

**University  
of  
Worcester**

**Institute of  
Science and the Environment  
&  
National Pollen and  
Aerobiology Unit**

**Safety  
Handbook**

**September 2011**

**For advice in an emergency**

**Page 12 for Fire**

**Page 9 for First Aid**

**Page 10 for Security**

**UNIVERSITY OF WORCESTER**  
**Institute of Science and the Environment (ISE) and the National Pollen and**  
**Aerobiology Research Unit (NPARU)**

**Safety Handbook**

It is the policy of the ISE and NPARU to provide safe working environments for their staff, students and visitors, in line with the University's Health and Safety Policy statement. This safety handbook is issued annually to all members of the Institute who must read and understand its contents. It should be kept available for reference at all times and backed up by reference to the [University Safety](#) web pages. Further forms and information are available on the ISE blackboard notice boards and on the NPARU X drive.

Primary responsibility for safety at the laboratory bench or other workstation rests with the member of staff supervising research or teaching activities, the manager in charge of support or administrative staff. If in need of information or in any doubt about safety issues, staff and students should initially consult the ISE or NPARU Safety Supervisor.

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In addition, useful reference material is indicated in the body of the text and in various appendices attached or available on request from Safety Committee members.

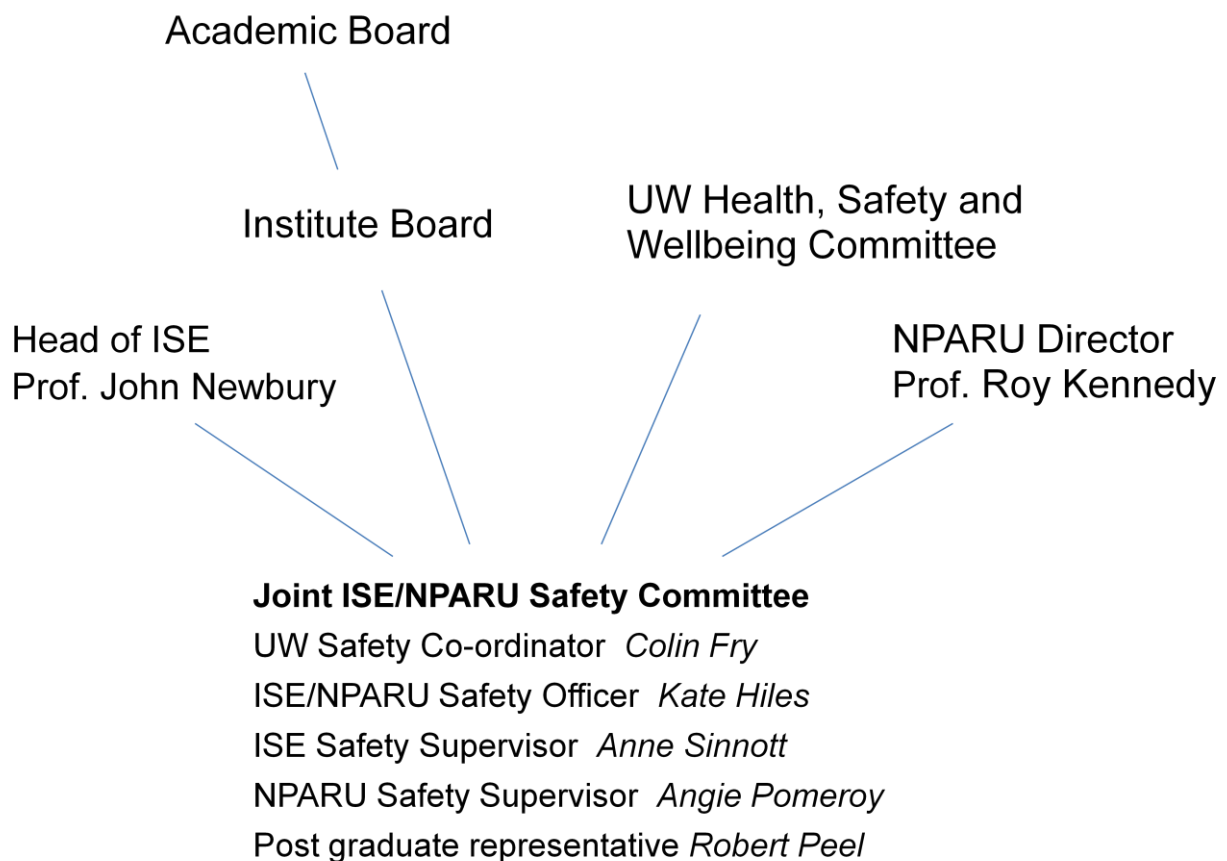
Professor H. John Newbury  
Head of Institute of Science and the Environment

## SECTION A

### INTRODUCTION AND POLICY

Any major amendments to the contents of this document will be notified by email and an updated electronic copy will be made available on the University Safety Webpages. The Head of Institute and the Director of NPARU are responsible for ensuring that safety procedures and regulations are observed and comply with University Policy. They are supported by a Safety Officer and two Safety Supervisors; details of the responsibilities and organisation are given below.

Members of staff acting in a supervisory capacity have responsibility (outlined in [University Health and Safety Policy](#)) for work done under their supervision. Responsibility for safety also rests with individuals, who at all times have a duty to keep themselves informed on safety procedures, conform to regulations, and carry out their work in a safe manner. **This responsibility of individuals for their actions is defined in law and places a legal duty of care on all in the workplace.**



## ***Safety Policy***

### **1. Rationale for a Safety Policy and its institutional context.**

The ISE and NPARU have an obligation to all who work within them, and to the wider public, to conduct work in a safe manner and with regard to the environment. They will fulfil these obligations by working within the regulations laid down by legislation and complying with the [University Health and Safety Policy](#). In fulfilment of these obligations they aim to achieve a safety standard at least as high as that required by law and are committed to the following principles:

- a) Recognition that management of Health and Safety is a management responsibility on an equal footing with other responsibilities – such as teaching and research.
- b) Acknowledgement of the Head of Institute and Director of NPARU as holders of prime responsibility for Health and Safety, with day-to-day management being delegated to the Safety Supervisors.
- c) Recognition that the ISE and NPARU will comply with their common law and statutory obligations in relation to Health and Safety.
- d) A commitment to avoid, as far as reasonably practicable, accidents or personal injury to employees, students and visitors and to maintain a safe place of work.
- e) To remind all employees that they have obligations under the law to act responsibly and to cooperate with managers or their delegates in all matters of Health and Safety.
- f) A commitment to continuously monitor Health and Safety and to review policy in the light of significant changes.

### **2. Safety Organisation**

Key personnel and their responsibilities are identified as follows:

- a) **The Institute Safety Officer** has primary responsibility for convening and chairing regular meetings of the joint ISE/NPARU Safety Committee and for arranging safety inspections within the ISE and NPARU. This committee is responsible for monitoring and reviewing Health and Safety performance and developing new policy (in conjunction with the University Safety Co-ordinator) where necessary. S/he is directly responsible to the Head of ISE but also keeps the Director of NPARU informed about safety issues. S/he ensures that safety reports are made to the Institute Board of the ISE and to the University's Health, Safety and Wellbeing Committee. S/he is responsible for the development of policy by liaison with the University Health and Safety Unit and ensures that there is shared practice, policy and documentation between the ISE and NPARU.
- b) **The ISE and NPARU Health and Safety Supervisors** support the Safety Officer. Their responsibilities are as follows:
  - They **deputise for the Safety Officer** as necessary and nominate competent persons to deputise for safety supervisors when one of them is absent.
  - They monitor safety within the ISE and NPARU taking simple remedial action where possible and advising the Safety Officer of potential risks and problems. This will include participation in **Safety Inspections** (see below).

- They ensure that premises and activities subject to **risk assessments** are assessed in accordance with the relevant legislation (see below).
- They are responsible for **record keeping** of safety matters, management of safety documentation including web facilities, and liaison with staff and postgraduate students regarding safety documentation (including risk assessments, COSHH,) and policy implementation. PAT testing documentation held by facilities.
- They attend meetings of the **joint ISE/NPARU Safety Committee**.
- They **liaise with Facilities, Porters/Cleaners and External Contractors** as described below.
- They along with other supervisory staff are responsible for ensuring that nobody (staff, students or visitors) is permitted to work in research or commercial laboratories or other hazardous environments until they have **read the relevant safety literature**, been instructed in safe practices in the procedures they will use, including awareness of fire prevention and procedures, and completed and signed *appropriate documentation* (where necessary) to that effect.
- They are responsible for ensuring that all **accidents, incidents and relevant illnesses are reported** (this is a legal requirement) as soon as possible to the Safety Office (see below).
- They are responsible for liaising with other workers on campus over safety matters as detailed below.

### 3. Role of the individual.

Legislation requires that every individual in the workplace must exercise care for the safety of himself or herself as well as others. Listed below are the **specific responsibilities** of individuals at each level in the implementation of safety policy.

- a) **Risk assessments.** Individuals planning to carry out activities that may have implications for safety should carry out a Risk Assessment. Advice may be received from the Safety Supervisors and/or the University Safety Office. Preparation of risk assessments may be delegated to others including research staff, support staff, postgraduate students and Independent Studies students where this is appropriate but individual staff members remain responsible for their provision and suitability for purpose.
- b) Academic staff members, managers and others in supervisory positions may be designated as being responsible for **safety management of specific physical areas** of the ISE and NPARU. This is because University policy acknowledges that primary responsibility for safe working must lie with those responsible for the work which creates or entails risk. In line with this policy every location (e.g. teaching and research laboratories, computer clusters, offices, chemical stores) is the primary responsibility at local level of an identified individual.
- c) It is the responsibility of supervisors to ensure that **instruction in safe working** is given to all newcomers under their supervision. However, the individual must also in law accept personal responsibility to comply with Health and Safety regulations and requirements, and must cooperate with staff with specific Health and Safety responsibilities.

- d) Students have the responsibility to read, understand and sign the relevant health and safety documentation e.g risk assessments. If they have questions regarding the content then they should contact a member of staff for clarification before continuing. Students have a duty of care for their own safety and those around them.

#### **4. Detailed arrangements for provision of safety at work**

##### **Safety Instruction.**

**Safety Supervisors** and other supervisory staff are responsible for ensuring that nobody (staff, students or visitors) is permitted to work in research laboratories, commercial laboratories or other hazardous environments until they have read the relevant safety literature, been instructed in safe practices in the procedures they will use, including awareness of fire prevention and procedures, and completed and signed a *pro forma* or check list to that effect.

##### **Safety Inspections.**

Safety inspections will be held at regular intervals, when practicable every six months, to monitor Health and Safety performance. The Safety Officer, supported by the two Safety Supervisors, will arrange and participate in the inspections and the teams will normally include the University Health & Safety Coordinator and other members of staff with appropriate experience. The inspections will be used as a basis for review of implementation of safety policy and identification of corrective measures where necessary.

##### **Accident and incident reporting.**

**Safety Supervisors** are responsible for ensuring that all accidents, incidents and relevant illnesses are reported (this is a legal requirement) **as soon as possible** to the Safety Office. Reports will be considered by the Health & Safety Coordinator and referred for onward reporting to the HSE if necessary.

- All accidents, dangerous occurrences and near misses will be investigated by the appropriate Safety Supervisor.
- The Health & Safety Coordinator will regularly analyse the accident statistics and issue a report to the Health, Safety & Wellbeing (HS&W) Committee identifying trends and common causations.

##### **Liaison with other workers at UW**

The Safety Supervisors liaise with other workers at the University as follows:

- Any safety issues associated with the **fabric and fittings of the buildings and the Estates plant** associated with the ISE and NPARU should be discussed with University Facilities Department.
- Issues of **cleanliness of the buildings** (where these are relevant to safe working) should be discussed with the porters/cleaners. Note that Laboratory technicians are responsible for cleanliness of laboratories other than routine floor cleaning. NPARU commercial laboratories should be cleaned to protocol and should not be entered by cleaning staff in line with ISO 17025 requirements.

