC2, PC3 and PC4).

Physical containment refers not only to the facilities, but also to the safety equipment, work practices and techniques, and health monitoring requirements.

## Physical containment for microorganisms

The physical containment level correlates directly with the risk group level of the microorganism (see Appendix A Classification of Infective Microorganisms for determining the risk group), ie Risk Group 1 can be used in PC1, Risk Group 2 in PC2 and so on.

## Physical containment for diagnostic specimens

Diagnostic specimens from humans or animals would normally be regarded as Risk Group 2 and must be handled at Physical Containment Level 2. If a microbial pathogen of a higher risk group is isolated from a specimen, it must be handled according to the corresponding risk group and at the appropriate physical containment level.

## Physical containment for animals

Animals inoculated with organisms from defined risk groups must be housed in containment facilities appropriate to the particular physical containment level (see AS/NZS 2242.3:2002 Section 10 for details).

## Physical Containment Requirements

As all work conducted in the University of Adelaide is conducted in PC1 or PC2 level facilities the following pages detail the appropriate requirements and recommendations for those levels including the personal protective and safety equipment, practices (including labelling and storage requirements), techniques and health monitoring procedures (see clauses 4.9 or 4.10 in AS/NZS 2243.3:2002 if PC3 or PC4 information is required).

If intending to use any material that fall into the PC3 or PC4 requirements contact the HSW Team (http://www.adelaide.edu.au/hr/ohs/contact/team/) before use.

PHYSICAL CONTAINMENT LEVEL 1 (PC1) REQUIREMENTS

A Physical Containment Level 1 facility, which requires no containment equipment, is suitable for work with microorganisms in Risk Group 1.

The following are requirements for a Physical Containment Level 1 facility:

## Personal protective clothing and equipment

a) Protective clothing to afford protection to the front part of the body is worn within the laboratory.
b) Closed footwear is worn.
c) Safety glasses, face shields and other protective devices are worn where there is a potential for splashes and other hazards to protect the eyes and face. NOTE: Contact lenses are not a form of eye protection.

## Work Practices

d) Food or drink for personal consumption is not brought into the laboratory or stored in laboratory refrigerators. Eating, drinking, smoking, shaving and the application of cosmetics is prohibited in laboratories.
e) Hands, pens and pencils, which can become contaminated from dirty surfaces, liquids and aerosols, are kept away from the face.
f) Long hair is tied back as it constitutes both a fire risk and a risk of contamination.
g) All emergency and safety equipment is kept and maintained in accordance with the manufacturer's instructions. All safety equipment remains readily accessible to the laboratory personnel at all times.
h) All work hazards are identified, assessed for their risk, and controls implemented where necessary (see Information Sheet Biological Hazard Management).
i) Mouth pipetting is not allowed.
j) Cultures are clearly identified and dated. Cultures are not stored for long periods on the bench. Transfer them to a dedicated storage area, such as a refrigerator or part of a cold room.
k) Care is taken to prevent the dissemination of material while flaming a wire loop, by drawing the loop gradually from the cooler to the hotter parts of the Bunsen burner flame, or by using a hooded or an 'electric' Bunsen burner. NOTE: Disposable loops may be used as an alternative.
l) Because airborne fungal spores can spread in a similar manner to aerosols, Petri dish cultures of fungi are sealed with laboratory stretch film to prevent dispersal of spores which may be allergenic or contaminate other cultures. NOTE: Where shedding of spores can occur, dedicated incubators should be allocated for specific use in fungal work.
m) Diagnostic kits and control sera are handled with care as the exclusion of all pathogens cannot be guaranteed.
n) Minimize the production of aerosols where work is carried out on the open bench.
o) Precautions are taken to ensure that reading and writing materials do not become contaminated.
p) Self-adhesive labels are used.
q) Spills are cleaned up immediately and the area decontaminated. (See Appendix C Emergencies)
r) Significant spills and accidents are reported immediately to the laboratory supervisor and Health and Safety Officer.
s) Work benches are decontaminated at least daily and after each task is completed.(See Information Sheet – Decontamination)
t) Specialized waste is segregated (e.g. broken glassware, biological and radioactive substances) at point of discard and dispose of according to local procedures. (See Appendix E Waste Disposal.)
u) Laboratory gowns are removed and stored in facilities provided.
v) Hands and fingernails are thoroughly washed before moving to areas outside the laboratory, e.g. lunch room or toilet.
w) Where infectious material is being injected under high pressure, Luer-lock fittings are used on disposable needles and syringes.

