

# Hong Kong University Biological Safety Policy and Guidance Document

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# 1. Introduction

This document forms part of the University of Hong Kong Health and Safety Policy. It is issued with the approval of the University Biosafety Committee and the University Safety, Health and Environment Committee. It is the duty of all employees and students to observe those parts of the University Health and Safety Policy that are relevant to their own work as well as observing any additional local rules and regulations on health and safety.

This part of the University Health and Safety Policy relates to the arrangements that must be made before working with hazardous biological materials and the precautions to be taken during the course of the work. The policy also includes arrangements for work with genetically modified biological materials.

The policy is developed to fulfill the basic requirements of legislation in Hong Kong and is intended to ensure standards within Hong Kong University match internationally accepted best practice. Extensive guidance produced by various expert technical advisory committees from the World Health Organisation, the United Kingdom, Australia and the United States of America has been incorporated into this document. A substantial contribution to the structure and content of this policy has been made by the University of Edinburgh biological safety policy (with permission).

## 2. Biological Hazards and the Law in Hong Kong

### 2.1 The Occupational Safety and Health Ordinance

In 1997 the Hong Kong government enacted [The Occupational Safety & Health Ordinance – Chapter 509](#) (CAP 509). This states that:-

"Every employer must, so far as reasonably practicable, ensure the safety and health at work of all the employer's employees. This includes:-

- (i) maintenance and provision of equipment and machinery (plant) and adopting safe systems of work,
  - (ii) arrangements for safe handling, and transport of plant and substances,
  - (iii) the provision of appropriate information, instruction, training and supervision."
- The penalty for failing to comply with the legislation is a fine of up to HK\$200000 and for flagrant violations can include up to 6 months imprisonment.

While biological hazards are not specifically mentioned in the ordinance they may be considered to be covered by the general duty of all employers to provide a safe place of work and the issues mentioned in (i), (ii), and (iii) (above) indicate the areas for particular concern specified by the legislation.

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## 2.2 Common Law

In the event of an accident involving personal injury or death, the injured person (or his/her representative) can institute legal action to obtain compensation from the wrongdoer. In the circumstances of an accident on University premises it is most likely that it would be the University that was taken to court, but depending on circumstances, it is possible that members of staff or even students could be cited in legal action.

Liability for such a claim would probably be based on whether any one was negligent or required safety measures were ignored. While it would be up to the court to decide what constitutes negligence and what safety measures were required they would probably look to international best practice as a guide for their judgment. It is the specific intention of this Biosafety Policy and the University to meet international standards as specified in the [WHO publication Laboratory Biosafety \(Third edition\)](#) and the [US NIH/CDC Biosafety in Microbiological and Biomedical Laboratories 5<sup>th</sup> Edition \(BMBL\)](#).

It is worth noting that compensation payments in civil courts tend to be greater than the fines imposed after breaches of criminal law. While civil litigation in Hong Kong is not on the scale of that in the UK or USA compensation awards have been substantial in a number of cases.

## 2.3 Other Legislation and Biological Agents

Hong Kong, unlike most other industrialized countries, has little specific legislation in the area of recombinant DNA or biological agents. However various pieces of legislation have an impact on those within the University that work with, import, export or dispose of recombinant or wild type biological materials.

### 2.3.1 The Import and Export ordinance (Chapter 60)

The Biological Weapons Ordinance (Chapter 491) prohibits the development, production, stockpiling, acquisition or retention of any biological agent or toxin of a type and in a quantity that has no justification for prophylactic, protective or other peaceful purposes. While the wording does not specify the agents this applies to, a specific list of Biological Agents controlled under the Import and Export Ordinance (Chapter 60) which has been drawn up to control agents capable of dual use (i.e. agents that can be exploited for legitimate peaceful aims or military purposes). Some of these agents are held by University departments and are actively studied; this includes Avian Influenza, Dengue virus, *B. pseudomallei* and *E.coli* O 157. [For information see the strategic trade](#)

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[control circular no. 2/01](#). Interestingly this also includes the import and export of nucleic acids associated with pathogenic traits from any of the listed agents (see 1C353 list). Consequently to send or receive DNA plasmids encoding, for example, Avian Influenza haemagglutinin (HA) may require a license depending on the interpretation of the legislation. Please contact the Biological Safety Officer for further information.

### 2.3.2 The Waste Disposal Ordinance (Chapter 354)

In the near future a piece of legislation is likely to be introduced which will add additional controls on the disposal of clinical wastes (under the Waste Disposal Ordinance, Chapter 354). In the interim, the University will continue to handle waste in accordance with [the Practice Notes on the Disposal of Clinical Waste at Landfills](#) issued by the Environmental Protection Department. Further information on University Policy can be found on the [Safety Office website](#). See also, section 7.3 of this policy.

### 2.3.3 The Cartagena Protocol

In September 2005 China ratified the Cartagena protocol on biosafety. The Hong Kong SAR government has also announced its intention of ratification (for background information see the factsheet [FS09/03-04](#)). A date has not yet been set although there were further discussions in the legislative council in 2006. As far as the University is concerned the only area where there might be some need to consider the requirements of the protocol is if any researchers in the University were to wish to import a living modified organism for intentional release into the environment (even for experimental research purposes). This would include field trials of recombinant plants. The definition of a living modified organism (LMO) covers all living recombinant organisms and while the protocol is focused on plants, particularly food crops, it might not exclude clinical trial applications of LMO's, for example recombinant virus vaccines in the poultry industry. (It is also possible that if the LMO's were kept in containment then the regulations may not apply because the intention is not for deliberate release). If researchers in the University were interested in this area then contact the biological safety officer for further discussion on the requirements of the Environmental Protection Department.

### 2.3.4 The Dangerous Goods (Consignment by Air) (Safety) Regulations Chapter 384 Subsidiary Legislation

These regulations require consignors i.e. shippers and freight forwarders to ensure all dangerous goods are properly classified, packed, marked, labeled and documented before they are offered for air transportation. A person who

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contravenes these Regulations commits an offence and is liable to a fine of \$250,000 and to imprisonment for 2 years. Under Section 5 of Chapter 384, every director and every officer concerned in the management of the company maybe convicted of the offence!

For transport of infectious agents and clinical specimens to (or from) other countries it is recommended that a specialist firm is employed as import and export licenses may be required. Compliance with UN international regulations on packaging will also be required and this can be quite involved. The International Air Transport Association (IATA)'s Dangerous Goods Regulations have recently undergone significant changes that impact how specimens must be classified and packaged. For more information see Section 8 and the relevant section on the Safety Office website.

### **3. Administrative Procedures**

#### **3.1 General**

In common with other areas of safety it is ultimately the University Council that establishes and oversees the University's Biological Safety Policy. The Vice-Chancellor ensures the implementation of the standards and procedures outlined in the policy. The Vice-Chancellor has overall responsibility for safety and health within the University and has the authority to suspend or prohibit any operation that could give rise to imminent risk of serious injury or ill health.

The Safety, Health and Environment Committee (SHEC) is responsible to Council for overseeing the management of risks to safety and health at the University and has established a Biosafety Committee as a sub-committee (see 3.4) to oversee work with biological materials.

It is the duty of the Deans of Faculties to ensure that all aspects of the Councils Health and Safety Policy is implemented within their area of responsibility. Deans along with the Heads of Departments are expected to make all relevant persons aware of any hazards associated with biological materials encountered during the course of their work. They must also ensure that working procedures designed to minimise the risk are adopted. Decisions on how best to work safely with biohazards stem from risk assessments (see 3.5). The appropriate information and instruction contained within a risk assessment must be supplemented with the training required to carry out the work safely. Before commencing any work with biohazardous materials it is necessary to make such an assessment, which in almost all cases will require to be recorded in writing, and made available for inspection by interested parties such as Labour Department Inspectors, the University's insurers or members of the Safety Office.

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In addition, each Head of Department must ensure the University Health and Safety Policy on safety in biological laboratories is supplemented by local departmental rules (see 5.5) relating to specific activities of the department, so that, when read in conjunction with this policy, the documents form an effective means of securing the safe use of biological materials, as well as potentially hazardous equipment and hazardous processes.

### **3.2 Faculty and Departmental Safety Committee's**

One effective tool to help manage safety and fulfill some of the duties of deans and Heads of Departments is to establish a safety committee. Indeed one of the responsibilities of a dean as detailed in the [University Safety Policy \[under section 2.1\(f\)\]](#) is "establishing a faculty safety and health committee which will include departmental safety representatives. The committee will be chaired by the dean or an appointed senior academic" Similarly one of the responsibilities of the Head of Department, detailed in the [University Safety Policy \[under section 3.1\(c\)\]](#) is:- "establishing and chairing a safety committee to include departmental safety representative(s), technical and non-academic staff and students. Where the size of the department is small or the level or risk is low enough not to merit the establishment of a safety committee, safety and health should be a standing agenda item on the Departmental meetings".

### **3.3 Advisory Appointments – BSO**

The University has appointed a Biological Safety Officer (BSO), within the University Safety Office, to provide specialist professional guidance and advice on all aspects of biological safety to the entire University community, to ensure compliance with relevant legislation, University Health and Safety Policy and current international best practice. All contact and liaison with the enforcing authorities (primarily the Labour Department) on matters relating to biological safety should be via, or in consultation with, the University Biological Safety Officer.

To facilitate liaison with the safety office and assist departments in fulfilling their responsibilities for safe working each Head of Department is required to appoint a local safety representative, who along with the head is the first point of contact within a department on safety matters.

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### 3.4 The Biosafety Committee

The Biosafety Committee oversees the safe use of biological agents in the university. It is a sub-committee of the main university safety, health and environment committee and is comprised of a number of experts in relevant fields of work.

#### Terms of Reference

- To oversee work in the university that may present a biological hazard with the aim of reducing risks and protecting people and the environment.
- To undertake assessment and review of work which involves genetic modification, handling pathogens or potentially infected materials as well as any biological work involving carcinogens or teratogens. Projects will be approved initially for 3 years and subsequently reviewed regularly by the University Biological Safety Officer. This assessment and review will take into account the potential intrinsic risks involved in the experiments, the competence of the personnel and the safety/security of the laboratory facilities.
- To prescribe conditions for containment, housing, storage, transportation and procedures under which biohazardous research may proceed.
- To inspect and approve containment facilities before they are used for work with biohazardous materials.
- To report on a regular basis to the Safety, Health and Environment Committee.
- To co-operate with research granting agencies and with any committees on biohazards that may be established at governmental level.
- To collect and disseminate information and guidance, promote audit of facilities and the training of staff and students and in the area of biohazards and biosecurity.