- Issues involving **external contractors** should be referred to the University Facilities Department
- **Dealing with emergencies.** Fire, flood etc. are the responsibility of the Head of University Facilities Department and the University Health & Safety Coordinator with the support of other management staff and Safety Supervisors.

### **Planning and review; consultation.**

Staff may raise safety issues under a regular agenda item at Institute Board, at equivalent NPARU meetings or at the University Health, Safety & Wellbeing Committee meetings and are encouraged to contribute to development of safety policy, either locally with their supervisor or at Institute/Research Centre level.

During the year, attention will be drawn to updates of this Safety Handbook by emails and by additions to the University Safety Webpage. A new version of the Safety Handbook incorporating any modifications will be produced annually.

### **Risk Assessments**

The joint ISE/NPARU Safety Committee will ensure that:

- All premises and activities subject to COSHH and risk assessments are assessed in accordance with the relevant legislation.
- Such assessments will be repeated whenever any of the following factors occur:
  - Change in legislation
  - Change in control measures
  - Significant change in work carried out
  - Transfer to new technology
  - Change in level of risk due to personal factors e.g. pregnancy, nursing mothers.
- Assessments will be recorded and records maintained by the Safety Supervisors.
- The results of all such assessments will be available for inspection by all employees and other relevant persons.
- All assessments will identify necessary protective and preventative measures.

### **Visitors**

Visitors to any location may not be aware of the risks associated with the site. Therefore all visitors must be accompanied where necessary, i.e. in laboratories or other potentially hazardous locations, by the person(s) they are visiting, who in turn will be responsible for their safety. The safety of visitors must be included in risk assessments.

### **Training**

To comply with the general duty to provide such information, instruction, training and supervision as is necessary to ensure, so far as is reasonably practicable, the health, safety and welfare of employees (including students), Health and Safety training will be provided as follows:

- At Induction
- Repeat training as appropriate

- On transfer to new duties
- On introduction of new technology
- On changes in systems of work
- When specific training needs are identified during risk assessments

Staff and line managers or supervisors are expected to review safety training needs annually at Appraisal.

All Safety Supervisors will be involved in the implementation of Health and Safety training of staff for whom they are responsible.

Records of all Health and Safety training will be maintained by the ISE and NPARU Safety Supervisors.

### **First Aiders**

First Aiders will be appointed by the ISE and NPARU in accordance with the Health and Safety (First Aid) Regulations 1981. First Aiders will be responsible for:

- the taking of prompt and appropriate action following any accident, whether to an employee or not.
- the maintenance of the contents of their First Aid kits, ensuring that only specified items will be retained in the kits.

The current list of First Aiders is:

<b>First Aider</b>	<b>Telephone Extension</b>	<b>Location</b>
ISE		
James Atkins	2163	EE G049
Mark Cook	5207	EE 1045b
Jo Dyson	5183	EE G025
Tracey Richards	5247	EE G072
Anne Sinnott	5219	EE 1023
Clare Wilkes	5208	EE 1045b
NPARU		
Matt Smith	5226	EE G073
Noel Egginton	2359	CD G007
Simon John	2354	CD G005

## **SECTION B**

### **BASICS OF STAFF, STUDENT AND VISITOR SAFETY**

This section sets out some basic rules and information to ensure that the ISE and NPARU can provide a safe working environment for everyone, both on these premises and on University business elsewhere. This guidance applies equally to Staff, Students and Visitors except where any special cases are indicated.

#### ***Emergency procedure***

Emergencies may arise for a variety of reasons. Accidents, building or equipment failure, fire or security problems are the most likely reasons. In all these situations you should alert the University Security Team on 5566 & 07977973956. They will then contact the appropriate services and personnel. Make sure you give clear information on the location, nature and severity of the incident.

#### ***Security***

The ISE and NPARU use and maintain stocks of hazardous substances. It is vital that all personnel are conscious of security and proactive in alerting Security staff of any suspicious incidents.

#### ***Access and egress***

The opening times of the Edward Elgar building containing the majority of the ISE are controlled by Security staff; access to the Charles Darwin building, housing the large teaching laboratory, is controlled by Security Staff during semester; swipe cards are currently required for access outside normal University hours. Access to the Sheila Scott building is controlled by Security Staff in normal working hours and by keypad for office users outside these times.

Access to NPARU facilities in the Charles Darwin Building can be obtained using swipe cards.

You SHOULD NOT under any circumstances allow others to enter the building with you after you have swiped open the door if they are not known to you or they do not have a valid ID card. It is IMPORTANT that that all visitors sign in the book by the entrance to indicate that they are in the building and sign out on leaving in order to satisfy requirements of ISO 17025. Access to NPARU outside normal working hours (06.00 – 18.30) is only allowed by staff with prior authorisation, who must inform security, security staff and emergency services.

If you are working in any of the buildings out of hours, you are asked to be particularly vigilant, especially before you leave, for any potentially unsafe operations or conditions such as unattended equipment left running, overheating of equipment etc. and to report any perceived problems to Security.

#### ***Access to NPARU monitoring equipment on the roof***

Full descriptions of the tasks and risks involved can be found in the Standard Operating Procedures and COSHH and Risk Assessment forms held by the NPARU. During normal working hours staff and post graduate students should tell a colleague where they plan to go, and what time they are due to return. In addition, when working on the roof outside normal working hours all staff and post graduate students should ensure that they have signed the appropriate book at reception and informed security that they plan to go on the roof. When finished, they should sign out and inform security that they no longer need access to the roof.

### ***Accidents***

All accidents (and 'incidents' e.g. illnesses that may be associated with the workplace or occurrences that might have led to injury) must be reported **as soon as possible** to the Safety Coordinator in the University Health & Safety Office (Tel: 01905 855176). The University Health and Safety Unit (HSU) has to be notified and in certain cases accidents and incidents have by law to be reported by the University to the Health and Safety Executive. An Accident Report Form must be completed for all accidents and dangerous occurrences including those involving University activities off-campus.

<http://www.worc.ac.uk/personnel/documents/Accidentreportform.doc>

Manual handling and slips and falls are the most frequent causes of reportable accidents further information can be found at [Slips Trips & Falls](#) & [Manual Handling](#).

OUT OF HOURS FIRST AID DUTY SECURITY OFFICERS 5566 & 07977973956

EMERGENCY AT ALL TIMES SECURITY / MAIN RECEPTION 5566

***If the injury is severe then you should telephone 999 immediately and request an ambulance and then contact Security / Main Reception.***

If medical treatment is required but an ambulance is not considered necessary the patient should be taken by University Vehicle or taxi to:

Worcester Royal Hospital Charles Hastings Way, Newtown Road, Worcester

You are advised not to use your own vehicle for such purposes on insurance grounds.

### ***Allergies and other chronic conditions***

All staff and post grads are asked to fill in a pre-employment health questionnaire. Sufferers from allergies or chronic medical conditions that may be exacerbated by exposure to chemicals or other materials used in the ISE or NPARU must make these facts known to their supervisors. They should follow guidelines issued by the University Health & Safety Coordinator and if necessary seek appropriate advice from the University Occupational Health provider (Soma Health Ltd contactable through the Personnel department). All health information supplied is treated in confidence.

### ***Field work***

The safety aspects of any fieldwork must be considered before any fieldwork commences and a risk assessment completed and lodged with the appropriate Safety Supervisor. Advice must be sought from the appropriate Safety Supervisor regarding the risk assessment as legal liabilities may be involved. Fieldwork in this context is defined as any practical work that is carried out by staff or students of the University for the purpose of teaching, research or commercial activity in places which are not under University control but where the University is responsible for the safety of its staff and students and those exposed to their activities.

[UCEA Safety in Fieldwork](#)

[Guidance for Work and Travel Abroad](#)

BS8848:2007 + A1:2009 The Specification for the provision of visits, fieldwork, expeditions, and adventurous activities, outside the United Kingdom. Document available from ISE Safety Supervisor.

### *Fire safety*

- Check that you know the location of the fire alarm points, the fire exits, escape routes out of the building and the assembly points for every room that you are likely to be using; assembly points are shown at [http://www.worc.ac.uk/personnel/documents/UWorcs\\_Fire\\_Assembly.pdf](http://www.worc.ac.uk/personnel/documents/UWorcs_Fire_Assembly.pdf)
- Inform students at the start of every session being held in a new or different venue, and any contractors or visitors about the fire procedure, point out the fire alarm points, the fire exits from the room/s, the escape routes and assembly points.
- If there are people with disabilities in the group, seek advice from the Disability & Dyslexia Service and/or the Personnel Department about any additional arrangements that may be needed to ensure their safety in the event of a fire.
- Check that you know the location of the nearest ‘evacuation point’ where a person who is unable to use the stairs can wait for assistance.
- If you discover a fire, sound the nearest alarm. Only tackle a fire yourself, using a fire extinguisher, as a means of procuring an escape route.
- If the alarms sound in the building you are using, you must instruct the people in the room to leave the building and accompany them to the assembly point; this includes any visitors or contractors.
- Close off any gas supply, but do not spend time closing down computers or collecting personal belongings. If time permits, close any doors and windows on your route out of the building as this may help to limit the air supply to the fire.
- The alarms are linked via Reception to the Fire Service who arrive, usually, within 10 minutes.
- Leave the building by walking quickly to the nearest fire exit, warning others on the way if they are not responding.

### **WHEN THE ALARM SOUNDS YOU MUST LEAVE THE BUILDING IMMEDIATELY EVEN IF YOU THINK THAT IT’S A FALSE ALARM.**

- Do not use the lifts.
- Check that anyone with a disability has assistance in leaving but if a person is to remain in a refuge point, or if you notice that someone is missing, ensure that you notify a member of the Facilities Team at the assembly point. They will be clearly identifiable by means of a high visibility jacket; this person will be in contact with the Emergency Manager.
- Stay at the Assembly point until the ‘all clear’ is given to return, or other arrangements notified by the Emergency Manager.

### **DO NOT RE-ENTER THE BUILDINGS UNTIL YOU ARE ADVISED THAT IT IS SAFE TO DO SO.**

- If you notice anything during your normal working day that might compromise fire safety, please report it immediately to the University Health & Safety Co-ordinator. Examples include; fire exit routes being blocked; fire doors being propped open; accumulations of waste paper; evidence of fire extinguishers being used; inaudibility of fire alarms in remote areas; vehicles blocking emergency access points and/or parking on double yellow lines; people smoking inside the buildings.

Fire alarms are tested on a weekly basis, in the Edward Elgar Building this is at 0730 every Thursday morning. A long continuous ring must be treated as an alarm.

### ***Laboratory safety for students***

Before any set practical or project work can take place, a risk assessment must be performed or reviewed by supervisors in order to identify hazards associated with work done under their supervision. In addition, supervisors must assess the level of supervision required for students undertaking practical work or projects particularly in the case of out-of-hours activities. Risk assessments for laboratory classes and projects are kept by the safety supervisor in charge of the appropriate laboratories.

A COSHH assessment must be written for any procedure involving hazardous chemicals or micro-organisms that will be used in practical classes or projects. Although for project work students may be encouraged to prepare these assessments and for Independent Study work they will be expected to, it is the responsibility of the supervisor to ensure that all users of the laboratory are aware of the requirements of these assessments and ensure that they are available. COSHH assessments must be available for consultation in the laboratory at all times, with copies also being kept on file by the ISE and NPARU Safety Supervisors.

For project and Independent Study work, check lists of all hazards associated with the work must be produced before students (or new staff) commence work in research laboratories or standard operating procedures (SOPs) must be followed. The 'check list' itemises the procedures used in the laboratory or work area that the supervisor considers capable of causing harm to the user or other laboratory personnel if not performed correctly. The procedure will require either advice or practical guidance (by the supervisor or authorised colleague) before being carried out by a user new to the laboratory. The check list can be incorporated into the risk assessment for the activity.