PHYSICAL CONTAINMENT LEVEL 1 (PC1) REQUIREMENTS (Continued)

| Laboratory Facilities |
|---|
| x) Bench tops are able to withstand heat generated by general laboratory procedures, e.g. flaming loops and heating of media.<br>y) Furniture is ergonomically suitable for use in the laboratory. The heights of laboratory stools and chairs are adjustable and commensurate with heights of the benches and safety cabinets. Seats are of smooth impervious material to facilitate cleaning.<br>z) Washbasins with potable hot and cold water services are provided inside each laboratory room, near the exit.<br>aa) Open spaces between and under benches, cabinets and equipment are accessible for cleaning. |

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PHYSICAL CONTAINMENT LEVEL 2 (PC2) REQUIREMENTS

A Physical Containment Level 2 facility is suitable for work with microorganisms in Risk Group 2 and incorporates all facilities, equipment and practices for Physical Containment Level 1; however, additional conditions of access, safety equipment and staff training requirements apply.

The following are requirements for a Physical Containment Level 2 facility:

**General**

a) A sign containing the biological hazard symbol and the level of containment, together with any access restrictions is prominently displayed near each entrance to each individual laboratory. NOTE: The signage for general infectious hazard is different from the signage for OGTR certified laboratories. (Link)

b) In large areas or whole floors designated as PC2 the safety of workers in the laboratory and visitors to the area must be maintained. Some of the issues that need to be considered are measures for restricting public access to the PC2 area, including via lifts and stairs, prohibiting eating and drinking in the entire area and mandatory training programs for all staff working in these areas.

**Personal protective clothing and equipment**

c) The protective equipment specified in PC1 laboratories is used.

d) Gloves are worn when working in a biological safety cabinet and when handling human blood and body fluids.

e) Goggles or visors are used where appropriate to protect eyes from contaminated or dangerous materials, or from ultraviolet light.

**Containment equipment**

f) When working with specimens containing microorganisms transmissible by the respiratory route or when the work produces a significant risk from aerosol production, a biological safety cabinet of Class I or Class II is used (for information see Section 1. 3. 1. 1. 1 of Biological Hazard Management).

g) When working with materials containing prions, a laminar flow cytotoxic drug safety cabinet is used.

h) A centrifuge fitted with either sealed rotors or safety cups is used where large volumes or high concentrations of infectious material are used.

**Work Practices**

i) In addition to the work practices detailed for PC1, the following work practices are observed:

j) Access to the laboratory is limited to laboratory personnel and persons specified by the laboratory management. NOTE: Laboratory doors are closed when work is in progress.

k) Laboratory personnel receive instruction and training, with regular updates, in handling pathogens.

l) Particular care is taken when using syringes and needles as needlestick injuries constitute a large portion of laboratory accidents. After use, the needle and syringe are placed in a sharps container for disposal by incineration. Sharps containers are provided at each point of use. Before disposal, needles must not be removed, bent, sheared, or replaced in a sheath or guard, unless the recapping/removal procedure can be carried out by a safe method with suitable equipment.

m) Laboratory staff advise maintenance and service personnel of the special microbiological hazards in the laboratory. Potentially contaminated surfaces are disinfected before maintenance of equipment is conducted.

n) All clinical specimens are regarded as potentially hazardous. Leaking containers are handled in a biological safety cabinet and the outside of the container disinfected. Where a replacement sample is obtainable, the leaking specimen is sterilized and discarded.

o) For manipulations such as shaking, mixing, and ultrasonic disruption, a biological safety cabinet or other equipment designed to contain the aerosol is used. A period of at least 5 min is allowed for aerosols to settle before opening homogenizer or sonicator containers in a biological safety cabinet. NOTE: Large items of equipment can interfere with the airflow pattern in a Class II biological safety cabinet and correct operation of the cabinet should be validated with the equipment in situ.

p) Any container of viable microorganisms is transported between laboratories or to pressure steam sterilisers within the building within a second unbreakable and closed container which can be readily decontaminated.

q) Potentially contaminated re-usable glassware is pressure steam sterilised or chemically disinfected prior to washing and re-use. For chemical disinfection, pipettes are placed in a disinfectant solution, tip-first and fully immersed, to minimise the production of aerosols. If pipettes are to be pressure steam sterilised, a detergent solution is acceptable.