### 3.5 Risk Assessment

The hazard of a biological material is the set of inherent properties of the material, which give it the potential to cause harm. Assessing risk involves examining the likelihood of a material causing harm, taking into consideration the nature of the work being undertaken.

The basic steps involved in carrying out any risk assessment are:-

- **Identification of the hazard.** In the case of biological materials this may mean potentially infected samples as well as deliberate culture of pathogens. Consideration of any potential environmental hazard is also appropriate.

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- **Identification of those who might be affected.** In practice this is primarily anyone working with the biological material concerned. However, personnel who share the facilities and equipment where the work is carried should be considered as well as others who might be affected such as cleaners, ancillary workers, visitors, maintenance personnel and deliverymen. It is likely that standard local rules will minimise the risk to those who are not involved directly in the work.
- **Evaluation of the steps to be taken to achieve and maintain adequate control.**
- **Recording findings,** in all but the simplest and most obvious cases.
- **Reviewing at regular intervals and revising if necessary.**

A risk assessment will be considered to be suitable and sufficient if the details and expertise with which it is carried out are in accord with the nature and degree of risk arising from the work and the complexity of the work concerned i.e. the higher the biosafety level the more detail that is required.

Detailed guidance on viral vector systems including [adeno-associated virus](#), [adenovirus](#), [retroviruses](#) including [lentiviruses](#) and [vaccinia virus](#) is available. Copies of blank and model risk assessment forms are available for a variety of pathogens including work with these viral vectors. These forms and associated guidance serve as an aide-memoir of the points to consider during the risk assessment procedure, as well as helping to keep information in a consistent manner.

All laboratories where biological work is carried out should have local rules (see 5.5) incorporating the standard working practices required for the level of containment at which the laboratory is operating. Local rules can simply be referred to on a risk assessment form (provided these are documented and in place), rather than all the control measures being reproduced in full. However any control measures that may be required for particular types of work that are in addition to the basic standard should be clearly identified in the risk assessment.

The Research Group Leader/Principal Investigator of a given research group, or the supervisor/manager of a unit or work area, is required to take ownership of the risk assessments for all work activities carried out by themselves and those persons under their supervision. Whilst they would normally be the person who carries out the risk assessment in some circumstances there may be someone who would be more appropriate either because of experience or knowledge. However if they did not carry out the risk assessment themselves it is crucial that they scrutinise, verify and countersign the relevant assessments produced by their group or unit etc. In order to discharge this responsibility, those with supervisory or managerial roles must themselves be competent in safety related matters and, where necessary, should seek additional training (or refresher training) as appropriate, via the University Safety

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Office. For further guidance on risk assessment see the Safety Office website. Regular courses on risk assessments will be carried out by the University Biological Safety Officer

The person who carries out the risk assessment must be competent to do so. This does not necessarily mean particular qualifications are required. However, the person should:-

- have adequate knowledge, training and expertise in understanding hazard and risk;
- know how the work activity uses or produces substances hazardous to health;
- have the ability and authority to collate all the necessary, relevant information;
- and have the knowledge, skills and experience to make the right decisions about the risks and the precautions that are needed.

The risk assessment relating to a particular work activity should be produced so that it can be easily understood by all those who need to refer to it. Anyone carrying out the activity must be made aware of the content of the risk assessment in order that they are familiar with the risks associated with the work and the control measures necessary for them to carry out their work safely. It is the responsibility of each worker to ensure they are aware of the content of risk assessments relevant to their work and they have a duty to follow all necessary control measures detailed in them. Signatures should be obtained from all relevant personnel to show that workers have read, understood and agree to adhere to the documented procedures and safeguards. Records of assessments should be maintained locally where the work takes place and should be reviewed, from time to time, to ensure that each is still relevant for the work activity concerned. All risk assessments should be reviewed at least annually, or following significant change in the work. Each Dean of Faculty is responsible for ensuring risk assessments are carried out, communicated to relevant workers and regularly reviewed. Risk assessments must be available for inspection by relevant parties, both from within and outside the University.

It should be remembered that persons working in a biologically oriented laboratory will often encounter many of the hazards present in a chemically oriented laboratory. The University Safety Office website and policies contained therein give much useful advice on general laboratory hazards, and on the specific problems that arise when handling chemical substances; this guidance should be consulted wherever it might be relevant to the work of the biological laboratory. Similarly where ionising, non-ionising or laser sources are used the University Safety Office web pages on radiation safety should be consulted.

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### 3.6 Biosecurity

Biosecurity can be defined as the protection of high consequence pathogens or toxins, or critical relevant information, against theft or diversion by those who intend to pursue intentional misuse ([Morbidity and Mortality Weekly Report December 6, 2002, Volume 51, No RR-19](#)). The security of biological agents has become an important issue and the WHO has issued some [general guidance](#) in this area. A number of countries have also enacted specific legislation e.g. The Select Agent Rule in the USA; the Anti-terrorism, Crime and Security Act 2001 in the UK, which was updated in 2005, and The Biological Agents and Toxins Act 2006 in Singapore. Hong Kong has yet to enact similar legal requirements, however as mentioned in section 2.3.1 in order to meet its obligations under international biological and chemical weapons treaties Hong Kong has enacted legislation, Cap 491, intended to prevent the misuse of potential biological warfare agents or certain dual use technologies. A specified list of biological agents are detailed which require import and export licenses.

The Head of Department along with the dean of the faculty shall ensure that an adequate risk-based security plan is implemented and where appropriate security risk assessments are carried out. This should involve proactive measures to identify vulnerabilities and implementation of effective control and monitoring mechanisms. It is likely that organisms classified as Class 2 or below will not require specific biosecurity arrangements although there are a few exceptions and if there is any doubt the issue should be discussed with the Biological Safety Officer. A department that has in its possession an agent specified by Cap 491 should conduct a security risk assessment. (See [IC351](#).)

In planning and conducting security risk assessments the following factors should be considered:

- (a) Theft of pathogens and toxins or related equipment, documents or data;
- (b) Sabotage including vandalism and tampering;
- (c) Break-in and intrusion;
- (d) Labour issues and disputes;
- (e) Workplace violence;
- (f) Picketing, occupation and barricade;
- (g) Screening and isolation of suspect packages;
- (h) Acts of terrorism;
- (i) Civil unrest or war.

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An area of particular concern for higher risk agents is specimen accountability. Detailed records must be kept for Class 3 agents. Heads of Departments may also wish to produce an inventory of Class 2 wild type and recombinant micro-organisms held in their department. This could include both those in use and in storage. To be of any value the information should be kept up-to-date and should identify the proper name and hazard group categorisation of the micro-organism, where it is used or stored and the Principal Investigator/supervisor under whose area of responsibility it belongs. If Heads of Departments wished, the University Biological Safety Adviser could undertake an annual survey to check the information held remains valid.

## **4. Requirements for the different types of biological work**

### **4.1 General**

Detailed guidance on a range of biological safety topics is provided in the biosafety section of the Safety Office website. This includes guidance on risk assessment and the control measures required in order to work safely when carrying out various different types of biological work. University guidance is based on the legislative requirements in Hong Kong, and publications of various expert technical advisory committees in several countries including the WHO and US NIH/CDC. This website provides a single point of reference for University personnel and all personnel must refer to and follow the guidance relevant to their work. They should only take other measures after consultation with the University Biological Safety Adviser and with the agreement of their Head of Department.

Each Dean of Faculty in consultation with the Head of Department is responsible for ensuring that work with biological materials is only undertaken in facilities that are suitable for the purpose, using appropriate working practices (see 5.3). Suitability is determined by the requirements indicated by the Safety Office website, and as a result of the risk assessment process.

### **4.2 Work with Micro-organisms and their Genetic Modification**

Micro-organisms are categorised into a hazard group. This forms the basis of the risk assessment and determines the level of containment under which the work must be undertaken. Additional control measures may then need to be assigned depending on the route of infection of the particular micro-organism and the nature of the work. Detailed guidance on hazard grouping and containment requirements for work with micro-organisms is provided on the Safety Office website. The [NIH/CDC](#) list of categorisations of biological agents according to risk, is the approved list for work in the University.

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All work with biological agents should be risk assessed. **All work with virus vectors and micro-organisms of hazard level 2 or 3, must be formally risk assessed and the assessment approved by the Biosafety Committee before the project commences.**

The University Biological Safety Officer is the point of contact to submit all risk assessments to the Biosafety Committee. In most straightforward cases he/she can give provisional approval for a project which will then be looked at by the whole committee at a full meeting. In the case of more complex assessments and all Class 3 work the whole committee will be circulated by e-mail and consensus arrived at before approval.

Please note this is not just work being funded externally and encompasses all relevant biological agent work carried out by undergraduate students, research assistants, PhD students, Post Docs and PIs. Any format for a risk assessment will be considered, however, staff are encouraged to use the forms which will be provided on the Safety Office website. This includes copies of blank and model risk assessment forms are available for a variety of pathogens including work with viral vectors. The forms and associated guidance serve as an aide-memoir of the points to consider during the risk assessment procedure, as well as helping to keep information in a consistent manner.

Applicants for financial support from external granting agencies or university sources of finance can follow the approval procedures currently in place detailed on the Safety Office website under the Safety Manual and Research proposals – [Safety Approval procedures subheading](#). The only additional requirement is that a risk assessment approved by the Biosafety Committee will be required in cases where virus vectors or micro-organisms of hazard level 2 or 3 are being worked on. (These measures will come into effect on 1<sup>st</sup> September, 2007.)

Risk assessment can be submitted at any time in the year and it would probably be prudent to avoid submission around the times RGC grants are due. It is the policy of the committee to give a response to the applicant within 7 working days. To assist in working to deadlines every effort will be made to reply within 48hrs although this may not always be possible.