Appropriate instruction must be given for each procedure and checklists must be initialled and signed by all students before any of the procedures are carried out. Students must also sign to indicate that they have read and understood the risk assessments and the relevant sections of this Safety Handbook.

The updated list provides evidence to Safety Supervisors, the University Safety Coordinator and HSE inspectors that the supervisor has carefully reviewed all hazardous activities that take place under his/ her supervision. At the same time the list clearly identifies for students and new staff those activities that must not be undertaken without prior advice or training.

One such list is shown below:

Autoclave  
Chemical hazards

Compressed gases  
Homogeniser  
Infectious organism handling  
Micro-organism handling  
Radioisotope work  
Shakers  
Centrifuges  
UV sources  
Disposal of waste materials  
Electrophoresis  
Human blood handling  
Liquid nitrogen storage  
Safety cabinets  
Ultrasonicator

### ***Out of hours activities***

New procedures and/or new equipment that are potentially dangerous must not be used alone outside normal working hours. When any hazardous activity has to be undertaken outside normal working hours, another person must be present in the same room or sufficiently near to be alerted in the case of an accident. Any equipment or laboratory procedure whose use involves a substantial risk of an accident which could result in personal injury should be regarded as being in this category. If in doubt, consult your supervisor or the ISE or NPARU Safety Supervisors.

Equipment left running outside normal working hours **must be clearly identified with the name and the contact telephone number of the person responsible and with any associated hazard indicated** so that in the event of flood, fire or other emergency, security personnel or fire personnel can obtain essential information.

**Undergraduate students** must be supervised and may only work in laboratories during normal hours. If it is necessary for final year undergraduates to work outside normal hours, the following must be observed:

- a) A laboratory pass form, obtainable from the ISE Safety Supervisor, must be completed in advance of the planned out of hours work and then validated by him/her, or another authorised person.
- b) A laboratory pass will only be issued for certain activities to students who are deemed competent. This will need to be agreed in advance with the safety supervisor with appropriate documentation completed and signed.

### ***Pregnancy***

Women who are pregnant, who have given birth within the last six months and/or are breast-feeding their babies are owed a special duty of care. Some hazards in the workplace may present additional risks and it is the responsibility of the employer to address these issues. Pregnancy can be a very sensitive issue and some women may choose not to inform anyone of their pregnancy during the early stages. This has to be respected but once the appropriate manager or supervisor has been informed then action may need to be taken. For confidential advice on issues relating to pregnancy in the workplace please contact the Personnel Department.

Guidance on specific hazards is given in Appendix 7.

### ***Protective clothing***

Standard laboratory coats should be worn for all general laboratory or similar work. Standard laboratory coats must be worn for work with chemicals. High-necked coats with elasticated cuffs (“Howie” style) must be worn for all work with micro-organisms pathogenic for people or animals.

Requirements for other protective shields or clothing are indicated in sections dealing with particular hazards. Where a risk assessment indicates that personal protective clothing or protective equipment should be used, it is the responsibility of the supervisor to ensure that they are available and of individuals that they are used.

### ***Security***

If you encounter a “stranger” on the premises, you should ask them for ID. If your suspicions are aroused then you should contact Security immediately Tel: 5566 or 07977973956 and inform relevant personnel e.g. Clare Smith or Sally Wall. For your own safety never attempt to apprehend an intruder. Prompt reporting of any incident is the correct procedure.

### ***Smoking, eating and drinking, application of cosmetics***

Smoking is not permitted anywhere in the buildings. Eating, drinking and the application of cosmetics are not permitted in any laboratory or equipment room. The preparation and consumption of food and drink must be confined to common rooms or personal offices.

### ***Stress management***

It is University policy that work should be managed in a manner that does not impose avoidable or unacceptable stress on individuals. Anyone who feels that they are subject to unnecessary stress should discuss this with their supervisors in the first instance. If problems cannot be resolved, they may raise them with senior management, the University Personnel Department or the University Occupational Health provider (Soma Health Ltd).

### ***Training and instruction***

No one may use machinery, apparatus or equipment or undertake any operations involving dangerous chemicals, carcinogenic substances, pathogenic micro-organisms or radio-isotopes unless they have received relevant training and instruction and a COSHH/risk assessment of the activity has been made. It is the responsibility of supervisors and individuals to arrange or seek appropriate training where it is clear that it is required.

### ***Visitors***

The Institute is responsible for the safety of casual visitors. Lay members of the public should not normally enter laboratories and risk areas, and children **must not** enter these areas without special arrangement. Workers visiting for an extended period must sign in at facilities and be issued with a visitors badge.

### ***Work Experience Placements***

The ISE or NPARU may accept applications for work experience placements. However, before a placement is offered the health, safety and welfare of such visitors must be considered carefully. Young persons on work experience placements are deemed to be employees of the University and as such we have to ensure their health, safety and welfare. These arrangements may have to differ from those made for other employees due to their inexperience and lack of maturity. A special duty of care applies.

A young person is defined as a person **less than 18 years of age**. Additional and stringent requirements apply in respect of young persons **under 16** years of age, involving full individual risk assessments for every element of work to be undertaken and acceptance of those risks by parents/guardians. It is recommended that no one under the age of 16 is accepted for a placement in the ISE or NPARU unless in exceptional circumstances. A Safety Supervisor should be consulted and informed of risk assessments made for work experience placements.

The University's Health & Safety guidance on Work Experience Placements can be found at: <http://www.worc.ac.uk/personnel/720.htm>. The key to a safe and successful placement is advanced planning and good supervision. You should consider carefully if the environment in which you might consider placing a young person is safe for someone who is inexperienced and lacks maturity. In all cases, work experience placement applications will go through Personnel, they will be informally assessed through any documented information sent, e.g. CV or letter, to help gauge relevance to placement and then if appropriate be invited for an interview with the member(s) of staff supervising the placement before any offer is made.

Further information is available at <http://www.worc.ac.uk/personnel/713.htm>

### ***Work Place design***

Poor work station design can lead to significant musculature and joint problems. Guidance on work station design including a self assessment checklist to determine the suitability of your work station can be found <http://www.worc.ac.uk/personnel/711.htm>

### ***Outline laboratory safety notes for NPARU staff, visitors and work experience***

Entry into the labs is restricted to members of staff or other authorised persons.

Initial entry for newcomers should be under full time supervision by the relevant competent person(s) and appropriate training and reading of the standard operating procedures and COSHH/risk assessments for the rooms, procedures and the equipment being used should be completed. Once a level of observed competency has been achieved, in accordance to the supervisor's specifications and, in the case of new staff, training is logged in to a personal training record; work may then be carried out under self supervision. If there is any doubt regarding procedure a member of staff must be contacted before undertaking any further work.

General housekeeping of the laboratories is the responsibility of those working within them, e.g. laboratories must be kept tidy during and after work is complete.

Storage of materials must be within appropriate vessels and locations, labelling must be clear and give full detail to what the materials are, associated hazards, dates of receipt and expiration.

Work in progress and associated materials must be appropriately identified by operators on vacating the laboratories.

No sharps should be placed anywhere other than the sharps bins provided and under no circumstances be left on the benches or in the sinks.

Disposal of the materials should be highlighted within operating procedures and process of disposal agreed by senior laboratory staff and relevant authorities.

All procedures that are carried out should follow standard operation and should be written down and locked in to a live SOP that is kept as a hard copy for use within the laboratories and an electronic copy for accreditation records. COSHH/Risk assessment must be completed, read and signed if required by the procedure being carried out.

## SECTION C

### BIOLOGICAL SAFETY

#### *Training*

All users of biological materials should have received appropriate training. This will usually be provided by experienced personnel within the ISE and NPARU but, where necessary, will be delivered by external providers.

#### *Use of animals*

No experimental work with animals may be carried out without appropriate authorisation and approval by the appropriate ethics committee. Some work involving vertebrates or some other named species may require a Project Licence granted by the Home Office. In such cases, the work **may not take place** without the permission granted by such a licence.

#### *Bee Hives*

There are two bee hives within the Conservation Area on the St John's Campus. They are situated in a quiet part of the campus away from paths and cordoned off from access. There is always a risk of stinging to humans while out in the open, particularly if they behave in a manner threatening to the bees e.g. waving arms about. Only authorised persons should go close to the hives or attempt to open them. If you wish to work with the bees permission must be sought from joint ISE/NPARU Safety Committee, after which a risk assessment and training will be set up. For guidance on action to be taken if stung by a bee see Appendix 9

#### *COSHH regulations for biological agents*

All work with potentially hazardous biological materials must be assessed with regard to the nature of the hazard they present and the risk that this might occur. Depending upon the nature of the material, approval must be obtained from one or more members of the joint ISE/NPARU Safety Committee in line with HSE guidelines **before** work can commence.

#### *Work with micro-organisms (MOs)*

All micro-organisms are grouped into hazard groups 1 – 4 (Advisory Committee on Dangerous Pathogens) according to the hazard they might present to human health. Procedures of Good Microbiological Practice must be used for handling all micro-organisms, including those that have been genetically manipulated and appropriate experience or training in these procedures must have been completed by those taking on such work. See appendices for Good Microbiological Practice, disposal, use of disinfectants, spillages etc.

Work with hazard group 1 MOs may proceed without prior approval. Nevertheless, a hazard risk assessment must be performed on the appropriate University form (downloadable from the Blackboard and the NPARU x drive) and a record kept.

Work with MOs in hazard groups 2 – 4 must be assessed as above and then approved by the joint ISE and NPARU Safety Committee and, if recommended, by the relevant University Committee **prior** to work commencing.

Use of some Hazard Group 2 pathogens and all Hazard Group 3 agents must be notified to the HSE, while some animal and plant pathogens require a licence from DEFRA.

### ***Work with genetically modified organisms (GMOs)***

The Health and Safety Executive (HSE) defines Genetically Modified Organisms (GMOs) as those in which the genetic material (either DNA or RNA) is altered by use of a method that does not occur in nature and in which the modification can be replicated and/or transferred to other cells or organisms. Any work which will involve the production of novel GMOs or the use of pre-existing GMOs **MUST** receive permission from UW's Genetic Modification Safety Committee (GMSC) before the work can commence. The University has obtained formal permission to carry out work with GMOs from the HSE and has set up the necessary committees and processes to deal with such work.

Its Terms of Reference of the GMSC are as follows:

1. The committee business will be determined by the Chair in consultation with the University Health, Safety and Wellbeing Committee and GMSC committee members, in response to the needs of the joint ISE/NPARU Safety Committee.
2. The committee will be responsible for advising on University policy on GM matters, reporting through the joint ISE/NPARU Safety Committee which in turn reports to the UW University Health, Safety and Wellbeing Committee.
3. The committee will be responsible for day-to-day scrutiny and approval of GM risk assessments throughout the University.
4. If necessary the committee will liaise with equivalent NHS bodies where local responsibilities overlap.
5. The committee will carry out regular inspections of buildings, laboratories and facilities to ensure compliance with good practice.
6. Committee minutes will be taken and held by the Biological Safety Officer and the UW Safety Co-ordinator and will be distributed to all members of the committee in good time.

The GMSC currently comprises Rob Herbert, Mike Wheeler, John Newbury, Roy Kennedy, Mahmut Tor; there is an invitation for a member of a local trade union to join the committee. Membership of the committee will be reviewed annually. The University GMSC shall meet three times a year with dates agreed for a 12 month period. It is chaired by the Institute's Biological Safety Officer (Rob Herbert).

Written and verbal reports from the GMSC will be made to the joint ISE/NPARU Safety Committee. Information will, when required, be disseminated to all appropriate areas of the University via the joint ISE/NPARU Safety Committee, Biological Safety Officer and the UW University Health, Safety and Wellbeing Committee. Communication to the University Health, Safety and Wellbeing Committee will be via Institute representatives who sit on that committee.