PHYSICAL CONTAINMENT LEVEL 2 (PC2) REQUIREMENTS (Continued)

r) Microbiological waste is disposed of in accordance with Information Sheet Disposal

s) Special care is taken in handling human blood, serum, other body fluids and substances that are visibly contaminated with blood, as these may contain viruses, such as hepatitis viruses or HIV. This risk extends to human sera and derivatives used as control reagents (both positive and negative) in diagnostic and other procedures. NOTE: Although existing test methods for viruses are sensitive, they do not entirely preclude the possibility of viral contamination. The fact that a serum sample is used as a negative control for some particular test does not necessarily mean that it is free of viruses.

t) Facilities within the laboratory, separate from the work bench, are provided for reference documents and papers other than worksheets which may be used on the bench. NOTE: Separate report writing and long-term write up areas should be provided outside the laboratory.

u) A pest control program against insects, birds and animals is instituted as required.

v) Active sniffing of bacterial cultures for odours is discouraged.

w) Standard Precautions

The National Health and Medical Research Council has recommended adoption of the term 'Standard Precautions' as the basic risk minimisation strategy for handling of human blood and body fluids, secretions and excretions (excluding sweat) and for contacting non-intact skin and mucous membranes Standard Precautions are the work practices required for the basic level of infection control. They include the use of—

- good microbiological practices (e.g. aseptic techniques);
- good hygiene practices (particularly washing and drying hands before and after patient and specimen contact);
- protective barriers (including the wearing of gloves, gowns, plastic aprons, masks, eyeshields and goggles);
- waterproof coverings over any break in skin integrity;
- appropriate procedures for the handling and disposal of contaminated wastes; and
- appropriate procedures for the handling and disposal of sharps.

## Laboratory Facilities

x) A pressure steam steriliser is provided where steam sterilizing of infectious laboratory wastes is required.

y) Freezers, refrigerators or other storage units for microorganisms or recombinant or manipulated DNA material located outside the designated laboratory are posted with the biological hazard symbol (link). NOTE: Where freezers or refrigerators are used by multiple personnel, it is recommended that the names and telephone numbers (inc after-hours if appropriate) of the users are displayed on the front of the unit.

z) To facilitate decontamination, protective covers are provided for keyboards on workbenches.

aa) Containers for infectious materials and a supply of clearly labelled disinfectants for decontamination purposes are available.

bb) If setting up a new facility refer to AS/NZS 2243.3:2002 section 4.7 for details of building and emergency shower/eyewash requirements.

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WORKING IN GLASSHOUSES OR WITH SOILS

## Glasshouse and Soil Handling

As soils may contain a large variety of microorganisms which have come from a range of sources it is possible for diseases to be transmitted. Organisms of particular concern are the Tetanus bacillus which causes tetanus and Legionella pneumophila which causes Legionnaire's and Pontiac disease. Other diseases can also be spread via soil.

Legionella pneumophila and Legionella Pontiac has been associated with water (cooling towers etc), special consideration is required for hydroponics setups and any unventilated pools of water.

### Handling Soils

a) When opening bags of composted potting mix, do so slowly, making sure the opening is directed away from your face.
b) When potting plants, wet soil to reduce dust.
c) Avoid doing this work in enclosed unventilated work areas.
d) Wash your hands carefully after handling soils and gloves should be used when possible.
e) If these precautions are not practicable then you are required to wear a dust mask or respirator to reduce inhalation risk.