It should be noted that one risk assessment written to encompass an organism or a set of functional pathways in an organism may cover more than a single project.

Heads of Departments shall be responsible for ensuring that PIs carry out a risk for all biological work and where the agent being used is a viral vector or a class 2 or 3 micro-organism they shall ensure that the approval of the Biosafety Committee is obtained before the work is started. The committee liaises with Heads of Departments and safety representatives where potentially hazardous biological research is being

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undertaken for dissemination of information and implementation of the committee's recommendations on the conduct of and conditions for such research.

### 4.3 Work with Biological Materials

A wide range of biological materials are handled within the University and there is substantial variation in the associated hazards. Detailed guidance on risk assessment and the control measures needed to work safely are provided on the Safety Office website with specific documents for work involving the use of blood and human tissues, tissue culture, oncogenes and other naked DNA's.

### 4.4 Work with Animals and Plants

The potential hazards associated with handling animals and plant materials must always be considered, and reference made to suitable sources of information to ascertain any precautionary measures required, before the work commences.

Persons working with animals must be aware of the risks of injury and ill-health to themselves, colleagues and the animals with which they work. (See Health and Safety Information for those working with animals in the University of Hong Kong on the Safety Office website). There is a range of different hazards associated with animal work that vary according to the type of work undertaken and the animals concerned. For example allergy to laboratory animals used in research is a well-known and significant cause of occupational ill health in some countries. See the [Laboratory Animal Unit \(LAU\)](#) website for all matters concerning animal work, including requirements for ethical approval of any work undertaken. Please also see "[Occupational health and safety in the care and use of research animals, NRC \(1997\)](#)" and "[Guide for the Care and Use of Laboratory Animals, NRC, USA \(1996\)](#)" for further information.

The Occupational Health Unit (see 11.1) undertakes a health surveillance programme of employees working in animal facilities. (See the document "Occupational Health Programme for Laboratory Animal Workers" available on the University Health Service (UHS) website). The LAU follow the policy and procedures for health surveillance as advised by the UHS. Heads of Departments, PIs and individual workers must also refer to and follow this policy.

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## 5. Safe Systems at Work

### 5.1 General

Although much of the microbiological and biochemical work in University laboratories does not involve materials known to be infectious, it should be remembered that many biological materials may contain pathogens, laboratory procedures may support the growth of pathogenic contaminants and many micro-organisms whilst not generally regarded as human pathogens may, in certain circumstances, cause infections. Health and safety precautions are therefore essential in all forms of biological work because of the ever present possibility that laboratory workers, students and other personnel who access the facilities might be affected by accidental infections or allergic reactions. The approach used throughout the world is known as working in, or under, containment and is described in more detail below. This precautionary approach is well tried and tested having been successful for many years across multidisciplinary work areas.

All those who work with pathogenic micro-organisms and potentially biohazardous materials must do so within a framework which will provides the containment and protection appropriate to a reasonable and informed assessment of the risks involved. A safe system of work will generally arise naturally out of such a risk assessment because many of the necessary control measures should be incorporated as fundamental and routine parts of everyday working in biological laboratories.

It is the responsibility of all persons routinely engaged in work with potentially infective materials to give serious consideration to the possible effects of this work on the health of themselves, their colleagues and the community as a whole. A collective awareness of infective hazards should be fostered and prompt steps taken to investigate the unexpected absence from work of any co-workers.

### 5.2 Routes of Infection

In order to cause an infection a micro-organism must first gain access to the body. In the natural environment micro-organisms use several different routes of infection to gain access although these are often characteristic of, and specific to, the micro-organisms and the diseases they cause. For example, gastrointestinal diseases usually result from ingestion of contaminated food or drink whereas respiratory diseases usually result from inhalation of an infectious aerosol. In the laboratory setting, primary consideration must always be given to a pathogen's normal route of infection but it should also be remembered that laboratory manipulations might potentially give rise to exposures that would not normally be encountered in everyday life. For example, a high concentration of a respiratory pathogen could be injected directly into the body

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as a result of a needlestick injury and whilst this may not deliver the pathogen to its primary site of infection the potential for it to cause disease would still be significant.

All workers must be aware in general of the various routes of infection and the control measures necessary to block these and more specifically of the particular route(s) of infection of any micro-organism (or the micro-organisms that may be contained within any biological material) with which they work.

Working practices when handling biological materials should always follow the precautionary approach of routinely blocking routes of infection. The following summarises the routes of infection that may occur within the laboratory and the principal means of blocking them.

**Ingestion route** – never put anything in the mouth whilst in the laboratory and avoid subsequent transfer to items such as food by always washing hands before leaving.

**Percutaneous route** – avoid the likelihood of puncture wounds by careful handling procedures and always keep any breaks in the skin covered whilst in the laboratory. Care should be taken to ensure working practices do not contaminate mucous membranes by, for example, splashing or transfer. Sharps injuries are a significant concern and all workers in biological laboratories must receive instruction and training on safe working practices. Detailed guidance on avoiding sharps and needlestick injuries is available on the Safety Office website and all laboratory workers must refer to and follow these procedures.

**Inhalation route** – care must be taken to minimise the production of aerosols and where infectious aerosols may be generated the work should be carried out in a microbiological safety cabinet.

**Instillation route** – care should be taken to ensure working practices do not contaminate eyes by splashing or transfer. If these may be likely then the wearing of suitable eye protection is of paramount importance.

Further guidance on blocking routes of infection is given in the following sections (5.3 and 5.4) on good microbiological practice and containment. Further information on what to do in the event of an accident or incident involving a biological material is given below in section 10.

### 5.3 Good Microbiological Practice

The term "Good Microbiological Practice" is used in a number of different ways. In this document the phrase is taken to mean the basic safety precautions adopted in all

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laboratories where there is a risk of infection – even where the consequence of infection is minimal. The following is a hybrid of requirements written into UK legislation and recommendations on a core safety curriculum for students from the American Society for Microbiology.

5.3.1 Microbiological procedures are to include:-

- (a) methods of aseptic transfer.
- (b) minimizing or containing the production of aerosols.
- (c) washing hands prior to and following laboratory activities and at any time contamination is suspected.
- (d) disinfection of laboratory benches and equipment prior to and at the conclusion of each laboratory session, using an appropriate disinfectant and allowing a suitable contact time.
- (e) identification and proper disposal of different types of waste.
- (g) good laboratory practice, including returning materials to proper locations, proper care and handling of equipment and keeping the bench top clear of extraneous materials.
- (h) reporting all spills and broken glassware to the instructor and receiving instructions for cleanup.
- (i) using "standard" (universal precautions) with blood and other clinical samples.

5.3.2 Protective and Administrative procedures are to include:-

- (a) tying long hair back, wearing personal protective equipment (eye protection, gloves, coats, closed shoes; glasses may be preferred to contact lenses) and using such equipment in appropriate situations. Laboratory coats belong in the laboratory, not the lecture theatre, office or refectory.
- (b) always using appropriate pipetting devices and understanding that mouth pipetting is forbidden.
- (c) never eating or drinking in the laboratory.
- (d) never applying cosmetics, handling contact lenses, or placing objects (fingers, pens etc) in the mouth or touching the face. Mobile phones should not be answered while conducting procedures.
- (e) testing equipment adequately and maintaining control measures.
- (f) testing, where necessary, for the presence of viable process organisms outside the primary physical containment.

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- (g) formulating and implementing local codes of practice for the safety of personnel, as required. (In particular local rules/SOP's should minimise the use of sharp instruments and ensure their correct use and disposal as well as detailing what to do in the event of an accidental. Local codes should also outline procedures designed to protect the environment.)
- (h) displaying biohazard signs where appropriate.
- (i) keeping adequate records. Including records of personnel reading and signing a laboratory safety agreement indicating that the individual has read and understands the safety rules of the laboratory.
- (l) providing written standard operating procedures where appropriate to ensure safety.
- (m) having effective disinfectants and specified disinfection procedures available in case of spillage (or shedding).
- (n) providing safe storage for contaminated laboratory equipment and materials where appropriate (e.g. waste material before autoclaving/ disposal).

#### 5.3.3 Emergency procedures are to include:-

- (a) locating and properly using emergency equipment (eyewash stations, first aid kits, fire extinguishers).
- (b) reporting all injuries immediately.
- (c) following the proper steps in the event of an emergency (specified in the SOP).

#### 5.3.4 Providing appropriate training and supervision of personnel (see section 9).

## 5.4 Containment

Work with biological materials, including micro-organisms and genetically modified organisms, is undertaken in containment laboratories. There are 4 different levels of containment (levels 1–4 alternatively called Classes 1–4).

#### 5.4.1 WHO Classification of infective microorganisms by risk group (with examples).

##### **Risk Group 1** (no or low individual and community risk)

A micro-organism that is unlikely to cause human or animal disease – WHO.  
 Not known to consistently cause disease in healthy human adults – NIH/CDC.  
*E.Coli K12*, *Saccharomyces cerevisiae* Adeno-associated virus, *Bacillus subtilis*,  
 Baculovirus.

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**Risk Group 2** (moderate individual risk, low community risk)

A pathogen that can cause human or animal disease but is unlikely to be 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 of infection is limited. All 8 human herpesviruses – HSV, VSV, EBV, CMV, HHV6, 7 & KSHV, Enterotoxigenic *E.coli* including *E.coli* O157, Adenovirus (all 50+ human serotypes) *Staphylococcus aureus* (including MRSA), Ringworm, HIV and HBV.

**Risk Group 3** (high individual risk, low community risk)

A pathogen that usually causes serious human or animal disease but does not ordinarily spread from one infected individual to another, directly or indirectly. Effective treatment and preventative measures are available. *Vibrio cholera*, *Shigella flexnerii*, *Mycobacterium tuberculosis* SARS, Rabies virus, Avian Influenza.

**Risk Group 4** (high individual and community risk)

A pathogen that usually causes serious human or animal disease and that can be readily transmitted from one individual to another, directly or indirectly. Effective treatment and preventative measures are not usually available. Marburg, Simian B virus, Ebola, Rift Valley Fever virus and Smallpox.

The level of containment under which particular work should be undertaken is determined as part of the risk assessment (see 3.4). Detail of the requirements of each containment level is described in supporting guidance on the Safety Office website.