**Anyone wishing to carry out work involving GMOs** can seek informal advice from any member of the GMSC and can find detailed notes at the HSE website: <http://www.hse.gov.uk/biosafety/gmo/about.htm#aboutwebsite>

However, in order to obtain the absolutely required formal permission to carry out work with GMOs at UW, the chair of the GMSC (Rob Herbert) must be informed. His duties include the following:

- passing on risk assessment forms for completion by proposers of specific pieces of work; note that separate forms are provided for work on GM micro-organisms and GM plants.
- providing examples of previously completed assessments for guidance and to prevent duplication
- deciding whether the work falls within the permission limits of the University; if it does not, further advice will be required from the HSE
- sending copies of the assessments to other members of the GMSC requesting informed comment about potential risks and hazards to humans and to the environment from the proposed work and any advice that may further reduce risk or technically facilitate the work proposed.
- collating the comments made by the reviewers and feed these back to the proposer
- when appropriate, signing off a final version of the risk assessment(s)
- maintaining electronic copies of the accepted risk assessments
- periodically, asking proposers if an update to a risk assessment is necessary.

### ***Work with human cells and tissues (including blood)***

Before work begins with human tissue or blood, permission must be sought from the joint ISE/NPARU Safety Committee as such tissues are now covered by the Human Tissues Act. Appropriate arrangements must be made for obtaining blood samples. See appendix 8 for guidance on training, risk assessments, spillages etc..

Human and non-human primate cell lines may also contain pathogens or potentially oncogenic viruses but, in general, well established cell lines with no known infectious risk may be regarded as hazard group 1 and used under containment level 1 without prior approval.

### ***Anti-terrorism, Crime and Security Act***

A number of pathogens and toxins are currently notifiable to the Home Office prior to their acquisition and/or use in the laboratory. Storage arrangements are subject to inspection by local police. The list of pathogens and toxins currently notifiable to the Home Office can be found in Schedule 5-pathogens and toxins (Anti-Terrorism, Crime and Security Act 2001, chapter 24). [www.opsi.gov.uk/acts/acts2001/ukpga\\_20010024\\_en\\_18](http://www.opsi.gov.uk/acts/acts2001/ukpga_20010024_en_18)

### ***Notifiable Diseases and Import of Non-Native Species***

A number of diseases caused by bacteria, viruses and other pathogens are compulsorily notifiable to the Department for Environment Food and Rural affairs (DEFRA) by the Specified Diseases (Notification and Slaughter) Order 1992 (as amended) and the Specified Diseases (Notification) Order 1996 (as amended) to enact European Union Legislation. Work with such agents requires approval by, and the issue of a licence from, DEFRA. For a list of such pathogens see the DEFRA website

(<http://www.defra.gov.uk/foodfarm/farmanimal/diseases/pathogens/index.htm#list>).

The import of non-native species including plant pests may also require a DEFRA licence. Proposal to work with such organisms should be discussed initially with a Safety Supervisor.

Further information:

- [www.hse.gov.uk](http://www.hse.gov.uk) Biological agents: Managing the risks in laboratories and healthcare premises.
- [OPSI](http://www.opsi.gov.uk) Office of public sector information website.

## SECTION D

### CHEMICAL SAFETY

#### *Training*

All staff and postgraduate students should undertake appropriate Chemical handling training or, in the case of experienced personnel entering the University from elsewhere, provide evidence that they have attended relevant training elsewhere to carry out the work.

All undergraduate and taught MSc students must attend a session on Safety and Laboratory practice (details provided in introductory packs and included in induction timetables).

#### *Good chemical practice*

All work should be to the standard of Good Chemical Practice (GChP). GChP sets the minimum standard for ensuring the protection of people against the adverse effects of chemical substances encountered at work. Details of GChP are in the further references at the end of this section.

- Food, drink, cosmetics and cigarettes must not be consumed or used in the laboratory.
- Pipetting by mouth is prohibited.
- All University buildings and most of the grounds are **NO SMOKING**.
- Benches should be cleaned and tidied regularly and surplus apparatus and chemicals returned to the stores or cupboards.
- Laboratory coats **MUST** be worn when working in the laboratory.
- Laboratory coats should be removed on leaving the laboratory area and **MUST NOT** be worn outside of the laboratory.
- As a minimum, safety spectacles must be worn to protect the eyes from splashes when handling hazardous liquids. When the risk from splashing is high, especially from toxic or corrosive liquids, a visor or goggles must be worn.
- Work must be carried out cleanly with the minimum of spilling and splashing to minimize contamination. Contaminated areas should be cleaned as soon as possible. The work area must be kept tidy and chemicals returned to the approved storage areas when not in use.
- Where it is necessary to avoid the inhalation of fumes and vapours or the build up of an explosive atmosphere (from highly flammable liquids or gases), a fume cupboard must be used. Fume cupboards should not be used for storage of chemicals.
- Flammable substances must be kept well away from sources of ignition – naked flames, hot plates etc. and infrequently used substances and containers larger than 0.5 litres stored in appropriate solvent bins.
- Minimise exposure to fumes and vapours by covering vessels and by prompt replacement of caps and stoppers to bottles when handling volatile or dusty chemicals.
- Winchester bottles must be carried in the special Winchester carriers available.
- Hands must be washed before leaving the laboratory area.
- Highly toxic chemicals must be stored in a locked container and a record of this store maintained.
- All work with carcinogens must be in accordance with the [Carcinogens and Mutagens Directive \(2004/37/EC\)](#).
- Containers must be adequately labelled to identify contents and to identify risk phrases.

- Chemicals must be stored according to hazard category.

### ***Hazard symbols***

There are nine specific hazards associated with chemicals, each having its own warning symbol on a bright orange background. These symbols are given on bottles and in catalogues. Chemicals within these categories must be labelled appropriately, e.g. small amounts of solvents shelved for current use must be labelled as flammable etc.

### ***Protective equipment***

The following protective equipment is available:

- Laboratory coats (undergraduate students should provide their own)
- Gloves of various types
- Safety Glasses, goggles and visors
- Dust masks
- Winchester carriers

### ***Accidents***

All accidents and near misses involving chemicals must be reported immediately to tutor, technician or H&S supervisor and Accident/ Incident report form completed or near miss record made.

### ***COSHH/Risk assessment***

Supervisors have a responsibility for assessing the risk to health and safety from any chemical hazard and for ensuring that working procedures are assessed and designed to minimise risk. They are responsible for ensuring that all activities involving chemicals have been assessed as required by the University Health and Safety Policy and that these assessments are documented and filed as completed COSHH (forms available from Blackboard, NPARU x-drive and [Personnel H&S](#) page on the University website). A number of laws and regulations impose legal requirements on work involving hazardous substances. The law requires:

- Assessment of the **hazard** (potential to cause harm) and **risk** (likelihood of harm under conditions of use) to the health and safety of people at work (and visitors) of the substances with which they are working.
- Prevention or adequate control of exposure to or risks from such substances.
- Adequate maintenance of plant and personal protective equipment needed for prevention or control.
- Monitoring exposure at the workplace if prevention cannot be achieved.
- Health surveillance where necessary.
- The provision of information, instruction and training for staff. The overriding requirement of the law is that work involving hazardous substances is prohibited unless a suitable and sufficient risk assessment has been made.

**University Health and Safety Policy is based on the legal requirements. Compliance with University Policy should ensure compliance with the law.**

Forms for Chemical Hazard and Risk assessments and associated guidelines are available to download from the [Personnel webpage](#), Blackboard and NPARU x-drive. All assessments will be kept by the safety supervisor and users.

### ***Hazardous Waste Disposal***

Procedures for the disposal of hazardous wastes are available from Safety Supervisors.

### ***Waste solvents***

At the point of production, waste solvents must be collected in securely closed screw-capped 2 litre Winchester bottles (maximum 2/3 full) in two categories:

- Halogenated (i.e. those that contain chlorine, bromine, fluorine or iodine)
- Non-Halogenated (not containing halogens in any form)

These should be labelled (remove or cover the original label) with a waste solvent label. Waste solvents should be taken to bunker.

### ***Transport and use of liquid nitrogen***

- All containers should be fully labelled with contents and potential hazard.
- All transport of liquid nitrogen should be with the use of special containers (dewars) designed for this purpose
- For transportation around labs during use, and for re-filling, the dewar should be used with a 'Pouring Trolley Stand'.
- Dewars should only be transported in lifts if barriers are put in place to ensure no-one enters the lift and appropriate signage is used e.g. DANGER/DO NOT ENTER. See a safety supervisor before transportation.
- Materials must not be inserted or removed from liquid nitrogen freezers without adequate personal protection i.e. eye protection and gloves. Special care must be taken with screw-capped vials that may explode due to rapid boiling of liquid nitrogen that has entered the vial, upon exposure to ambient temperature
- Operators should be fully trained in procedures relating to the transport and storage of liquid nitrogen and the potential risks before use.

Further information from the HSE website:

[Control of Substances Hazardous to Health. COSHH](#)

[Working with substances hazardous to health. What you need to know about COSHH.](#)

[A short Guide to Personal Protective Equipment at work regulations 1992](#)

Work place exposure limits <http://www.hse.gov.uk/coshh/basics/exposurelimits.htm>

[Read the labels: How to find out if chemicals are dangerous.](#)

[List of symbols, abbreviations, risk and safety phrases](#)

## SECTION E

### ELECTRICAL AND MECHANICAL SAFETY

This advice is of a general nature and is relevant to what might be regarded as the ordinary use of electrical equipment. For special situations, such as testing of live equipment and use of equipment under adverse conditions, additional precautions are required and further specialist advice must be sought via Mr Neil Morris, Maintenance Manager (ext 5163).

#### *Electrical safety*

- When equipment is purchased or hired, written confirmation should be obtained from the suppliers that it complies with relevant standards, and that safety information is provided in accordance with Section 6 of the Health and Safety at Work Act. 13 amp plug tops will be fitted by members of the technical staff who have received instruction. All items of portable electrical equipment will be checked by a competent person at appropriate intervals and records kept of the checks.
- All equipment must have a means of isolation (switch) that is easily accessible and easily identifiable with the specific items of equipment.
- All terminals including low voltage lines must be electrically and mechanically sound and no undue strain put on them (e.g. plugs and sockets hanging unsupported).
- All terminals must be securely covered to prevent persons touching them.
- All lead acid and alkaline batteries should have protective insulated covers over the terminals and be used in well-ventilated areas.
- All flexes must be kept clear of the floor or protected to prevent heavy objects being placed or dropped on them or people walking or tripping on them.
- All flexes must have extra protection where they pass over or round sharp objects or corners or pass through metalwork (i.e. points of entry of equipment, etc.).
- Take care not to trap flexes in doors. Flex lengths should not normally exceed 2 metres.
- All flexes must be kept clear of radiators or other sources of heat and must not be wrapped round or fastened to pipe work.
- Keep all electrical equipment clear of taps. Containers of water or other liquids must not be placed on electrical equipment other than those items of equipment specifically designed for the purpose.
- Plugs and sockets used for 220/ 240 volts must not be of the same type as plugs and sockets used for lower voltages. Plugs and sockets should conform to appropriate

British Standard specifications, e.g. BS 1363: 1984 for 13 amp supplies. Advice is available from Maintenance.

- Where parts are replaced, it is essential that the correct type of replacement part is used (e.g. double insulated parts for double insulated equipment, cartridge fuses not fuse wire in plugs. etc.).
- Ensure that any items of equipment that are interconnected are fed from the same phase of the mains supply and have a single isolation point.
- Ensure that all equipment has a clear air space round it for cooling purposes.
- All equipment, not on standby, should be switched off when not in use.
- Equipment on standby or running for a set period, e.g. pH meters, PCRs should be identified.
- Equipment normally left on, e.g. freezers, should be identified by a label on the plug.
- Electrophoresis equipment. All equipment must be provided with safety covers or switches that prevent access to tanks and electrically live parts during operation.
- **It is expressly forbidden to bypass safety covers or switches.**

### *Mechanical safety*

This advice is of a general nature and draws attention to mechanical safety implications in the use of moving machinery and equipment. Specialist advice and information is available both from manufacturers and from the Maintenance Department.