### Personal protective clothing for glass houses and handling soil

f) Appropriate protective clothing (for example gowns, overalls, or laboratory coats) must be worn.
g) Closed-in footwear must be worn at all times. Bare feet, thongs and sandals are prohibited.
h) Gloves must be worn.
i) Face masks are to be worn when handling soils which have not been sterilised.

### Work Practices for glass houses and handling soil

j) Protective clothing shall be removed before leaving the area and shall be hung on coat hooks provided.
k) Use of needles and syringes require special care, including disposal in puncture resistant containers for incineration.
l) All staff and students working with soils may require a booster for tetanus (see Information Sheet Biological Hazard Management – Immunisation/Vaccination)

### General Procedures for glass houses and handling soil

m) Bench tops able to withstand heat generated by general laboratory procedures, e.g. flaming loops and heating of media.
n) Cover all open wounds with a waterproof dressing.
o) Wash hands after work and before leaving the area.
p) Use disinfectants after handling suspected infectious materials.
q) Do not pipette by mouth, use mechanical pipetting devices.
r) Keep floors tidy and dry.
s) Keep benches clean.
t) Clean working area and equipment thoroughly after use.
u) Hydroponics are to be monitored for bacterial growth.
v) All breakages and spills must be reported to the supervisor/lab manager and dealt with immediately. Materials should be cleaned and disposed (See Appendix E Waste Disposal).

EMERGENCIES

SPILLS

## 1.1 Spills inside a Biosafety Cabinet

Droplet-size spills or those up to 1 mL may be treated easily by wiping or flooding with a suitable disinfectant solution. If a larger spill or breakage occurs, more extensive treatment may be needed.

However, spills inside a biological safety cabinet are generally not as hazardous as those outside the cabinet as they are contained and aerosols are swept away by the cabinet air stream. Clean-up may be commenced immediately. The suggested procedure is:

- ☐ Ensure that the cabinet remains operating to retain aerosols.
- ☐ Place absorbent material wetted with suitable disinfectant over the spill.
- ☐ Alternatively, proprietary absorbent materials which release hypochlorite may be used. Allow approximately 10 min to effect disinfection.
- ☐ Disinfect gloved hands and remove protective gloves in the cabinet. Remove clothing for sterilization, if contaminated, and wash hands and arms. Put on a clean set of gloves and protective clothing for carrying out the remainder of the clean-up.
- ☐ After initial disinfection of the spill, remove any sharp objects with forceps and discard as contaminated sharps then remove excess fluid with absorbent material and discard into a container for sterilization. Discard culture bottles, petri dishes and solid material associated with the spill into the same container. Decontaminate (or remove for sterilization) cultures, media and disposable materials adjacent to the spill.
- ☐ Wipe down the work floor, cabinet work zone and remaining items of equipment with fresh disinfectant solution. Disinfect both sides of the front grille and work floor within the cabinet. Regardless of whether there is a solid work floor, check that the spillage has not contaminated the sump. If the sump is contaminated, add sufficient disinfectant solution to completely cover the sump floor. If the spill is large, use sufficient disinfectant to dilute and inactivate the infectious material.

## 1.2 Spills outside a Biosafety Cabinet

Biological spills (human or animal) outside biological safety cabinets will generate aerosols that can be dispersed in the air throughout the laboratory.

To reduce the risk of inhalation exposure in such an incident, occupants should:

- ☐ Hold their breath, remove contaminated PPE and leave the laboratory immediately.
- ☐ The laboratory should not be re-entered to decontaminate and clean-up the spill for at least 30 minutes. During this time the aerosol will be removed from the laboratory by the exhaust air ventilation system.
- ☐ Appropriate protective equipment is particularly important in decontaminating spills involving microorganisms. This equipment includes lab coat with long sleeves, back-fastening gown, disposable gloves, disposable shoe covers, and safety goggles and mask or full face shield. Use of this equipment will prevent contact with contaminated surfaces and protect eyes and mucous membranes from exposure to splattered materials.

### 1.2.1 Minor Spill

- ☐ Wear disposable gloves.
- ☐ Soak paper towels in disinfectant and place over spill area.
- ☐ Place towels in plastic bag for disposal.
- ☐ Clean spill area with fresh towels soaked in disinfectant.