## 5.5 Facilities and Working Practices Including Local Codes of Practice/ Laboratory Rules

The principles of containment are applied both in the basic design and facilities of the laboratory and in the working practices of all the people in the laboratory. The purpose of containment is not only to prevent the micro-organisms getting out of the laboratory but also to ensure that the workers are safe whilst in the laboratory. Each Dean of Faculty along with the Head of Department is responsible for ensuring that work with biological materials is undertaken in the University only in facilities that are suitable for the purpose and using appropriate working practices. Individual workers have a duty to work in accordance with the containment requirements for the activities they carry out.

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Whilst working in containment laboratories it is also necessary to use the precautions indicated in the section on good microbiological practice (5.3).

Each Head of Department has a responsibility to ensure that the level of containment required for a particular facility is correctly identified to those involved in the design and/or refurbishment of containment facilities, including the relevant Estates and Buildings Project Manager and the University Biological Safety Officer. The Head of Department should also ensure the requirements of the department and workers who will use the facility are made clear and taken into account in the design process. The Director of Estates and Buildings is responsible for ensuring that all new building and refurbishment work in containment laboratories meets the required/agreed specification.

Arrangements and responsibility for preparation of local rules must be included in the Departmental safety policy but this is expected to be within the following framework.

Each laboratory must have clear documented local rules indicating the working practices that must be followed for activities in that laboratory. Individual workers must have access to and adhere to local rules. The Research Group Leader/Principal Investigator of a given research group, or the supervisor/manager of a unit or work area, is responsible for ensuring local rules are in place and are complied with. These should be tailored for local conditions and activities.

When drawing up local rules and procedures note should be made of the following two points:

- There should be no need for workers in laboratories to routinely disinfect their hands. It is very bad practice to spray hands with alcohol as this will damage the integrity of the skin and upset the balance of the normal skin microflora. Skin disinfectants are for use in clinical settings. All workers should wash their hands regularly whilst working in the laboratory, and always before leaving. Standard handwash products are suitable for this and there is no need to use specialist antimicrobial products. Cloth towels must not be used in laboratories. Single use paper towels are recommended.
- Procedures for the laundering of potentially contaminated clothing, e.g. laboratory coats, gowns, etc, must be clearly laid down in the departmental health and safety policy – such items must never be worn, or otherwise taken, out of the School until they have been rendered safe. Laboratory coats from containment level 3 facilities must be autoclaved before laundering. Coats used in containment level 2 areas

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should be sent for laundering as soiled linen or if grossly contaminated (for example following an accident) be autoclaved first.

Risk assessments should include cross-reference to the local rules. This pre-empts any need to write out or duplicate the information within the risk assessment and ensures consistency in standards.

Further information on the working practices that are fundamental to containment, and the reason for them, are described in the guidance on good microbiological practice and containment see section 5.3 and the Safety Office website.

## 5.6 Good Housekeeping

Good housekeeping is important in all types of laboratories but it is especially so in microbiological laboratories, and in other laboratories handling biological materials. Cleanliness is fundamental to minimising any contamination and ensuring a safe working environment. In order to facilitate cleaning, the laboratory should be tidy with no clutter or unnecessary items on benches and floors. It is also important that in the event of a spillage this does not seep into, onto or under items that need not be there.

Benches, floors and any items that may become contaminated should be easily cleanable. At the end of each working session or day, benches should be tidied and cleaned and, where appropriate, disinfected. Used culture plates and media should be disposed of as soon as they are no longer required to minimise growth of contaminants etc. Generally, items should not be stored in cardboard boxes, especially on floors, as these are impossible to clean. Cardboard boxes should never be used in cold rooms because they tend to become damp which encourages growth of moulds. Laboratory sinks should also be regularly cleaned and disinfected.

The Head of Department should allocate day to day responsibility for housekeeping in shared or multi-user facilities to a named member of staff to ensure satisfactory standards are maintained. Cold rooms are areas where housekeeping is often poor, often leading to mould contamination of walls and ceilings, equipment and experimental materials. This can result in unhealthy exposure to mould spores of workers entering the cold room. Attention should be paid to avoiding conditions where mould will result and any growth should be cleaned and disinfected as soon as it is observed.

Laboratories or similar facilities that are clean and tidy and have good standards of housekeeping are usually ones where there also is good management, organisation and working practices. Safety inspections often focus on housekeeping and workers should not underestimate its relevance to safety and should pay appropriate attention to this detail.

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As part of the housekeeping regime it should be ensured that hand wash sinks (including the taps) are regularly cleaned, and soap and paper towels are always available. If liquid soap is used in a containment laboratory this should be in a dispenser and, to prevent the multiplication of any contamination, dispensers should not be topped up from other bulk stocks. Single use paper towels are recommended for drying hands. Cloth towels must not be used.

## 5.7 Signs

To be effective safety signs must be used judiciously. Signs must indicate current conditions and be regularly checked for validity.

Each Dean of Faculty together with the Head of Department is responsible for ensuring laboratories or other facilities where biohazardous micro-organisms or materials are present are labeled at the point of entry with:-

- an international biohazard sign, which comprises a black biohazard symbol in a black triangle on a yellow background (a hazard warning sign),
- the words Containment Level followed by the number of the level of containment at which the laboratory or facility is operating (this should be fixed immediately adjacent to the biohazard sign and also have markings/words in black on a yellow background), and
- a prohibition sign restricting access to authorised persons only.

Laboratories and similar facilities where blood and/or clinical samples are handled must operate as a minimum at Containment Level 2 and display the appropriate signs.

The following signs should also be considered and used as appropriate to reinforce local rules and procedures:

- at the point of exit – the mandatory sign indicating hands must be washed before leaving;
- in a prominent place – the mandatory sign indicating laboratory coats must be worn;
- at a dedicated hand wash basin – the mandatory sign indicating this sink is to be used for hand washing only.

The use of biohazard signs or labels within a containment laboratory or facility should not generally be required and should not be used unnecessarily. The displaying of a

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label on the door as described above indicates it is a containment area and restricts access to those persons authorised to enter. These people should have been instructed on the procedures that must be followed whilst in the area and any hazards they may encounter and they therefore know biohazards are to be expected. Only in exceptional circumstances, for example following an accident, should any area of benching or equipment be contaminated to such an extent that it requires to have a biohazard sign (label or tape) displayed on it and where used this should be taken to indicate a significant hazard or one greater than would normally be expected. The labeling of fridges and freezers for example is unlikely to serve a useful purpose, it is only to be expected that biohazardous material will be contained therein and in any case materials must be stored safely such that no exposure will occur to anyone using the fridge or freezer. In the case of storage it may however be prudent depending on usage, especially if shared or mixed or for higher risk materials, to use the biohazard sign on particular items for example on the outside of the secondary containment.

## 5.8 Fumigation

Fumigation of microbiological safety cabinets and some containment level 3 facilities is routinely carried out by the University Safety Office environmental team. This usually involves the use of formaldehyde vapour and even at low concentrations this has irritant and toxic properties and carries a risk of respiratory and/or skin sensitisation reactions. At the higher concentrations used for room fumigations it is extremely hazardous and exposure to such levels, even for a short time, would likely result in very serious injury or death.

If the individual departments were to undertake fumigation it is the responsibility of the Dean of Faculty with the Head of Department to ensure appropriate systems are in place to provide safe and suitable procedures. In conjunction they must ensure adequate and appropriate instruction, training and supervision is provided for all workers undertaking fumigation procedures. They should also ensure that suitable arrangements are in place to monitor and review working practices.

## 5.9 Liquid Nitrogen

Cryogenic storage of biological materials in liquid nitrogen is commonplace and it is important that workers are aware of the potential hazards associated with the use of liquid nitrogen. These fall into three main areas:

- Temperature – the extremely cold temperature of  $-196^{\circ}\text{C}$  means there is a very serious risk of cold burn on contact with the liquid. Items that have been in the liquid are cold and when touched may freeze to and stick to the skin. On

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evaporation, whilst unlikely to cause skin damage, the gas can cause damage to eyes and lungs.

- Explosion – if samples are stored in tubes in the liquid phase of the vessel, liquid nitrogen may seep into the tube. When the samples are removed and warmed, the liquid nitrogen changes to a gas rapidly expanding in volume and may cause the tube to explode. Certain materials when immersed in liquid nitrogen become brittle and may shatter unexpectedly.
- Asphyxiation – when liquid nitrogen evaporates and changes from a liquid to a gas there is a huge expansion of nearly 700 times in volume (1 litre of liquid gives 0.7m<sup>3</sup> of gas). A spillage of just a few litres of liquid in a poorly ventilated room would lower the oxygen concentration to such an extent that a person in or entering the room can lose consciousness and die.

Each Dean of Faculty along with the Head of Department is responsible for ensuring appropriate systems are in place to provide safe and suitable procedures for use of liquid nitrogen in biological laboratories and associated facilities. In addition, they must ensure adequate and appropriate instruction, training and supervision is provided for workers using liquid nitrogen. They should also ensure arrangements are in place to monitor and review working practices.

When drawing up local rules and procedures note should be made of the following points:

- Eye protection, most appropriately in the form of a full face visor, thermal gloves and suitable footwear must always be worn when cryogenic liquids are being handled.
- Liquid nitrogen should be decanted into Dewar flasks which are designed for this purpose; if domestic thermos flasks are to be used as liquid nitrogen containers they should be made of stainless steel rather than glass.
- Ideally liquid nitrogen should not be carried in occupied lifts.
- Where significant volumes of liquid nitrogen are handled it is likely that additional low level, high volume ventilation will be required and the use of oxygen depletion monitors should be considered. Further advice can be obtained from the Safety Office.

It is worth noting that there have been at least two deaths from asphyxia in recent years in academic institutions as a consequence of the use of liquid nitrogen (in Australia and Scotland).

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## 6. Equipment

### 6.1 General

Each Dean of Faculty along with the Head of Department is responsible for ensuring appropriate systems are in place to provide safe and suitable equipment for use in biological laboratories and associated facilities. In addition, they must ensure adequate and appropriate instruction, training and supervision is provided for workers using the equipment. They should also ensure arrangements are in place to monitor and review arrangements and working practices.