- All moving parts of machinery and equipment must be adequately guarded. Do not use if guards are missing or defective. Report defects to a Laboratory Technician or the Safety Supervisor. Isolate defective equipment and post notices to prevent others from using it.
- No machinery, apparatus or equipment must be used or serviced unless the operator/user has received training or read instructions for use.
- Instructions regarding the use of eye protectors, ear defenders and protective clothing must be adhered to.
- Prototype and modified equipment should not be commissioned or used without reference to safety supervisor.
- Centrifuges. All heads and rotors must be properly secured and tubes balanced before operation. High-speed heads and rotors will be checked by the manufacturer as specified.

- Autoclaves, compressed gases and pressure vessels must only be used by trained personnel and operating instructions adhered to. Equipment is subject to periodic checks by the University's insurers/engineers in accordance with regulations. (See Appendix 1).
- Power tools. Eye protection must be worn when using power tools.
- Vacuum systems. All components in or attached to vacuum systems must be designed or manufactured to withstand the pressures involved. Eye protection is required when glassware is used. Safety netting must always be used on evacuated vessels as a guard in case of implosion.
- Microwave ovens. In the event of failure the Safety Supervisor must be informed; s/he will arrange for servicing by the manufacturer. Such ovens must never be used to heat sealed or metal-containing containers or to melt large volumes of agar where pressure may build up due to local boiling of parts of the melting gel. Follow instructions displayed on each oven.
- Ultrasonic equipment. Ear defenders must be provided for use with ultrasonic probes and sonic emission limited by insulation if hazardous to others.
- High/low temperature equipment. Gloves must be provided and precautions taken to protect operators and others from burns, or in the case of very low temperature freezers, freezing of hands or sticking to cold surfaces. Warning notices must be displayed where hot surfaces are exposed.
- Shakers, homogenisers and mixers. (See Appendix 2)
- UV light. (See Appendix 3)

Further references for the following are available from  
<http://www.worc.ac.uk/personnel/657.htm>

Workstations and Laptops  
 Manual Handling  
 Working at Height  
 Electrical Testing

## SECTION F

### ENVIRONMENTAL SAFETY

The University's commitment to Environmental Sustainability is set out at <http://www.worc.ac.uk/about/10776.html> and the objectives and targets for safeguarding the environment are outlined. Specific policies are evolving and their scope is likely to be wide ranging. Key objectives from the policy include the following:

- Integrate environmental management into our day-to-day operations to ensure environmental issues are addressed, whilst providing a quality service to all stakeholders
- Recognise the potential impact of climate change and the strategic and operational need to control, manage and reduce carbon dioxide and other greenhouse gas emissions
- Comply with all relevant environmental legislation, regulations and requirements
- Reduce our use of natural resources such as energy and water
- Reuse resources whenever possible rather than dispose of them
- Encourage environmentally-responsible procurement and employ whole-life costing and environmental performance criteria for selection
- Encourage the use of recycled materials and recycling initiatives
- Prevent pollution by reducing emissions and discharges and regularly reviewing practice against benchmarks
- Encourage environmentally-friendly transport and implement a Sustainable Transport/Green Travel Plan
- Enhance biodiversity and incorporate biodiversity in environmental management, creating new opportunities for wildlife on campus wherever possible
- Ensure sustainable approaches in all construction and refurbishment and incorporate energy-efficient approaches in all work
- Provide appropriate environmental training for all our staff and students and encourage them to support this programme
- Promote communication with internal and external interested parties and respond appropriately to reasonable requests for information about our environmental performance
- Incorporate environmental responsibility in all staff job descriptions
- Ensure that this Environmental Policy is readily available to the general public and all our stakeholders
- Embed inclusion of sustainability principles in the curriculum and support research in relevant areas

The institute has paper recycling points located on each floor beside photocopiers, individual multi-item recycling bags are available for use in offices.

Further references

Environmental Agency ([www.environment-agency.gov.uk](http://www.environment-agency.gov.uk))

## **SECTION G**

### **HORTICULTURAL SAFETY**

The Institute's horticultural safety is under the supervision of the joint ISE and NPARU Safety Committee.

#### **Pesticides, herbicides and agrochemicals**

Hazardous agrochemicals must be kept under lock and key; issue and use must be controlled. Users must be familiar with specific hazards, and appropriate safety equipment and clothing must be provided and used. Anyone wishing to use any chemicals or materials in the Greenhouse, cold frames or field sites must ensure that a full COSHH assessment has been made and must obtain the approval of the Safety Supervisor

#### **Electricity and heating**

Only staff authorised by the joint ISE and NPARU Safety Committee may make adjustments to supplies or control gear and no portable or temporary electrical equipment may be installed without clearance from a Safety Supervisor.

#### **Information**

Technical Staff have responsibility for access and allocation of space in the Green House and cold frames and will advise others in the Institute on the appropriate use of horticultural chemicals.

## **SECTION H**

### **RADIATION SAFETY**

The use of radioisotopes in University laboratories is governed by legislation in the Radioactive Substances Act 1993, the Ionising Radiations Regulations 1999, and the Health and Safety at Work Act 1974.

At present no work with radioactive substances is carried out in the ISE or the NPARU. Someone wishing to work with radioactive substances should contact the joint ISE and NPARU Safety Committee to begin proceedings to set up protocols and safety guidelines.

## APPENDICES

- 1. Standard procedure for autoclave operation.**
- 2. Shakers, stomachers, centrifuges and vortex-mixers**
- 3. Ultraviolet light sources and Lasers**
- 4. Handling Microbiological Hazards: Good Microbiological Practice**
- 5. Manual Handling**
- 6. Hypodermic needles**
- 7. Guidance notes on specific hazards and control measures for new or expectant mothers (Staff and Students)**
- 8. Guidance on working safely with human blood tissues and other specimens in laboratories**
- 9. Stinging by Honeybees**

### Appendix 1

#### Standard procedure for autoclave operation.

##### 1. Associated risks.

Autoclaves are sterilisers using high-pressure and high-temperature steam. The potential safety risks for the operators are:

- Heat burns from hot materials and autoclave chamber walls and door.
- Steam burns from residual steam coming out of the autoclave and materials on completion of cycle.
- Hot fluid scalds from boiling liquids and spillage in autoclave.
- Hand and arm injuries when closing the doors/lids.
- Injury in the case of an explosion.

##### 2. Risk management.

- Autoclaves are inspected annually and certified.
- Autoclaves used for the disposal of bio hazardous materials are subject to annual working tests, logging and in use efficiency testing.
- A training session must be successfully completed prior to use of the autoclaves.
- It is the supervisor's responsibility to ensure that their students and staff are trained before operating the autoclave.
- Procedural and instructional documents/notices must be followed.
- Personal protective clothing and equipment must be worn when loading and unloading the autoclave.
- Equipment to protect against scalds and burns:
  - ❖ Heat insulated gloves/hand protectors.
  - ❖ Face shield providing coverage of the face and neck.
  - ❖ Splash apron or closed laboratory coat.
  - ❖ Closed toed footwear.

##### 3. Operator instructions.

## **Training**

- All operators must have successfully completed a training session on the safe operation procedures of autoclaves.

## **Material preparation**

- Ensure that the material is able to be autoclaved – oil's, waxes, flammable materials, radioactive materials and samples containing solvents or substances that may emit toxic fumes should not be autoclaved.
- Glassware should be inspected for cracks prior to autoclaving.
- Prepare and package material suitably:
  - ❖ Loose dry materials should be wrapped or bagged in steam penetrable paper or loosely covered in aluminium foil. Wrapping too tightly will impede steam penetration, reducing the efficiency of the process.
  - ❖ All containers must be covered by a loosened lid or steam-penetrable bung.
  - ❖ Plastics must be heat resistant e.g. Polycarbonate, PTFE and most polypropylene.
  - ❖ Loosen all lids to prevent pressure build up.
  - ❖ Place bags of agar plated or other materials that may boil over or leak in a secondary container large enough to contain the total spill of the contents.
  - ❖ Bags must not be tightly sealed to allow steam penetration.
  - ❖ Bio hazardous materials must be labelled as such.

## **4. Loading Autoclave**

- Wear insulated gloves and closed toed shoes.
- Place material in autoclave.
- Do not overload autoclave; allow sufficient room around materials to allow steam circulation.
- Close door according to individual autoclave instructions.

## **5. Operating autoclave.**

- Refer to manufacturers instructions.
- Bench autoclaves: Ensure that the equipment is stable and not in an exposed position at the beginning of the run. Remember to add water; ensure safety valves are not blocked and that lid is securely fastened.
- Bench autoclaves should be stored dry when not in use to avoid pitting.

## **6. Unloading autoclave.**

- Ensure that the pressure is 0 and the load temperature is below 50oC before opening the door. Wear heat insulating gloves, closed toed shoes, face shield and splash apron or closed lab coat and stand back from the door/lid as a precaution carefully opening the door to allow residual steam to escape.
- Allow sterilised materials to stand for 5 to 10 minutes to allow steam to clear and trapped air to escape from liquids.
- Wear safety equipment as above.
- Do not agitate containers of super heated liquids or remove caps before unloading.
- Place unloaded items on an area clearly identified as hot.

## **7. Equipment Malfunction.**

- Report any malfunction in the equipment to Technical Staff. Do not attempt repairs.
- Label autoclave as faulty.

#### **8. Accident.**

- Report all accidents or incidents to the UW Safety Co-ordinator.

#### **9. Spill clean-up.**

- It is the responsibility of the user to ensure that all spills in the autoclave are cleared up before leaving the equipment

## **Appendix 2**

### **Shakers, stomachers, centrifuges and vortex-mixers**

1. Read manufacturer's instructions and operate for the first time under supervision of an experienced person.
2. Check caps, bottles, cups, seals, and gaskets before use to ensure they make a proper seal.
3. Vortex mixing must be in sealed containers if the material is toxic or infective.
4. In all cases allow a short time for aerosols to settle before opening the container.
5. After use, ensure all equipment is cleaned and disinfected.
6. Centrifuges must be balanced before operation.

## **Appendix 3**

### **Ultraviolet light sources and Lasers**

1. Ultraviolet radiation use can cause conjunctivitis and skin burns. Repeated doses can cause skin cancer.
2. As far as possible, avoid exposure. Ensure the source is properly shielded and never look directly at it.
3. If working under an ultraviolet source, shield your skin with rubber (not plastic) gloves and your eyes with protective glasses. Limit exposure; the maximum permissible emission level is  $10^{-7}$  W/cm<sup>2</sup> for an 8 hour day,  $2 \times 10^{-7}$  W/cm<sup>2</sup> for 4 hours and so on.
4. UV light emitted from microscope lamps should not be directly visible; seek expert advice if in doubt.
5. Use of UV lamps is carefully monitored to ensure lamps are replaced before they exceed their working life.

In the event of a UV lamp shattering during use, mercury vapour will be released from the broken lamp. Should this occur, evacuate the room immediately, close the door and do not

allow anyone to re-enter the room. A Safety Supervisor should be informed immediately so that emergency remedial action may be carried out.

## Appendix 4

### Handling Microbiological Hazards: Good Microbiological Practice

This is additional to the safety instruction detailed under Good Chemical Practice. Particular attention should be paid to instructions regarding food & drink, protective clothing and hand washing.

Aseptic techniques for handling microbiological hazards on the open bench should protect the worker from infection and the work from contamination. The required manual dexterity should be achievable with practice.

- i. The work area should be sterilised, uncluttered and free from dust and draughts.
- ii. Equipment should be arranged logically.
- iii. A commercially available biocide and disposable cloth should be used to absorb spills.
- iv. Work is normally performed near a flame that is used for sterilising loops, flaming glassware etc.
- v. Aerosol production must be kept to a minimum.
- vi. Containers should be opened as briefly as possible.
- vii. Cultured environmental samples should only be opened in an appropriate class of Containment Cabinet
- viii. Movements should avoid jerkiness.
- ix. The bench should be swabbed with disinfectant after use.