EMERGENCIES (Continued)

### 1.2.2 Major Spill

- ☐ Attend to injured or contaminated persons and remove them from exposure.
- ☐ Alert people in immediate area of spill.
- ☐ Close doors to affected area.
- ☐ Put on protective equipment.
- ☐ Cover spill with paper towels or other absorbent materials.
- ☐ Carefully pour a freshly prepared 1 in 10 dilution of household bleach around the edges of the spill and then into the spill. Avoid splashing.
- ☐ Allow a 20-minute contact period.
- ☐ Use paper towels to wipe up the spill, working from the edges into the centre.
- ☐ Clean spill area with fresh towels soaked in disinfectant.
- ☐ Place towels in a plastic bag and decontaminate in an autoclave.
- ☐ Have person knowledgeable of the incident and laboratory assist emergency personnel.
- ☐ Should the spill be so serious as to pose a risk to the wider community the emergency management coordinator should be notified immediately (Security phone 830 35444 or HSW Team).

## 1.3 Management of Blood Spills

### 1.3.1 For smaller spills:

- Spots or drops of blood or other small spills can easily be managed by wearing gloves and wiping the area immediately with paper towelling. Then clean with detergent and water. Where cleaning is difficult (eg between tiles) and there is a possibility of bare skin contact with that surface, then a disinfectant (such as bleach) may be used after the surface has been cleaned with detergent and water.

### 1.3.2 For larger spills:

- wear disposable cleaning gloves
- wipe up spill immediately with absorbent material eg damp cloth, tissue or paper towel. Place contaminated absorbent material into leak proof container or plastic bag for disposal
- clean the area with warm water and detergent, using disposable cleaning cloth or sponge
- where contact with bare skin is likely, disinfect area by wiping with bleach, allow to dry
- discard contaminated materials (absorbent towelling, cleaning cloths and disposable gloves) as general waste
- wash hands.

## 1.4 Spill inside a centrifuge

### 1.4.1 Centrifuges with sealed rotors or buckets that are able to be pressure steam sterilized

- ☐ Steam sterilise intact at 121°C for an appropriate time.

EMERGENCIES (Continued)

1.4.2 Centrifuges with non-sealed rotors and centrifuges not able to be pressure steam sterilized

- ☐ Where breakage or spillage is observed, allow 30 min for aerosols to settle.
- ☐ Place the rotor or bucket in an appropriate non-corrosive disinfectant solution (see Appendix E of AS/NZS 2243.3:2002).
- ☐ Remove larger pieces of broken glass to the sharps container with forceps and use material such as cotton wool moistened with disinfectant to pick up the finer pieces.
- ☐ Wipe internal surfaces of the centrifuge bowl with disinfectant.
- ☐ Spills and leaks of human blood and body fluids should be cleaned up in a similar fashion.

1.5 SPILL KITS

Spill kits appropriate to the hazards in the area should be made available and personnel trained in their use.

Suggested contents for a spill kit:

- Disposable gloves
- Disposable shoe covers
- Protective clothing (eg lab coat with long sleeves)
- Safety glasses
- Mask or full face shield
- Absorbent material, eg paper towel, proprietary material containing hypochlorite
- Chemicals available to prepare fresh disinfectant solution
- Forceps
- Cotton wool
- Plastic bags or leak-proof container

EMERGENCIES (Continued)

## 1.6 EXPOSURE

### 1.6.1 Procedure for managing an exposure to blood/body fluids/substances

These include sharps injuries (including needlestick) and splashes into/onto mucous membranes or bare intact skin.

Exposure is an injury that involves direct skin contact with a body fluid listed above and there is compromised skin integrity such as an open wound, abrasion or dermatitis, or if there is direct mucous membrane contact. For exposure to skin, the larger the area of skin exposed and the longer the time of contact, the more important it is to verify that all the relevant skin area is intact.

Occupational hazards for workers from sharps injuries (including needlestick injury) and other blood or body fluid incidents include human immunodeficiency virus (HIV), hepatitis B virus and hepatitis C virus.