Individual workers must always closely follow instructions provided for use of equipment, use it only for the purpose it was intended and never tamper with or over-ride any safety related devices. Documented operating instructions should be available for all pieces of equipment. For some items of equipment the manufacturer's instructions will provide adequate systems of work whereas for others a local standard operating procedure should be drawn up applicable to the particular usage of the equipment.

Equipment must be maintained and, where necessary, tested to demonstrate it is working effectively. Further guidance on some of the common types of equipment used in biological laboratories can be provided by the Safety Office if required. The most significant safety related items are microbiological safety cabinets and autoclaves for which there are some specific requirements as follows.

### 6.2 [Microbiological Safety Cabinets/Individually Ventilated Animal Cages \(IVC's\)](#)

Cabinets and cages must be properly installed and commissioned and prior to use, a cabinet must pass the performance tests specified in an acknowledged standard (In this specific case the Safety Office works to the British Standard). The test requirements are quite detailed, and require competent persons to undertake the work for it to be carried out properly. This therefore forms part of the service offered by the Safety Office. Similar requirements apply when cabinets are moved or relocated. All microbiological safety cabinets and IVC's must be serviced on an annual basis and undergo examination and test at that time. A record should be kept by the department for at least 5 years of the examinations and tests and of any repair carried out.

[Detailed information on microbiological safety cabinets](#) is provided on the University's Safety Office website. Workers must refer to and follow this guidance. The requirement for a safety cabinet/IVC, and where required, the type or class, of safety cabinet, should be determined as part of a risk assessment of the work to be undertaken.

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## 6.3 Autoclaves, Boilers and Pressure Vessels Safety

Chapter 56 "**The Boilers and Pressure Vessels Ordinance**" is administered by the government labour department and applies to establishments using boilers and pressure vessels including thermal oil heaters, steam receivers, steam containers, air receivers and pressurized cement tanks mounted on trucks and trailers. The legislation regulates the standards and operation of these boilers and pressure vessels, and requires them to be registered and examined before being put into use and periodically thereafter. This legislation includes autoclaves and pressure cookers.

"Each Dean of Faculty along with the Head of Department must ensure all autoclaves are only operated under the control of persons possessing the relevant certificates of competency, as required by law"

Where an autoclave is used to decontaminate or make safe waste, the process should be validated at least annually and at any other times when the previous test may no longer be valid (such as part of re-commissioning after maintenance work). Records of validation should be kept for at least 5 years.

It is worth noting that the Labour Department, Boilers and Pressure Vessels Division, conducts regular spot checks on pressure equipment. It also conducts examinations associated with the issue of Certificates of Competency, investigates accidents and undertakes activities to promote safety.

## 7. Disinfection and waste disposal

### 7.1 General

The use of chemical disinfectants, normally in the form of proprietary products specifically for use in laboratories, is a widespread and important control technique in biological laboratories. Laboratories in the University where micro-organisms and other hazardous biological materials are handled should routinely use chemical disinfection to decontaminate surfaces and equipment, and prevent microbial growth in spent culture fluids etc.

Wherever possible the use of disinfectants should be consistent throughout a Department rather than varying between laboratories although different types of work may need particular types of disinfectant. If possible, the number of different disinfectants used in a laboratory should be reduced to a minimum to avoid mistakes in application. Adequate information and instructions must be given to all workers to ensure they know what disinfectant to use and how to use it.

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Each Head of Department must ensure there is a clear documented disinfection policy indicating suitable concentrations, contact times and applications for all disinfection requirements within the department. Workers must follow the local policy and new disinfectants should not be introduced without first consulting the Safety Office.

## 7.2 Chemical Disinfectants

Care must be taken to ensure that the disinfectant used is appropriate for the task in hand, and is, in fact, effective against the biohazards likely to be present. All disinfectants are by their nature hazardous to human health although the extent varies considerably. Some disinfectants, such as formaldehyde and glutaraldehyde, have irritant and toxic properties, are extremely hazardous and carry a risk of respiratory and/or skin sensitisation reactions. These types of chemical disinfectants must not be used as a general disinfectant in the laboratory, may only be used for specialised tasks when no suitable alternative is available, and only then when a strict risk assessment has been undertaken.

If it is necessary to use an aldehyde based disinfectant, potential health effects must be anticipated before work commences, and adequate protection, with particular emphasis on ventilation control, supplemented where appropriate by personal protective clothing and equipment, must be detailed in the relevant risk assessment, and must be employed at all times, to minimise exposure as far as is practicable. Health surveillance must be put in place if identified as being required as part of the assessment. Any instance of suspected sensitisation must be reported immediately using the University accident reporting system (see 10.3) and medical advice must be sought.

## 7.3 Disposal of Waste

Certain wastes arising from biological laboratories require specialist disposal as clinical waste because they may contain infectious micro-organisms. Some of the wastes may also have components that are regarded as unacceptable to be placed in the general waste stream and these, even if they are rendered non-infectious by some sort of pre-treatment, must always be disposed of as clinical waste. The disposal of clinical waste is tightly regulated and must be in accordance with strict legislative requirements.

The Dean of Faculty, together with Heads of Departments, is responsible for the management of waste arising in areas under their control. They must ensure all biological wastes produced are disposed of in accordance with the University Code of Practice by incorporating the requirements into clear documented local rules and procedures.

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Workers must follow the local rules and procedures. Each worker in the University must ensure that waste is managed properly and disposed of safely and in accordance with legal requirements. Each Head of Department must ensure adequate instruction, equipment, training and supervision is provided to enable all workers to carry out their responsibilities.

Work in biological laboratories may also produce other hazardous wastes. Guidance, on the safe disposal of chemical substances is available on the [Safety Office website](#).

## 8. Transport

### 8.1 General

Certain biological samples, cultures and other materials fall within the description of dangerous goods for carriage and both national and international legislation demand stringent requirements must be met if the goods are transported by any means. All workers in the University must ensure Regulations applicable to the transport of biological materials are complied with for each particular consignment and not carry, consign, package or play any other role in the transport chain if they are not competent to do so.

Heads of Departments must ensure that all persons undertaking any role in the transport chain are properly trained and have a detailed understanding of the relevant Regulations to ensure they are able to undertake their responsibilities to the required standards. The level of training should be commensurate with those responsibilities. Even if the particular biological material to be transported is not hazardous and does not fall under the description of dangerous goods, the item still must be packed safely for carriage.

Detailed guidance on the transport of biological materials is provided on the University's Safety Office website (also see 8.2 and 8.3 below).

Any problems occurring during transport, such as leakage or breakage, should be reviewed in order that corrective measures can be taken to prevent any recurrence. If workers in the University receive packages that are not properly packaged or labeled they should contact the originator to advise of the problem and ask that any future packages meet the legislative standards.

When transporting samples particularly those of a potentially infectious nature (including bloods and clinical samples) a number of issues should be taken into account.

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- Work should be organised in such a way as to minimise transport of samples around a building and they should only be transported between buildings when absolutely necessary.
- When it is necessary to transport biological materials between buildings both primary and secondary leak proof containers must be used. The secondary container should hold enough absorbent material to surround and contain the sample should any breakage occur.
- Carrying unpackaged tubes on their own or in racks in public areas such as corridors and lifts should be avoided. For transport between laboratories, screw capped tubes are preferable to flip top eppendorf tubes and the use of open or stoppered glass tubes should be discouraged because of the potential for breakage if they should be dropped.

## 8.2 Transport on the University Campus.

For any transport between buildings of known or potentially biohazardous materials a sealed primary container must be placed into a sealed secondary container bearing a biohazard label on which the name of the material has been written. If the primary container is glass, a rigid, unbreakable secondary container must be used, as broken glass may penetrate a sealed plastic sample bag. Paper towels or other absorbent material should be used to separate primary glass containers from each other and from the secondary container to minimize the potential for breakage. The amount of absorbent used must be sufficient to absorb the contents of the primary container. Appropriate decontamination of the exterior surfaces of the primary and secondary containers should also be carried out.

For transport to other Universities in Hong Kong or journeys that involve crossing or navigating public highways, for example carrying material from the main campus to buildings on the Sassoon road site, rigid leak proof primary and secondary containers with absorbent material incorporated to contain any spill is required.

## 8.2 Transport within Hong Kong

Guidance for the transport of biological materials within Hong Kong is provided on the Safety Office website and includes sub-sections on using couriers and postal services. All University staff and students must refer to and follow the guidance relevant to their activities.

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## 8.3 Transport Abroad

For transport of samples abroad, anyone sending biological materials by air must ensure they comply with the IATA Dangerous Goods Regulations. All information in these Regulations relevant to the transport of biological materials abroad has been summarised and supplemented with guidance on interpretation in University guidance available on the Safety Office website. All University staff and students must refer to and follow the guidance relevant to their activities.

For transport of infectious agents and clinical specimens to (or from) other countries it is recommended that a specialist firm is employed as import and export licenses may be required. Compliance with UN international regulations on packaging will also be required and this can be quite involved. Please also note that these regulations specify that anyone packing dangerous goods (including infectious organisms) must be trained by an accredited organisation and will require recertification on a regular basis.

## 9. Training and Supervision

### 9.1 General

As part of the induction procedures when first arriving, all persons working in the University should be made aware of the University Health and Safety Policy and of any other local health and safety policies made at Faculty and departmental level and below. All persons studying or working in biological laboratories must receive information, training and supervision appropriate for the work undertaken, so that risks to the health and safety of all persons involved are controlled. Each Dean of Faculty together with the Head of Department is responsible for ensuring appropriate systems are in place to provide adequate and appropriate induction, training and supervision for workers in biological laboratories. They should also ensure that suitable arrangements in place to monitor and review the levels of supervision and training received in practice.

The Research Group Leader/Principal Investigator of a given research group, or the supervisor/manager of a unit or work area, is required to give careful attention to the health and safety of those under their supervision. They should ensure all workers they are responsible for supervising receive the appropriate safety information and training and that this is suitably documented (see 9.2). In order to effectively discharge these responsibilities, those with supervisory or managerial roles must themselves be competent in safety related matters and, where necessary, should seek additional training (or refresher training) as appropriate.