Loops and wires should be <5cm long (to minimise aerosol formation by vibration) and uncorroded. Loops should be completely closed and <3mm diameter. They must be cooled before use.

Flame-sterilisation of loops, wires, scalpels and forceps - these are immersed in 70% ethanol in appropriate pots. Excess ethanol is drained into the pot. Avoid ignition of ethanol in pot - if this should occur replace lid for a few seconds until flame is extinguished.

The ethanol is driven off by (briefly) passing the spreader through a Bunsen flame. Heat scalpel, loop, wire or forceps tips in flame with end of tool higher than handle until tip glows orange. Place tool on sterilised stand to cool before proceeding.

Pipettes must be undamaged and fitted with a pipette filler. Pipettes should be held near the top and inserted into the filler with a rotary motion (avoiding leverage) until secure. Do not use force when inserting pipettes into fillers. Forcible expulsion of the last drop is a potent source of aerosols. Pipette plugs may reduce contamination but offer limited resistance to the passage of micro-organisms. Pipettes should be filled carefully and discharged slowly with the tip close to the agar/liquid surface to minimise aerosol production. Air must not be bubbled through cultures. Solutions may be mixed by repeatedly drawing up a portion into the pipette and discharging carefully. Inadvertent contact of pipette tips with hands, body and equipment must be avoided. Used pipettes must not be placed on the bench etc. but must be

completely immersed (point downwards) into disinfectant pots. Discard Pasteur pipettes into biohazard bins.

Pipettors (Finn, Oxford, Gilson, Genex etc.). The disposable tips have fine orifices and may create significant aerosols, particularly if the last drop is forcibly expelled. Pipette tips must be disposed of as sharps as they can penetrate disposal bags.

Sharp instruments such as scalpel blades, scissors etc. should be used as little as possible when handling microbiological hazards. No attempt must be made to arrest the fall of a dropped instrument. Sharps must be discarded into appropriate containers or decontaminated, cleaned and stored safely.

Glassware must be robust (particularly centrifuge tubes) and be closed with a cap, lid or plug. Plugs made of foam or rolled cotton wool must be close fitting. Contamination of caps etc. and aerosol formation through frothing or agitation of vessel contents must be avoided. Tubes and bottles should be kept in racks made of plastic or plastic coated wire.

Pouring liquid cultures should be avoided as aerosol formation and splashing may result.

Organisms isolated from the environment. Pathogenic organisms may be isolated from many sources including soil, polluted water, sewage and contaminated food. All unidentified organisms isolated should be treated as pathogenic until shown to be otherwise.

Fungal colonies must be manipulated with care to avoid dispersal of spores.

Disposal of microbial cultures and GM contaminated waste.

All general glassware (except pipettes & tissue culture glassware) containing microbial cultures/GM contaminated waste for disposal should be placed directly into baskets; loosen screw caps slightly before placing glassware into the baskets.

Do not place glassware containing chemicals into the baskets. Do not over-fill baskets with glassware.

All agar plates and other plastics (e.g. Eppendorfs) for disposal should be placed into autoclavable bags. You must use a leak-proof container to support autoclave bags that are being used in the laboratory for the collection of GM waste. This is to minimize the risk of GM contamination from leaking bags. Do not over-fill the bags as these must be contained within the cans with the lid in place for transportation.

Discard Pasteur pipettes into suitable containers containing appropriate disinfectant for overnight disinfection. Glassware used for tissue cultures should be put in appropriate disinfectant and left completely immersed for 24 hours before washing up.

Contaminated "sharps" (hypodermic needles, scalpel blades, tips etc.) should be put in the special containers provided. When full the containers should be autoclaved prior to disposal.

Disinfectants

There is no 'universal disinfectant' and disinfection is a less reliable method of decontamination than steam sterilization. Specific disinfectants may have to be used in special circumstances but, in general, disinfectants must be available at each work station for:

- (1) swabbing work surfaces before and after use;
- (2) dealing with accidents;
- (3) discarding pipettes and tissue culture glassware.

When working with genetically modified organisms or category 2 pathogens the disinfectant must be validated for use for that organism.

Disinfectants may be used in the following manner, or where appropriate and subject to a risk assessment, alternatives such as Virkon may be appropriate.

Graduated pipettes and Pasteur pipettes	2.5% Hypochlorite solution complete immersion overnight: no autoclaving
Tissue culture glassware	10% Hypochlorite solution;  complete immersion overnight: no autoclaving
Surfaces (benches, safety cabinets, spills)	either 1% Virkon, or 70% ethanol

PPE must be worn when handling undiluted disinfectants.

## Appendix 5

### Manual Handling

Manual handling includes any lifting, transporting, supporting or putting down of a load by hand or bodily force. Instructions are provided in the document “[A Guide to Manual Handling](#)” which is available from the Personnel website.

Avoid, as far as is reasonably practicable, the need to undertake manual handling operations that involve a risk of injury.

Where this is not reasonably practicable, make a suitable and sufficient assessment of risk having regard to specified factors:

1. The task - Lifting/carrying distance, posture i.e. standing, stooping, twisting etc.
2. The load - Weight, shape, rigidity, edges/projections, temperature, contents etc.
3. The environment - Space constraints, uneven surfaces, steps & slopes etc.
4. Individual capacity - Strength, height, fitness, pre-existing injury etc.

Having performed a risk assessment, take steps to reduce the risk of injury to the lowest level reasonably practicable.

1. Make use of mechanical aids - trolleys, lifting tables, hoists etc.
2. Eliminate twisting and stooping movements.
3. Store heavy items between knee and shoulder height.
4. Reduce carrying distances.
5. Clear away obstacles.
6. Split loads.
7. Change personnel and/or employ team lifts.
8. Wear protective clothing - gloves, safety boots/shoes, face/eye protection if there is a risk from splashing if the load were dropped. Wear overalls to protect clothing if appropriate.

Inform your supervisor of any physical conditions affecting safety or any changes that may affect existing risk assessments.

Do not attempt to carry loads beyond your capacity - get help if necessary.

You must report any accidents or incidents to the appropriate manager IMMEDIATELY. Complete an Accident/Incident form and submit it to the University safety Office

## **Appendix 6**

### **Hypodermic needles**

- Hypodermic needles must not be used where a safer alternative is available;
- Syringes with hypodermic needles attached should not be used as storage containers.
- Hypodermic needles must not be re-sheathed
- Following completion of a task utilising hypodermic needles they must be disposed of to a sharps bin as soon as possible and the sharps bin located as near as possible to the site of use
- If a hypodermic is dropped then it must be recovered and disposed of safely. It is not acceptable to leave such needles for recovery by cleaning or servicing staff.
- All needlestick injuries must be reported to a Safety Supervisor and an Accident/Incident form completed and submitted to the Safety Co-ordinator.

## **Appendix 7**

### **GUIDANCE NOTES ON SPECIFIC HAZARDS AND CONTROL MEASURES FOR NEW OR EXPECTANT MOTHERS (STAFF & STUDENTS)**

#### **PHYSICAL AGENTS**

##### **IONISING RADIATION**

Potential Risks

Significant exposure to ionising radiation can be harmful to the foetus and placing limits on the external radiation dose to the abdomen of the expectant mother for the declared term of her pregnancy recognizes this.

If a nursing mother works with radioactive liquids or dusts, these can cause exposure to the child, particularly through contamination of the mother's skin.

Also, there may be a risk to the foetus from significant amounts of radioactive contamination breathed in or ingested by the mother and transferred across the placenta.

#### Control of Risks

Procedures must be reviewed to ensure that exposure of the pregnant woman is as low as reasonably practicable and certainly below the statutory dose limit for pregnant women. Special attention should be paid to the possibility of nursing mothers receiving radioactive contamination and they should not be employed in work where the risk of such contamination is high.

The working conditions should be such as to make it unlikely that a pregnant woman might receive high accidental exposures to radioactive contamination.

### NON-IONISING RADIATION

#### Potential Risks

Exposure to electric and magnetic fields within current recommendations is not known to cause harm to the foetus or the mother. However, extreme over-exposure to radio-frequency radiation could cause harm by raising body temperature.

#### Control of Risks

Exposure to electric and magnetic fields should not exceed the restrictions on human exposure published by the National Radiological Protection Board.

Any member of staff who is concerned about working with radiation should contact the Health & Safety Co-ordinator.

### THERMAL COMFORT

#### Potential Risks

When pregnant, women tolerate heat less well and may more readily faint or be more liable to heat stress. The risk is likely to be reduced after birth but it is not certain how quickly an improvement comes about.

#### Control of Risks

Since there are no activities with extremes of temperatures at the University then the normal heating/ cooling provisions apply.

### GENERAL MOVEMENT

#### Potential Risks

Fatigue from standing and other physical work has long been associated with miscarriage, premature birth and low birth weight.

Excessive physical or mental pressure may cause stress and can give rise to anxiety and raised blood pressure.

### Control of Risk

Ensure that seating is available where appropriate.

Where work involves new or expectant mothers moving around the campus it must be ensured that hours of work and the volume and pacing of work are not excessive and that, where possible, there is some local control over how their work is organised.

Longer or more frequent rest breaks will help to avoid or reduce fatigue.

## **CHEMICAL & BIOLOGICAL AGENTS**

### Potential Risks

Substances, which carry the following risk phrases potentially, pose a risk.

R40: possible risk or irreversible effects

R45: may cause cancer

R46: may cause heritable genetic damage

R49: may cause cancer by inhalation

R61: may cause harm to the unborn child

R63: possible risk of harm to the unborn child

R64: may cause harm to breast-fed babies

The actual risk to health of these substances can only be determined following a risk assessment of a particular substance at the place of work – i.e. although the substances listed may have the potential to endanger health or safety, there may be no risk in practice, for example if exposure is below a level which might cause harm.

### Control of Risks

Since these substances have the potential to cause heritable genetic damage, the COSHH assessment in the case of women who are pregnant or who have recently given birth should address these risks.

The Strategy for control of exposure to chemicals should be

- Avoidance either getting someone else to work with material, or suspending its use until an appropriate time.
- Substitution considering whether use of alternatives are possible.
- Limitation of Exposure limiting extent of use but at same time readdressing control measures both engineering controls, (such as fume cupboards) or personal protective equipment (including consideration of using a higher standard e.g. nitrile versus disposable gloves).

## **LEAD AND ITS DERIVATIVES**

### Potential Risks

Some more recent studies draw attention to an association between low-level lead exposure before the baby is born from environmental sources and mild decreases in intellectual performance in childhood.

#### Control of Risk

There are specific regulations for control of exposure to lead and these set both airborne levels and blood lead levels. The latter are lower for women of reproductive capacity. Given that we are not in an industrial context there are unlikely to be any processes that give rise to a significant risk. However, a COSHH risk assessment should be carried out and if such assessment raises concern about significant absorption, then Occupational Health must be contacted for further advice.

### MERCURY AND ITS DERIVATIVES

#### Potential Risks

Organic mercury compounds could have adverse effects on the foetus. Studies have shown that exposure to these forms of mercury during pregnancy can slow the growth of the unborn baby, disrupt the nervous system, and cause the mother to be poisoned but there is no clear evidence of adverse effects on developing foetus from mercury and inorganic mercury compounds.

#### Control of Risk

HSE Guidance Notes EH17 and MS12 give practical guidance on the risks of working with mercury and how to control them.

### CYTOTOXIC SUBSTANCES

#### Potential Risks

In the long term these drugs cause damage to genetic information in sperm and eggs. Some can cause cancer. Absorption is by inhalation or through the skin.

Exposure should be reduced to as low a level as is reasonably practicable and assessment of the risk should look particularly at preparation of the drug for use, administration of the drug, and disposal of waste (chemical and human).