The following body fluids pose a risk for bloodborne virus transmission:

- blood, serum, plasma and all biological fluids visibly contaminated with blood
- laboratory specimens that contain concentrated virus
- pleural, amniotic, pericardial, peritoneal, synovial and cerebrospinal fluids
- uterine/vaginal secretions or semen.

<u>Immediate action</u>

#### 1.6.1.1 Percutaneous exposure

If a worker has a percutaneous exposure, for example needle stick or a cut then:

- ☐ Treat the puncture wound or cut by liberal washing with soap and water and / or dilute hypochlorite solution.
- ☐ If the face is splashed with blood, rinse the eyes and mouth (which present exposed membranes) gently with water to minimise the risk of infection.
- ☐ If blood gets in the mouth, spit it out and rinse with water several times.
- ☐ Seek medical attention. If a needle/sharp was involved, place it in a rigid-walled container. Take it with you to the doctor. Due to the risk of further injury do not attempt to cover a needle.

#### 1.6.1.2 Eye Contact

- ☐ Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention (take MSDS if available).

#### 1.6.1.3 Ingestion

- ☐ The treatment for ingestion of a biological sample will depend on the biological that has been ingested - seek medical attention.
  Note that it is against University policy to eat and drink in the laboratory and mouth pipette.

EMERGENCIES (Continued)

1.6.1.4 Skin Contact

- ☐ Promptly flush the affected area with water and remove any contaminated clothing, you may need to seek medical attention.

1.6.1.5 Inhalation

- ☐ Seek medical attention (eg University Health, 8303 5050 or the Royal Adelaide Hospital).

1.6.1.6 Reporting

- ☐ Ensure that the incident is reported to the laboratory supervisor, that the incident/accident documentation has been completed and that medical attention is sought.
- ☐ If possible, identify the source material and test for the presence of HIV or Hepatitis B.

1.6.1.7 Counselling

- ☐ Counselling is available to affected staff/students through the Employee Assistance Program (EAP). Information on the EAP is available at http://www.adelaide.edu.au/hr/ohs/wellbeing/eap/

TRANSPORTATION

## 1.1 TRANSPORTING WITHIN OR OUT OF THE LABORATORY

Special care should be taken when choosing containers for the transportation of specimens into, through and out of the laboratory.

- ☐ Primary containers must be leakproof and sealable; snap-top lids are not recommended. The primary specimen container should be sealed inside a leak-proof secondary container.

## 1.2 TRANSPORT BY ROAD, RAIL, AIR OR POST

### 1.2.1 Transport by Road

There are legislative requirements for transportation by road or rail of biological material if the material falls into the categories of infectious substances, biological products, diagnostic specimens and waste.

#### 1.2.1.1 Infectious Substances

Infectious substances are those substances known or reasonably expected to contain pathogens. They are subject to the road transport regulations and the Australian Code for Transport of Dangerous Goods by Road or Rail (ADG Code) (http://www.ntc.gov.au/viewpage.aspx?AreaId=35&DocumentId=1147) if they are capable of spreading disease when exposure to them occurs.

#### 1.2.1.2 Biological Products

Biological products are those derived from living organisms and used either for prevention, treatment or diagnosis of disease in humans or animals, or for related development, experimental or investigational purposes. They include, but are not limited to, finished or unfinished products such as vaccines and diagnostic products. For the purposes of the road transport regulations and the Australian Code for Transport of Dangerous Goods by Road or Rail the biological products are those known or reasonably expected to contain pathogens in risk groups 2, 3, or 4. Substances in this group should be classified in Class 6.2.

#### 1.2.1.3 Diagnostic Specimens

Diagnostic Specimens are any human or animal material including, but not limited to, excreta, secreta, blood and its components, tissue and tissue fluids being transported for diagnostic or investigation purposes, but excluding live infected animals.

For the purposes of the regulations and the ADG Code they are divided into the following groups:

a) Those known or reasonably expected to contain pathogens in risk groups 2, 3 or 4. Such substances should be classified in class 6.2. Specimens transported for the purpose of initial of confirmatory testing for the presence of pathogens fall within this group.
b) Those where a relatively low probability exists that pathogens of risk groups 2 or 3 are present. Specimens transported for the purpose of routine screening tests or initial diagnosis for other than the presence of pathogens fall within this group.
c) Those known not to contain pathogens.