To fulfill its function, the degree of supervision must have reasonable regard for the level of training and expertise of the staff or students being supervised. Young and

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inexperienced workers will require a greater level of supervision than those who are more experienced (see 9.4). Provision of adequate training and supervision applies not only to work on University premises but also to University work carried out elsewhere either in the UK or abroad.

For all workers, specific laboratory training should as a minimum include familiarisation with local rules and working practices, use of personal protective equipment (lab coat, gloves, eye protection), use of microbiological safety cabinets, disinfection procedures, waste disposal procedures, accident and emergency procedures and discussion of relevant risk assessments.

The University Safety Office offers training courses on various biosafety related topics and attendance at relevant sessions should be regarded as part of the training for workers handling biological materials. Further information on these biosafety training courses is available on the Safety Office website. Under some circumstances specific sessions on topics of particular interest to a department can be arranged.

## **9.2 Training Records**

While international practice varies in keeping records of training for work at containment levels 1 and 2 the Safety Office wishes to encourage Heads of Department to adopt a more systematic and thorough approach to training. The keeping of training records is one way of promoting this aim. Many of the basic procedures and control measures are common to all laboratories and the form can be tailored as appropriate for the different areas of work carried out. This proforma can be used as the basis of a training record for all biological workers at Containment Levels 1 and 2 including work with blood and human tissues, pathogens and genetically modified micro-organisms. For those undertaking work with pathogens or GM work at Containment Level 3, a more specific and detailed training programme will be required for the activities in a CL3 facility and a separate or supplementary record should be kept for this. The Research Group Leader/Principal Investigator or the supervisor/manager is responsible for maintaining the training record for each person for whom they have responsibility.

## **9.3 Single/Lone Working and Out of Hours Working**

Each Dean of Faculty in consultation with Heads of Departments should ensure any work is prohibited which entails a risk of serious personal injury or fire by persons working alone in the evenings or at weekends, irrespective of the status and experience of the worker. Generally work with biological materials does not present an immediate risk of serious injury and there is no reason why work with high risk biological materials cannot be undertaken by lone workers or out of hours. However, it must be

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remembered that the work may be associated with other risks in the laboratory and these must be assessed against the restriction given above (also see 9.4).

Where single/lone working and out of hours working occurs, there must be appropriate monitoring to ensure standards of working practices are maintained when individual workers are on their own without any immediate supervision.

#### **9.4 Young Persons and Inexperienced Workers**

The level of training and supervision required by young persons (16-18 years old) and inexperienced laboratory workers of any age will be greater than that required of more experienced workers. Supervisors should clearly identify training needs as part of induction procedures and work should be carried out under close supervision until it has been confirmed that individuals are competent to carry out their work safely.

Undergraduates, young persons and inexperienced workers should only be allowed to carry out practical laboratory work in the evening or at weekends if explicit permission is given on each occasion by their supervisor and adequate supervision is employed (also see 12.5). If the supervisor is not a senior member of the academic staff then one who is must agree to the granting of the permission and only do so after they have satisfied themselves as to the individual's competency.

## **10. Accidents and Incidents**

### **10.1 General**

Most accidents and incidents can be avoided with good management systems in place. Each Dean of Faculty together with the Head of Department is responsible for ensuring the health and safety of all persons on their premises and must make appropriate arrangements to minimise the likelihood of accidents, incidents or instances of occupational ill health occurring.

All accidents and incidents that do occur should subsequently be reviewed by the individual(s) involved in conjunction with their immediate supervisor. The cause of the accident or incident should be established and it should be possible to identify what should be done to prevent any recurrence. Accidents and incidents should also be monitored and reviewed at Faculty level to identify any improvements that are necessary. Any remedial action identified must be implemented and any lessons learnt should be communicated widely within appropriate Faculties to others who may benefit from the information. However, care must be undertaken to protect the confidentiality of individuals involved in particular accidents.

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The potential seriousness of accidents involving biological materials should not be underestimated. All workers must be made aware of the consequences should they be exposed to biohazardous materials. In some cases, for example blood carrying HIV or hepatitis B, a life long infection may develop that will have a serious detrimental effect on their health and quality of their life and that of their immediate family. Needlestick and sharps injuries are particularly serious and each Head of Department must ensure all workers handling needles and sharps receive instruction and training on safe procedures. Workers in the University must refer to and follow the guidance on [avoiding sharps and needlestick injuries](#) available on the Safety Office website. Particular care should be taken to ensure that others in the laboratory do not help with the clear up of accidental spillage (especially where there has been an accident that involves broken glass) unless they are aware of the potential risks and trained in safe working practices.

Accident procedures are described in detail below and summarised in the Accident Procedures – glass and sharps flow chart. A copy of the flow chart and/or summary of appropriate procedures should be displayed in areas where infectious or potentially infectious materials are handled.

## 10.2 First Aid

In the event of an accident or incident in a biological laboratory, workers in the University must take immediate action to reduce the risk of infection developing. However this should not be at the detriment of treating other more serious injuries which should always take priority. The following should therefore be read in context of appropriateness to the particular accident or incident.

Immediately following ANY exposure to biological materials, irrespective of whether or not the source is known to pose a risk of infection, the site of exposure e.g. wound or non-intact skin should be washed liberally with soap and water but without scrubbing. Antiseptics and skin washes should not be used – there is no evidence of their efficacy, and their effect on the body's own defence systems is unknown. Free bleeding of puncture wounds should be encouraged gently but wounds should not be sucked. Exposed mucous membranes, including conjunctivae, should be irrigated copiously with water, before and after removing any contact lenses. In the event of a serious injury requiring medical attention, individuals should attend the Accident and Emergency Department/Minor Injuries Unit of the local hospital.

The University Health Service should be informed immediately in the event of any accident where exposure to a pathogen, genetically modified micro-organism or potentially infectious material may have occurred – it is important that the need for any prophylactic treatment or health surveillance be assessed on a case by case basis by

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medical personnel. Alternatively, for example out of normal working hours, the Accident and Emergency Department/Minor Injuries Unit of the local hospital should be contacted.

### 10.3 Accident Reporting

In the event of an accident or incident occurring, the individual(s) involved must inform the manager/person who has responsibility for the particular area and if this is not their immediate supervisor they must also inform them. The individual and the manager/supervisor have a responsibility to ensure an accident and incident, or occupational ill health, report is completed. All accidents and instances of occupational ill health (illness reliably attributed to a work activity) must be reported to the Director of Health and Safety as soon as possible after the incident has occurred, and in any case within seven days, so that the requirements of The Employees' Compensation Ordinance, Cap. 282 may be met. This ordinance requires an employer to report to the Commissioner for Labour any work accident or specified occupational disease in the University on an appropriate form within a specified time period. Any reporting required under these Regulations will be undertaken by the Safety Office. No accident should be considered too trivial to report although not all will be reported to the Labour Department. Near misses that could have had serious consequences should also be reported. Details of the accident etc. reporting system in the University and forms are available on the [Safety Office website](#).

Recent proposals to update the Quarantine and Prevention of Disease Ordinance (Cap 141) in order to implement the new WHO International Health Regulations (2005) include a requirement to notify the department of health if any accident occurs with certain high risk pathogens listed in an appendix. Along with this is a further proposal that gives a Health Official the right to seize and destroy the material being handled when the accident occurred. This section will be updated as and when the legislation comes into effect

### 10.4 Emergency Plans

Each Dead of Faculty along with the departmental head is required to ensure arrangements are made to deal with emergencies and other untoward events that may arise in areas where biological work is carried out. These would be events not usually expected during the course of day-to-day work activities. Examples would include, but are not limited to, fire or flooding. The arrangements should be documented in an emergency plan that should include:

- the foreseeable types of incidents, accidents or emergencies that might occur;
- the role, responsibilities and authority of individuals during an emergency;

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- procedures for workers to follow – including identifying the special needs of any disabled workers;
- the safety equipment and personal protective equipment to be used;
- first aid facilities;
- procedures for cleaning up and disposal of waste;
- reporting procedures;
- a programme for regular safety drills or practice; and
- a post-incident review investigating what happened and why, how it was dealt with and whether any amendments are required to the emergency plan.

Specific and detailed arrangements must be made in relation to containment level 3 facilities taking account of the potential for exposure to dangerous pathogens in varying emergency situations. Entry into such facilities is tightly restricted and contact details of an authorised user must be available in order they can provide advice and supervised access in the event of an emergency.

All workers must be made aware of what action they need to take in the event of an emergency and those with specific roles must receive training in order for them to carry out their responsibilities effectively.

## 11. Occupational Health

### 11.1 General

The University Health Service (UHS) has expertise in Occupational Health and advises both the University's managers and workers on all aspects of occupational health. It is totally independent, impartial and completely confidential. If individuals have concerns about the effect of any work activity on their health they should seek advice from the UHS or, if they prefer, from their own General Practitioner. A Dean of the Faculty or Head of Department may refer a worker to the UHS if they have concerns about an individual's health. Contact between an individual and the professional staff of the Unit is subject to medical confidentiality and medical information will only be disclosed to others with the consent of the individual concerned, irrespective of whether contact is by self-referral or by a supervisor or manager.

Where necessary and in consultation with the safety office the UHS will provide or arrange for any health surveillance identified as being required for a particular work activity.

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The UHS must be informed immediately in the event of any accident or incident where exposure to a pathogen, genetically modified micro-organism or potentially infectious material may have occurred. This will enable the need for any prophylactic treatment or health surveillance to be assessed on a case-by-case basis by medical personnel. Alternatively, for example out of normal working hours, the Accident and Emergency Department/Minor Injuries Unit of the local hospital should be contacted.

## 11.2 Immunisation

The University offers immunisations to individuals who may be exposed to pathogens at work, where an effective vaccine is available. Deans of faculty along with Heads of Departments are responsible for ensuring that the requirement for any immunisations be considered and determined as part of the risk assessment process. The UHS will provide any immunisations identified as being required for a particular work activity. The UHS can be contacted for further advice on immunisations.

The UHS undertakes a well-established immunisation programme which targets certain groups of workers. For example, those who may be exposed in the course of their employment to human blood or body fluids are required to receive Hepatitis B immunisation. Specific immunisations, travel and health advice will also be provided to workers at risk of developing disease while on University business abroad.