Those who are trying to conceive a child or are pregnant or breastfeeding should be fully informed of the reproductive risks.

### CARBON MONOXIDE

#### Potential Risks

This is a chemical that readily crosses the placenta and can result in the foetus being starved of oxygen.

There are no applications where CO gas is used on site.

### CHEMICAL AGENTS – ABSORBED, VIA THE SKIN

#### Potential Risks

A variety of chemical agents may pose a risk of exposure via skin absorption.

As with all substances, the risks will depend on the way that the substance is being used as well as on its hazardous properties.

#### Control of Risk

The COSHH assessment should address the control measures and in the light of someone indicating they are pregnant, COSHH assessments should be revisited to ensure engineering controls and personal protective equipment (gloves, overalls, fire guards) are adequate.

Given that skin absorption is the main risk, the adequacy of gloves in terms of permeability should be scrutinised.

## **BIOLOGICAL AGENTS**

### Potential Risks

Many biological agents categorised as hazard group 2, 3, 4 can affect the unborn child if the mother is infected during pregnancy. These may be transmitted through the placenta while the child is in the womb, or during or after birth, for example through breastfeeding or through close physical contact between mother and child.

Examples of agents where the child might be infected in one of these ways are hepatitis B, HIV (the AIDS virus), herpes, TB, syphilis, chickenpox and typhoid.

For most workers, the risk of infection is not higher at work than from living in the community; but in certain occupations, exposure to infections is more likely, for example laboratory workers, health care, people looking after animals and dealing with animal products.

Some biological agents are however known to cause abortion of the foetus or physical and neurological damage.

For example Rubella (German measles) and toxoplasma can harm the foetus, as can some other biological agents, for example cytomegalovirus (an infection common in the community) and chlamydia in sheep. Again the risks of infection are generally no higher for workers than others, except in those exposed occupations.

Where employees are likely to be exposed to such agents, this should be taken into account in risk assessments carried out under the Control of Substances Hazardous to Health Regulations (COSHH).

### Control of Risks

Account must first be taken of:

- the nature of the biological agent
- how infection is spread
- how likely contact is
- what control measures there are.

The *control measures* may include:

- physical containment
- hygiene measures
- use of available vaccines (if exposure justifies this)

If there is a known high risk of exposure to a highly infectious agent, then it will be appropriate for the pregnant worker to avoid exposure altogether.

## **Appendix 8**

### **GUIDANCE ON WORKING SAFELY WITH HUMAN BLOOD, TISSUES AND OTHER SPECIMENS IN LABORATORIES**

#### **1. Introduction**

The following are guidelines indicating good practice on the collection, storage, handling and disposal of human body fluids. The guidelines should be used when developing risk assessments for practicals or discussing possible Independent Study projects with students. This is not a risk assessment. These guidelines consider finger prick tests (see sections 14 below) and larger volumes of blood.

In drawing up these guidelines we have considered the uses made of human body fluids within ISE to date and anticipated use within the next year. The fluids to be covered are: blood (finger prick and larger volumes), urine, semen, saliva and faecal material.

The risks considered when drawing up these guidelines were those posed by human pathogenic micro-organisms. The major routes of acquisition of laboratory infection include aerosol, mucous membrane (including enteric (intestinal)) and percutaneous (through the skin). The human immunodeficiency virus may be transmitted by the percutaneous inoculation of blood. The risk of exposure may be reduced by following certain safety procedures.

## **2. Legislation**

The fundamental basis of current legislation on working safely with human blood, tissues and other specimens is to assess the risks to health before starting the work so that appropriate precautions to safeguard health can be put in place. The specific legislation concerning work with human blood is The Control of Substances Hazardous to Health Regulations 2002. Essentially these regulations make legally enforceable the following sensible measures to ensure safe working with human blood, tissues and other specimens:

- a. assessing the risk to health before starting work;
- b. selection of appropriate precautions to eliminate or at least minimise the risk to health;
- c. ensuring the precautions are used through adequate supervision;
- d. ensuring the precautions are effective through maintenance, inspection and testing;
- e. ensuring staff are working safely through provision of information, instruction and training;
- f. providing health surveillance and vaccination where appropriate.

For research involving human blood, tissues and other specimens where the presence of potentially lethal micro-organisms is unknown the Regulations state:

- a. where there is no intention to work with pathogens but they may be present in samples the work must be carried out at Containment Level 2, possibly with additional control measures, unless it is known or suspected that a higher Containment Level is required;
- b. if it has not been possible to carry out a conclusive risk assessment and the work may involve a serious health risk to employees then Containment Level 3 must be used.

Effective implementation of this Code of Practice will ensure safe working with human blood, tissues and other specimens and compliance with the COSHH Regulations.

## **3. Risk Assessment**

An assessment of the health risks before starting work with human blood, tissues and other specimens must be completed using Human Samples Risk Assessment Form or an equivalent. The risk assessment must be specific for the procedures involved in the work and take account of the nature and source of the samples to be handled. In many cases the risk assessment will identify the potential of a fatal infection arising from the work; fortunately the consistent application of good working practices and **avoiding the use of sharps** will eliminate, or at least substantially reduce, the risk of serious illness. When working with samples from residents of the UK the following guidelines may be appropriate:

- a. blood that has not been screened for commonly occurring pathogens can be handled at Containment Level 2+. This does not apply to other human tissues;

- b. propagation of peripheral white blood cells from individuals not known or suspected to be infected with HIV or other viruses may be handled at Containment Level 2+ provided incubation does not exceed 100hours;
- c. although blood and tissues known to be negative for commonly occurring pathogens (eg blood from Blood Transfusion Service) can be handled at Containment Level 2 as best practice Containment Level 2+ should be used;

Section 12 below details the control measures required for Containment Level 2 and 2+.

#### **4. Taking Blood**

The following procedure must be adopted when taking blood from known individuals.

- a. Ethical approval must be given.
- b. Written consent must be obtained beforehand by the person taking the blood. This should not be the researcher or supervisor of the project to avoid accusations that unfair pressure was exerted on the volunteer. It should be made clear that a volunteer can withdraw consent at any time.
- c. Blood must be taken only by a registered medical practitioner, phlebotomist, or by a person whose competence has been verified in writing by an accepted organisation.
- d. The volume of blood taken from an individual must be recorded.
- e. The sample must be packaged and labelled appropriately for transport to the laboratory

#### **5. Sample reception**

Packages containing samples of human blood, tissues and other specimens should be opened only in the laboratory by trained staff. When opening packages the risk of leakage in transit must be considered so that appropriate precautions can be taken. Samples must be stored securely in a designated fridge or freezer, and be clearly labelled.

#### **6. Waste disposal**

All waste should be rendered non-infectious by a validated method before disposal if possible (eg by heat treatment in an autoclave). Untreated items may be disposed of through the Clinical Waste stream if this is not possible provided that they are packaged securely to avoid leakage in transit.

#### **7. Local rules**

A set of simple, easily understood instructions must be formulated and a copy given to each laboratory worker handling human blood, tissues and other specimens. They should include procedures for:

- a. disinfection of contaminated surfaces;
- b. safe collection, transport and disposal waste;
- c. safe handling and transport of samples within and outside the laboratory;
- d. secure storage of samples.

An example of a typical set of local rules applicable to all laboratories where human blood, tissues and specimens are handled is given in section 13 below.

#### **8. Instruction, information, training and supervision**

Training should provide:

- a. information regarding hazards and safeguards to prevent exposure/infection;
- b. knowledge and understanding of local rules;
- c. knowledge and understanding of disinfection policy;

- d. knowledge and understanding of waste disposal arrangements;
- e. knowledge and understanding of emergency spillage procedures;
- f. technical competence for all aspects of the work e.g. use of microbiological safety cabinet, centrifuges and automatic pipette aids.

Staff and students working with blood, tissue and samples should be competent to work safely. For a new member of staff, competence should not be assumed but must be verified and, if necessary, training should be provided. Training programmes should be tailored for each individual taking into account their level of experience and the type of work undertaken. Written records of training should be kept. A high standard of supervision of the work should be maintained at all times to ensure control measures to minimise exposure are used.

Extra attention must be given to the needs of undergraduates, and other young people. Undergraduates should not work with unscreened samples unless they receive a very high level of training and supervision. Young people on work experience schemes should not work with human blood, tissues and other specimens, and should be closely supervised at all times when working in a hazardous area.

## **9. Health Surveillance and Vaccination**

Generally health surveillance is not required. Laboratory workers carrying out procedures with a significant risk of a 'needlestick' injury with unscreened blood, and any tissue or specimen containing blood should be vaccinated against the virus, and have their response assessed. The University Occupational Health Service will provide vaccination if required (Colin, is it ok to put this here??).

## **10. Accident Procedure**

Following an accident that results in:

- a. superficial contamination of the skin.

The affected area should be washed with soap and running water, with gentle scrubbing.

- b. contamination of the eye.

The eye should be irrigated with the eye wash.

- c. contamination of nose or mouth.

They should be washed out with copious amounts of tap water.

- d. breakage of the skin.

The wound should be encouraged to bleed, and the area washed with soap and water but without scrubbing. The wound should be covered with a waterproof dressing.

The accident should be reported immediately to a First Aider and Safety Officer, medical intervention should be sought if required. The source of contamination (specimen, sample, material) should be identified and retained for testing if required.

Measures must be taken within the department to ensure the confidentiality of people potentially exposed to blood borne pathogens as a result of an accident.

Laboratory personnel involved in the clean up and disinfection of the spill must be informed of the risks and trained in safe working procedures. They must not place themselves at risk, especially if the accident involves broken glass or other sharp objects.

## **11. Spillage Procedure**

### **spill onto bench**

#### small spills

- a. spray with 2% Virkon solution or freshly made hypochlorite 10, 000ppm
- b. mop up spill immediately with paper towels

- c. place contaminated paper towels into an autoclave bag
- d. place contaminated disposable gloves into an autoclave bag
- e. spray bench with 2% Virkon solution or freshly made hypochlorite 10, 000ppm, leave for 10 minutes before drying with paper towels
- f. place paper towels into an autoclave bag

#### large spills

- a. cover spill with Virkon powder or paper towels which are then treated with freshly made hypochlorite 10, 000ppm
- b. leave for at least 3minutes
- c. wipe up Virkon powder with paper towels and place contaminated paper towels into an autoclave bag
- d. place contaminated disposable gloves into an autoclave bag
- e. spray bench with 2% Virkon solution or freshly made hypochlorite 10, 000ppm, leave for 10 minutes before drying with paper towels
- f. place paper towels in an autoclave bag

#### **spill onto floor**

- a. move away from the area for a few minutes to allow aerosols to disperse, keep other people away
- b. treat as above
- c. remove contaminated clothing and footwear and place in plastic sack
- d. contaminated clothing should either be soaked in cold water, and laundered at high temperature (at least 80°C) or disposed of as clinical waste
- e. contaminated footwear should be washed with 1% Virkon

#### **spill involving broken glass**

Thick rubber gloves or two pairs of disposable gloves must be worn.

- a. treat with Virkon or freshly made hypochlorite, 10 000ppm as appropriate for small or large spill
- b. sweep up broken glass with dust pan and brush, empty into Sharps Bin
- c. carefully mop up spill with paper towels since small fragments of glass may remain
- d. immerse dust pan and brush in 2% Virkon, or discard as clinical waste

## **12. Containment Levels**

### **LABORATORY CONTAINMENT LEVEL 2**

**Laboratory Containment Level 2 must be used for work with screened human blood, tissues and other specimens.**

#### **1. Management Measures**

- 1. Personnel must receive information, instruction and training in working safely with human blood, tissues and other specimens potentially infected with lethal biological agents.
- 2. A high standard of supervision of the work should be maintained.
- 3. Ensure control measures to minimise exposure are used.
- 4. Accidents and incidents should be reported immediately to, and recorded by, a Safety Officer and the Safety Co-ordinator.