TRANSPORTATION (Continued)

1.2.1.4 Waste

Waste derived from the medical treatment of animals or humans or from bio-research where there is a relatively low probability that infectious substances are present. Decontaminated wastes which previously contained infectious substances are considered non-dangerous unless the criteria of another class are met (eg radioactive).

- ☐ If biological sample is being transported by rail or road then it must be packed in accordance with Australian Code for Transport of Dangerous Goods by Road or Rail. Refer to the Guidance Notes for the Transport of Class 6.2 (Infectious Substances Dangerous Goods available at http://www.infrastructure.gov.au/transport/australia/dangerous/pdf/guidnote-class62.pdf.

1.2.2 Transport by Air

- ☐ If chemical or biological samples are to be transported by air, it must be packed by a certified Civil Aviation Safety Authority (CASA) trained person.[1] If there is no-one in your School who has been CASA trained, request that the company collecting the sample send a person trained to do the packing.

1.2.3 Transport by Post

- ☐ If biological samples are being transported by post, then it must be packed in accordance with the Australian Post, Dangerous and Prohibited Goods and Packaging Guide (http://www.auspost.com.au/GAC_File_Metafile/0,,4005%255Fdangerousgoodsguide,00.pdf)
- ☐ Documentation must accompany the specimen and should be protected from contamination. Double-walled clear plastic bags are recommended.
- ☐ Recipients must be informed of all known hazards associated with material in advance of delivery.

1.3 Further Information

Further information regarding requirements for transportation is available in Section 13, AS/NZS 2243.3:2002.

- ☐ If transporting biological material on dry ice use a container with venting holes. Under no circumstances can the container be sealed. See the Chemical Handbook, Appendix D Cryogenic Substances (http://www.adelaide.edu.au/hr/ohs/handbook/chemical/) for further information on the storage, handling, transport and contingency arrangements for dry ice.

[1] CASA's primary function is to conduct the safety regulation of civil air operations in Australia. Contact the HSW Team to obtain information on becoming CASA certified.

Appendix E (Page 1 of 1)

WASTE DISPOSAL

Always wear a lab coat or gown when disposing of biological or infective materials/ specimens and wear heavy gloves and cover all cuts and lesions on the hands with waterproof dressings.

Choosing the Correct Path for Waste Disposal

If you are unsure of the correct waste disposal plan please consult with your supervisor and/or the Health and Safety Officer (HSO).

| Animal tissue |
|---|
| ❑ All wastes to be placed in double plastic bags, sealed and placed into yellow bio-waste bins. Bins collected for removal by contractor when full. |
| **Pathogenic waste** |
| ❑ All material is to be autoclaved at 121°C for 30mins at 15psi prior to disposal via yellow bio-waste bins. |
| **Biohazard waste** |
| ❑ All material is to be autoclaved at 121°C for 30mins at 15psi then discarded via yellow bio-waste bins. |
| **Animal house waste** |
| ❑ All sawdust, straw, earth and cage scraps are to be placed into designated green bins. These green bins are collected by Campus Services. |
| **Sharps** |
| ❑ Sharps include items such as glass, scalpels, razor blades, needles, Pasteur pipettes and any other sharp object that may present a risk of infection. Sharps must not be discarded into general waste but are to be placed in labelled puncture-proof containers located in laboratories. When full they are to be sealed and discarded via yellow bio-waste bin. |
| **Infected Re-useable Glassware** |
| ❑ Glassware and content can be disinfected overnight with a 1% Sodium hypochlorite solution or autoclaved (134°C for 10mins at 15psi) then the glassware is processed for re-use. |
| **Infectious Solutions and/or Solids** |
| ❑ This material must be placed in appropriate vessels, such as autoclavable jars, bottles or bags, labelled and autoclaved at 121°C for 30mins at 15psi. Solid residue is then disposed of via the infectious waste bin and solutions tipped down the sink or incinerated<br>❑ Waste solutions can alternatively be chlorinated overnight and disposed of via the sewer. |