A minimum requirement for animal house staff and veterinary workers should be immunisation against tetanus, for those not already immune. It must be noted however, that immunisation against tetanus is part of routine childhood immunisations and therefore most adults are already immune. Boosters are not recommended other than at the time of tetanus prone injury since they have been shown to be unnecessary and can cause considerable local reactions.

If any member of the University chooses to reject advice to receive an immunisation, a signed declaration should be obtained to this effect. Immunisation must always be regarded as a back up rather than a control measure, and must never be regarded as a substitute for safe working practices.

## 12. Access to Biological Laboratories by non-laboratory personnel

### 12.1 General

Access to University laboratories and other facilities where biological work is carried out (containment laboratories) must be limited to those persons who have a valid reason to enter the laboratory. At containment levels 2 and above access should be restricted to authorised persons.

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From time to time it will be necessary for persons other than laboratory personnel to require access to laboratory areas. Such access may be required regularly, for example by cleaners, or only intermittently, as would be expected for maintenance and repair work. Other individuals may visit for a variety of reasons. Each Head of Department is responsible for ensuring the health and safety of all persons on their premises and must have appropriate systems in place to control access to biological laboratories. They should also ensure that suitable arrangements are in place to monitor and review access controls and how they work in practice.

Appropriateness in terms of controlling access will vary depending on the nature of the access required. The different types of access likely to be required must be reviewed, the associated risks assessed and how each is to be managed addressed by incorporating procedures into local rules. Further guidance for departments, which they are expected to refer to and follow, is provided on the Safety Office website in the sections detailed below.

Anybody and everybody who enters a laboratory where biological work is carried out should be made fully aware of the hazards they may encounter in the area and be given information on what they should and should not do whilst in the laboratory in order to prevent and control any exposure to biohazardous materials.

## **12.2 Repairs and Maintenance Work in Biological Laboratories**

Entry of maintenance staff and contractors into biological laboratory areas must only be by agreement with those in charge of the area concerned and in the event of an accident only after the area is made safe. One way to control who enters the department including laboratory areas is to adopt a permit-to-work system. This is a well tried and tested system commonly used in industrial settings and building sites to control hazardous activities. If departments were interested in adopting this type of system please contact the Safety Office.

Entry to Class 3 laboratories must be tightly controlled and unauthorised persons should not be able to gain entry except by specific arrangement with one of the authorised laboratory workers and only after the area has been made safe. Workers carrying out repair or maintenance at Class 3 should be accompanied at all times.

In addition, the Head of Department must ensure that all maintenance staff and contractors whose job involves them entering and working in laboratory areas should be provided with information and guidance on the measures they need to take to ensure the safety of themselves and others whilst they are in the laboratory.

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### 12.3 Cleaning of Biological Laboratories

Arrangements should be put in place to ensure the safety of cleaners in laboratories.

### 12.4 Visitors

Only persons who have a valid, laboratory work related reason for entering a laboratory should be given access as a visitor. Casual access, for example by family, friends, office-based colleagues etc, should be discouraged.

Dogs and other pets are not allowed in University buildings, with the exception of assistance dogs. However, assistance dogs must be excluded from entering biological laboratories until risks have been assessed and specific control measures put in place to ensure the health and safety of the animal, and that safety standards in the laboratory are not compromised. The University Biological Safety Officer should be consulted for advice in such cases.

### 12.5 Children and Young Persons

Children (under 16 years of age) must be excluded from entering all laboratories where biological work is carried out. There may however be some occasions where access by children is required for a specific purpose, for example in the case of organised educational visits and open days. These would be regarded as exceptional cases and may proceed subject to agreement of the Dean of Faculty or Head of Department and specific arrangements being put in place to ensure the health and safety of the children whilst visiting the laboratories. The areas should be rigorously cleaned and disinfected and all infectious and potentially infectious material moved or otherwise made inaccessible. The children must be accompanied and supervised at all times when they are in biological laboratories. For group visits the level of supervision must be adequate for the numbers involved.

Young persons (16–18 year olds) who are not employees of the University must be accompanied and supervised at all times when they are in biological laboratories. Young persons on work experience or youth employment schemes and others not directly employed by the University should not work with blood, blood products or pathogens (also see 9.4).

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## 13. Monitoring, Inspection, Audit and Review

### 13.1 General

The University has made various arrangements, primarily as set out in the Health and Safety Policy, for ensuring the health and safety of its workers and others who may be affected by its activities. There is a need for procedures to be in place to confirm that these arrangements are effective and remain valid. For biological work the arrangements are supplemented by additional arrangements made at faculty and departmental level and below and these are implemented within the various work areas. Each Dean of Faculty along with the Head of Department has a responsibility to ensure all such arrangements are suitable and effective, and are appropriate for the particular work activities carried out. There are various means by which this should be achieved and the following are expected to be in place.

### 13.2 Monitoring

Monitoring tends to be on an informal basis but it has an important role in every day activities. All persons with supervisory or managerial roles, and those appointed to safety related roles, should routinely monitor working practices and have a responsibility to identify any instances where the required safety standards are not met and ensure that appropriate corrective action is taken to improve the situation. If they are aware of any safety-related problem in an area for which they themselves are not responsible then they must bring this to the attention of the person whose responsibility it is or to a more senior member of staff.

All workers in the University are directed to take notice of what is going on around them and report to their supervisor, or to a more senior member of staff, any instances where University policy is not being followed or any other safety-related concern they may have.

### 13.3 Inspection and Audit

Inspections mainly involve observation of facilities and working practices with a view to assessing whether standards are adequate when compared to those required for the particular work activities. Audits look at implementation of the health and safety management system to verify whether the documented procedures and arrangements are being followed in practice – in other words, to check that the sentiments and intentions expressed in the various documents actually translate into what is happening in practice. Often there is considerable overlap between inspection and audit and usually these are carried out in parallel. It must be remembered however that both of these are required.

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The dean of the faculty together with the Head of Department is responsible for ensuring that regular and systematic local health and safety inspections and audits are carried out in order to scrutinise health and safety standards and the effectiveness of the health and safety management systems in place. The purpose of inspections and audits is to identify any unsafe or unhealthy conditions or work practices that may already be occurring and to prevent any arising in the future. Inspections and audits should be recorded and included within the report should be the remedial action that may be required, who is to undertake it and in what timescale. Procedures should be in place to follow up and ensure any recommendations made are carried out.

The findings of audits and/or inspections should be recorded and these should be retained with a record of actions taken to address any recommendations. Interested parties, such as Labour Department Inspectors, the University's insurers or members of the Safety Office, may wish to see these documents and they should be made available on request.

Central auditing programmes carried out by or in conjunction with the Safety Office, will also contribute a higher level view.

#### **13.4 Review**

In order to ensure that health and safety arrangements remain valid it is necessary to undertake periodic reviews that take account of any changes in work activities, any new information on risks or technological advances in particular work areas, management and organisational changes, the results of inspections and audits, and any changes in relevant legislation and best practice recommendations.

The University Biological Safety Officer is responsible for monitoring changes in legislation and expert guidance relevant to biological work and, where necessary, updating University Biosafety Policy and associated University guidance. Information on any changes shall be disseminated within the University to ensure any amendments required to local arrangements within Faculties and Departments are identified.

The Deans of Faculties along with Heads of Departments are responsible for ensuring regular reviews are undertaken of the health and safety arrangements (local policies, procedures etc.) in the areas for which they are responsible to confirm they are appropriate and are working effectively. Where it is identified that any improvements to arrangements should be made then these must be implemented. Serious consideration should also be given to any other changes that could result in improved or better standards of health and safety management and standards.

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## APPENDICES

The following duties and responsibilities are abstracted from the University Biological Safety Policy and background document. They are provided as a summary list and should be read in conjunction with the full text of the biological safety policy. Where the duties or responsibilities are duplicated in different sections of the full text, only the first occurrence is included in the list. Some minor editing has been done in places to either give context to the paragraph or omit sections of text. The sections referred to enable the reader to locate the text within the whole document. In parts of this policy it has been intentional to make no distinction between the roles and responsibilities of the Deans of Faculties and the roles and responsibilities the Heads of Departments. Consequently parts of Appendix B are repeated directly in Appendix C.

### APPENDIX A General Duties and Responsibilities of all Staff and Students

It is the general obligation of all University employees and students to observe those parts of the University Biological Safety Policy that are relevant to their own work as well as observing any additional local rules and regulations on biosafety.

#### Section 5.1

All those who work with pathogenic micro-organisms and potentially biohazardous materials must do so within a framework which will provide the containment and protection appropriate to a reasonable and informed assessment of the risks involved. A safe system of work will generally arise naturally out of such a risk assessment because many of the necessary control measures should be incorporated as fundamental and routine parts of everyday working in biological laboratories.

It is the responsibility of all persons routinely engaged in work with potentially infective materials to give serious consideration to the possible effects of this work on the health of themselves, their colleagues and the community as a whole. A collective awareness of infective hazards should be fostered and prompt steps taken to investigate the unexpected absence from work of any co-workers.

#### Section 5.5

Individual workers have a duty to work in accordance with the containment requirements determined to be safe for the activities they carry out.

#### Section 6.1

Individual workers must always closely follow instructions provided for use of equipment, use it only for the purpose it was intended and never tamper with or over-ride any safety related devices.

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## **APPENDIX B** Duties and Responsibilities of the Deans of Faculties

### **Section 3.1**

It is the duty of the Deans of Faculties to ensure that all aspects of the Councils Health and Safety Policy is implemented within their area of responsibility.

Deans along with the Heads of Departments are expected to make all relevant persons aware of any hazards associated with biological materials encountered during the course of their work. They must also ensure that working procedures designed to minimise the risk are adopted.

### **Section 3.2**

It is the responsibility of the Dean to establishing a faculty safety and health committee which will include departmental safety representatives. The committee will be chaired by the dean or an appointed senior academic.

### **Section 3.6**

The Head of Department along with the dean of the faculty shall ensure that an adequate risk-based security plan is implemented and *where appropriate* security risk assessments are carried out (this should be determined on the basis of the organisms being handled by the department and is most relevant for Class 3 work).

### **Section 4.1**

Each Dean of Faculty in consultation with the Head of Department is responsible for ensuring that work with biological materials is only undertaken in facilities that are suitable for the purpose, using appropriate working practices.

### **Section 5.7**

Each Dean of Faculty together with the Head of Department is responsible for ensuring laboratories or other facilities where biohazardous micro-organisms or materials are present are labeled at the point of entry.

### **Section 5.8**

If the individual departments were to undertake fumigation or store liquid nitrogen it is the responsibility of the Dean of Faculty with the Head of Department to ensure appropriate systems are in place to provide safe and suitable procedures. In conjunction they must ensure adequate and appropriate instruction, training and supervision is provided for all workers undertaking fumigation procedures. They should also ensure that suitable arrangements are in place to monitor and review working practices.

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### **Section 6.1**

Each Dean of Faculty along with the Head of Department is responsible for ensuring appropriate systems are in place to provide safe and suitable equipment for use in biological laboratories and associated facilities. In addition, they must ensure adequate and appropriate instruction, training and supervision is provided for workers using the equipment. They should also ensure arrangements are in place to monitor and review arrangements and working practices.

### **Section 6.3**

Each Dean of Faculty along with the Head of Department must ensure all autoclaves are only operated by persons possessing the relevant certificates of competency as required by law.

### **Section 7.3**

The Dean of Faculty, together with Heads of Departments, is responsible for the management of waste arising in areas under their control.

### **Section 9.1**

Each Dean of Faculty together with the Head of Department is responsible for ensuring appropriate systems are in place to provide adequate and appropriate induction, training and supervision for workers in biological laboratories. They should also ensure that suitable arrangements in place to monitor and review the levels of supervision and training received in practice.

### **Section 10.1**

Each Dean of Faculty together with the Head of Department is responsible for ensuring the health and safety of all persons on their premises and must make appropriate arrangements to minimise the likelihood of accidents, incidents or instances of occupational ill health occurring.

### **Section 10.4**

Each Dean of Faculty along with the departmental head is required to ensure arrangements are made to deal with emergencies and other untoward events that may arise in areas where biological work is carried out. These would be events not usually expected during the course of day-to-day work activities. Examples would include, but are no limited to, fire or flooding.

### **Section 11.2**

Deans of Faculty along with Heads of Departments are responsible for ensuring that the requirement for any immunisations be considered and determined as part of the risk assessment process.

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### **Section 13.1**

Each Dean of Faculty along with the Head of Department has a responsibility to ensure all monitoring, inspection, audit and review of safety practices are suitable and effective, and are appropriate for the particular work activities carried out.

### **Section 13.3**

The dean of the faculty together with the Head of Department is responsible for ensuring that regular and systematic local health and safety inspections and audits are carried out in order to scrutinise health and safety standards and the effectiveness of the health and safety management systems in place.

### **Section 13.4**

The Deans of Faculties along with Heads of Departments are responsible for ensuring regular reviews are undertaken of the health and safety arrangements (local policies, procedures etc) in the areas for which they are responsible to confirm they are appropriate and are working effectively.

## **APPENDIX C Duties and Responsibilities of the Heads of Departments**

### **Section 3.1**

Deans along with the Heads of Departments are expected to make all relevant persons aware of any hazards associated with biological materials encountered during the course of their work. They must also ensure that working procedures designed to minimise the risk are adopted.

Heads of Department must ensure the University Safety Policy on safety in biological laboratories is supplemented by local departmental rules relating to specific activities of the department, so that, when read in conjunction with the policy on biological safety, the documents form an effective means of securing the safe use of biological materials, as well as potentially hazardous equipment and hazardous processes.

### **Section 3.2**

It is the responsibility of the Head of Department to establish and chair a departmental safety committee to include departmental safety representative(s), technical and non-academic staff and students. Where the size of the department is small or the level or risk is low enough not to merit the establishment of a safety committee, safety and health should be a standing agenda item on the departmental meetings.

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### **Section 3.3**

To facilitate liaison with the safety office and assist departments in fulfilling their responsibilities for safe working each Head of Department is required to appoint a local safety representative, who along with the head is the first point of contact within a department on safety matters.

### **Section 3.6**

The Head of Department along with the dean of the faculty shall ensure that an adequate risk-based security plan is implemented and where appropriate security risk assessments are carried out (this should be determined on the basis of the organisms being handled by the department and is most relevant for Class 3 work).

### **Section 4.1**

Each Dean of Faculty in consultation with the Head of Department is responsible for ensuring that work with biological materials is only undertaken in facilities that are suitable for the purpose, using appropriate working practices.

### **Section 4.2**

Heads of Departments shall be responsible for ensuring that PIs carry out a risk for all biological work and where the agent being used is a viral vector or a class 2 or 3 micro-organism they shall ensure that the approval of the Biosafety Committee is obtained before the work is started.

### **Section 5.5**

Each Head of Department has a responsibility to ensure that the level of containment required for a particular facility is correctly identified to those involved in the design and/or refurbishment of containment facilities, including the relevant Estates and Buildings Project Manager and the University Biological Safety Officer. The Head of Department should also ensure the requirements of the department and workers who will use the facility are made clear and taken into account in the design process.

### **Section 5.6**

The Head of Department should allocate day to day responsibility for housekeeping in shared or multi-user facilities to a named member of staff to ensure satisfactory standards are maintained.

### **Section 5.7**

Each Dean of Faculty together with the Head of Department is responsible for ensuring laboratories or other facilities where biohazardous micro-organisms or materials are present are labeled at the point of entry.

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## **Section 5.8**

If the individual departments were to undertake fumigation or store liquid nitrogen it is the responsibility of the Dean of Faculty with the Head of Department to ensure appropriate systems are in place to provide safe and suitable procedures. In conjunction they must ensure adequate and appropriate instruction, training and supervision is provided for all workers undertaking fumigation procedures. They should also ensure that suitable arrangements are in place to monitor and review working practices.

## **Section 6.1**

Each Dean of Faculty along with the Head of Department is responsible for ensuring appropriate systems are in place to provide safe and suitable equipment for use in biological laboratories and associated facilities. In addition, they must ensure adequate and appropriate instruction, training and supervision is provided for workers using the equipment. They should also ensure arrangements are in place to monitor and review arrangements and working practices.

## **Section 6.3**

Each Dean of Faculty along with the Head of Department must ensure all autoclaves are only operated by persons possessing the relevant certificates of competency as required by law.

## **Section 7.1**

Each Head of Department must ensure there is a clear documented disinfection policy indicating suitable concentrations, contact times and applications for all disinfection requirements within the department.

## **Section 7.3**

The Dean of Faculty, together with Heads of Departments, is responsible for the management of waste arising in areas under their control. Each Head of Department must ensure adequate instruction, equipment, training and supervision is provided to enable all workers to carry out their responsibilities are regards waste disposal.

## **Section 8.1**

Heads of Departments must ensure that all persons undertaking any role in the transport chain are properly trained and have a detailed understanding of the relevant Regulations to ensure they are able to undertake their responsibilities to the required standards.

## **Section 9.1**

Each Dean of Faculty together with the Head of Department is responsible for ensuring appropriate systems are in place to provide adequate and appropriate induction, training and supervision for

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workers in biological laboratories. They should also ensure that suitable arrangements in place to monitor and review the levels of supervision and training received in practice.

### **Section 10.1**

Each Dean of Faculty together with the Head of Department is responsible for ensuring the health and safety of all persons on their premises and must make appropriate arrangements to minimise the likelihood of accidents, incidents or instances of occupational ill health occurring.

Needlestick and sharps injuries are particularly serious and each Head of Department must ensure all workers handling needles and sharps receive instruction and training on safe procedures.

### **Section 10.4**

Each Dean of Faculty along with the departmental head is required to ensure arrangements are made to deal with emergencies and other untoward events that may arise in areas where biological work is carried out. These would be events not usually expected during the course of day-to-day work activities. Examples would include, but are not limited to, fire or flooding.

### **Section 11.2**

Deans of faculty along with Heads of Departments are responsible for ensuring that the requirement for any immunisations be considered and determined as part of the risk assessment process.

### **Section 12.1**

Each Head of Department is responsible for ensuring the health and safety of all persons on their premises and must have appropriate systems in place to control access to biological laboratories.

### **Section 12.2**

The Head of Department must ensure that all maintenance staff and contractors whose job involves them entering and working in laboratory areas should be provided with information and guidance on the measures they need to take to ensure the safety of themselves and others whilst they are in the laboratory.

### **Section 13.1**

Each Dean of Faculty along with the Head of Department has a responsibility to ensure all monitoring, inspection, audit and review of safety practices are suitable and effective, and are appropriate for the particular work activities carried out.

### **Section 13.3**

The dean of the faculty together with the Head of Department is responsible for ensuring that regular and systematic local health and safety inspections and audits are carried out in order to scrutinise

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health and safety standards and the effectiveness of the health and safety management systems in place.

#### **Section 13.4**

The Deans of Faculties along with Heads of Departments are responsible for ensuring regular reviews are undertaken of the health and safety arrangements (local policies, procedures etc) in the areas for which they are responsible to confirm they are appropriate and are working effectively.

### **APPENDIX D Duties and Responsibilities of the Principal Investigator/Group Leader**

#### **Section 3.5**

The Research Group Leader/Principal Investigator of a given research group, or the supervisor/manager of a unit or work area, is required to take ownership of the risk assessments for all work activities carried out by themselves and those persons under their supervision. Whilst this does not necessarily mean they are required to formulate each risk assessment personally, they would be required to scrutinise, verify and countersign the relevant risk assessment forms produced by the group or unit etc. In order to discharge this responsibility, those with supervisory or managerial roles must themselves be competent in safety related matters.

#### **Section 5.5**

The Research Group Leader/Principal Investigator of a given research group, or the supervisor/manager of a unit or work area, is responsible for ensuring local rules are in place and are complied with.

#### **Section 9.1**

The research group Leader/principal investigator of a given research group, or the supervisor/manager of a unit or work area, is required to give careful attention to the health and safety of those under their supervision. They should ensure all workers they are responsible for supervising receive the appropriate safety information and training and that this is suitably documented. In order to effectively discharge these responsibilities, those with supervisory or managerial roles must themselves be competent in safety related matters and, where necessary, should seek additional training (or refresher training) as appropriate.

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