#### **2. Physical/Engineering Measures**

- 1. Access to the laboratory is to be restricted to laboratory personnel and other specified persons.
- 2. A biohazard sign must be displayed on the laboratory entrance door.
- 3. There should be adequate space in the laboratory for each worker.

4. The laboratory should be easy to clean. Bench surfaces must be impervious to water, easy to clean and resistant to acids, alkalis, solvents and disinfectants.
5. The laboratory must contain a wash basin located near the laboratory exit.
6. If the laboratory is mechanically ventilated, an inward flow of air should be maintained by extracting room air to atmosphere.
7. Microbiology safety cabinets should exhaust to the outside air or to the laboratory air extract system. If this cannot be arranged then it is possible to use a re-circulation type of cabinet. Some other types of equipment may provide adequate containment in their own right but this should be verified.
8. An autoclave for the sterilisation of waste materials must be readily accessible in the same building as the laboratory, preferably in the laboratory suite.

### **3. Operating Procedures**

1. The laboratory door should be closed when work is in progress.
2. Laboratory coats, which should be side or back fastening, must be worn and removed when leaving the laboratory suite.
3. Laboratory coats must be stored in a clearly defined place apart from personnel clothing and be cleaned at suitable intervals.
4. Laboratory coats contaminated by biological agents must be removed on leaving the work area and kept apart from uncontaminated clothing. They must be decontaminated and cleaned or, if necessary, destroyed.
5. Eating, chewing, drinking, smoking, taking medication, storing food and application of cosmetics in the laboratory must not take place in the laboratory.
6. Mouth pipetting must not take place.
7. Hands must be washed or disinfected immediately when contamination is suspected, after handling infective materials and before leaving the laboratory. When gloves are worn, these should be changed before handling items likely to be touched by others (eg telephones).
8. In general, work can be carried out on the open bench but care must be taken to minimise the production of aerosols. Laboratory procedures likely to create infectious aerosols must be conducted in a microbiological safety cabinet, isolator or be otherwise suitably contained.
9. Bench surfaces should be regularly decontaminated according to the pattern of work.
10. There must be safe storage of biological agents.
11. Effective disinfectants must be available for routine disinfection, and for immediate use in event of a spill.
12. There should be a means for the safe collection, storage and disposal of contaminated waste.
13. Materials for autoclaving should be transported to the autoclave in robust containers without spillage.
14. Used laboratory glassware and other materials awaiting sterilisation before recycling should be stored in a safe manner. Pipettes, if placed in disinfectant, should be totally immersed.
15. Contaminated waste should be suitably labelled before removal for incineration.

### **LABORATORY CONTAINMENT LEVEL 2+**

**Suitable for work with unscreened human blood samples either for research or diagnostic purposes where there is no intention to propagate or concentrate a Hazard Group 3 pathogen**

#### **1. Management Measures**

1. Personnel must receive information, instruction and training in working safely with human blood, tissues and other specimens potentially infected with lethal biological agents.
2. A high standard of supervision of the work should be maintained.
3. Ensure control measures to minimise exposure are used.

4. Accidents and incidents should be reported immediately to, and recorded by, a Safety Officer and the Safety Co-ordinator.

## 2. Physical/Engineering Measures

1. Access to the laboratory is to be restricted to laboratory personnel and other specified persons.
2. A biohazard sign must be displayed on the laboratory entrance door.
3. There should be adequate space in the laboratory for each worker.
4. The laboratory should be easy to clean. Bench surfaces must be impervious to water, easy to clean and resistant to acids, alkalis, solvents and disinfectants.
5. The laboratory must contain a wash basin located near the laboratory exit.
6. If the laboratory is mechanically ventilated, an inward flow of air should be maintained by extracting room air to atmosphere.
7. Microbiology safety cabinets should exhaust to the outside air or to the laboratory air extract system. If this cannot be arranged then it is possible to use a re-circulation type of cabinet. Some other types of equipment may provide adequate containment in their own right but this should be verified.
8. An autoclave for the sterilisation of waste materials must be readily accessible in the same building as the laboratory, preferably in the laboratory suite.

## 3. Operating Procedures

1. The laboratory door should be closed when work is in progress.
2. Work should be carried out in a designated workstation within the laboratory that is clearly identified. The area should be chosen to ensure people can work undisturbed and to minimise the risk of collisions. The workstation should be cleared of unnecessary equipment before work commences. There should be sufficient bench space to ensure the workstation is not cluttered and working practices are not compromised by lack of space. The workbench and any equipment on the bench must be disinfected immediately on completion of the work.
3. A laboratory coat should be kept specifically for this work. The coat should be side or back fastening and worn at all times when working with human blood etc. It should be stored separately from other laboratory coats and personal clothing and be cleaned at suitable intervals. If contamination occurs, the coat must be removed and kept apart from uncontaminated clothing until it has been decontaminated and cleaned or, if necessary, destroyed.
4. Lesions on exposed skin should be covered with waterproof dressings.
5. A single pair of single use (disposable) gloves should be worn. If during use the glove is punctured or grossly contaminated it should be removed and disposed of. Gloves should be removed before handling items likely to be touched by others (eg telephones). On completion of work, gloves should be removed and discarded, and hands should be washed.
6. When a microbiological safety cabinet cannot be used and there is a risk of splashing and aerosol generation full face protection and a plastic apron must be worn.
7. The use of sharps (anything that could puncture the skin, eg needles, scalpels, glass pipettes, dissection instruments, scissors, wire loops that are not closed circles, glass microscope slides and coverslips) and glassware **should be avoided** if possible. Glass items should be replaced with a plastic equivalent. If a sharp object must be used then handling procedures must be established to minimise the risk of puncturing the skin.
8. Used sharps must be placed **immediately** into a sharps bin. Do not leave sharps lying about, or dispose of sharps in plastic bags. Hypodermic needles must not be re-sheathed before disposal. Do not use a scalpel blade without its handle. Sharps bins must not be filled more than  $\frac{2}{3}$  full. Sharps that are likely to be contaminated with pathogenic micro-organisms should be autoclaved in the sharps bin before collection for incineration.
9. Samples should be centrifuged in sealed buckets ideally with transparent lids or sealed rotors. These should be cleaned and disinfected regularly and immediately following leakage. If a sample has been known to leak during centrifugation then the bucket or rotor must be opened

- in a microbiological safety cabinet. Seals on buckets and rotors should be checked before use for wear and damage and replaced if damaged.
10. Eating, chewing, drinking, smoking, taking medication, storing food and application of cosmetics must not take place in the laboratory.
  11. Mouth pipetting must not take place.
  12. In general, work can be carried out on the open bench but care must be taken to minimise the production of aerosols. Laboratory procedures likely to create infectious aerosols must be conducted in a microbiological safety cabinet, isolator or be otherwise suitably contained eg homogenisation,
  13. Bench surfaces should be regularly decontaminated according to the pattern of work.
  14. All sample reception should be undertaken in the laboratory by trained staff. Arrangements must be made to prevent untrained staff from handling samples, especially samples received through the postal system. There must be safe storage of samples.
  15. Effective disinfectants must be available for routine disinfection, and for immediate use in event of a spill.
  16. There should be a means for the safe collection, storage and disposal of contaminated waste.
  17. Materials for autoclaving should be transported to the autoclave in robust containers without spillage.
  18. Following an accident with a sharp object resulting in a puncture wound the following actions must be taken immediately.
    - a. The wound should be encouraged to bleed.
    - b. The wound should be washed with soap and water.
    - c. The wound should be covered with a waterproof dressing.
    - d. Any contaminated skin, conjunctivae or mucous membranes should be washed immediately.
    - e. Professional medical advice must be obtained if the likelihood of exposure to a blood borne pathogen is high.
    - f. Any contaminated areas of bench, floor and equipment should be treated with a suitable disinfectant such as Virkon. People providing assistance in clearing up the accident should be aware of the hazards and be trained in safe working practices. They should exercise caution so that they do not suffer cuts, especially if the accident involved broken glass.
  19. The source of contamination should be identified and retained for testing if necessary
  20. Used laboratory glassware and other materials awaiting sterilisation before recycling should be stored in a safe manner. Pipettes, if placed in disinfectant, should be totally immersed.
  21. Contaminated waste should be suitably labelled before removal for incineration.

### **13. Local Rules**

#### **TYPICAL LOCAL RULES FOR HANDLING HUMAN BLOOD, TISSUES AND OTHER SPECIMENS IN THE LABORATORY**

##### **The following precautions must be followed when working with samples that have been screened for known pathogens.**

1. Work cannot commence unless you have received instruction and training from a Tutor or Technician or other competent person.
2. The laboratory must be kept tidy and organised such that separate writing and working areas are available.
3. The laboratory door should be kept closed.
4. Samples arriving in the laboratory must be stored securely in a designated fridge or freezer.
5. Eating, chewing, drinking, smoking, applying cosmetics, storing of food and outdoor clothing in the laboratory is forbidden. Workers should avoid touching their mouth or eyes when in the laboratory.
6. Laboratory coats must be worn at all times in the laboratory and removed before leaving.

7. Hands should be washed regularly and always before leaving the laboratory.
8. Mouth pipetting is forbidden.
9. All procedures must be performed so as to minimise production of aerosols: rapid pouring of liquids must be avoided; pipettes used slowly; bottles opened carefully.
10. All workers in the laboratory must cover cuts and abrasions to exposed skin with a waterproof dressing.
11. On completion of work, benchtops must be cleaned with 2% Virkon solution
12. Waste materials are to be placed in autoclave bags or sharps bins
13. All specimen containers, glassware and used equipment must be completely immersed in 2% Virkon and left for 10 minutes before cleaning and disposal.
14. Following spillages contaminated surfaces must be disinfected immediately with 2% Virkon solution and left for 10 minutes.
15. Accidents must be reported to a Safety Officer and the Safety Co-ordinator. Following contamination of skin, eyes or nose and mouth they should be washed immediately with water. If the skin is broken, the wound should be encouraged to bleed, washed thoroughly with soap and water without scrubbing, and covered with a waterproof dressing.

**Additional precautions for working with samples that have not been screened for known pathogens in the Laboratory.**

1. The use of sharps is prohibited unless there is no alternative. Used sharps must be placed directly into a sharps bin for disposal. Wherever possible, sharps bins must be autoclaved before incineration.
2. Laboratory coats must be worn at all times in the laboratory and removed before leaving. They should be side or back fastening with a high collar and elasticated sleeves and should be stored on a dedicated set of pegs, away from other clothing. The remainder of the body should be protected with suitable clothing.
3. Gloves must be worn at all times and removed before leaving the laboratory or touching items used by others (eg telephone).
4. Single use (disposable) gloves must not be reused. Multi-use gloves must be checked for integrity before use.
5. In the event of gloves becoming damaged or grossly contaminated the gloves must be discarded, hands washed and new gloves put on.
6. Eye protection and a plastic apron should be worn if the work activity is likely to cause splashing.
7. Work must be carried out at a clearly defined and secluded workstation.
8. On completion of the work the workstation and all equipment must be disinfected.
9. Samples must be centrifuged in sealed buckets.

**14. Fingerprick Guidance**

**Obtaining blood samples by finger puncture - general procedure for student practicals.**

1. Students MUST NOT puncture other students' fingers.
2. Students MUST ONLY handle their own blood.
3. Immediately after use, all disposable items, i.e. swabs and lancets, must be placed in the container provided (e.g. a yellow sharps box). Under no circumstances should these items be placed on bench surfaces.
4. Immediately after use, all glassware, i.e. blood diluting pipettes, haemocytometer chambers, cover slips and cuvettes, must be placed in a bucket containing decontaminant (0.05% sodium hypochlorite or 1% bleach or Virkon). Under no circumstances should these items be placed on bench surfaces.
5. If blood is inadvertently spilled on any laboratory surface, the student must don a pair of disposable gloves and swab the affected area with decontaminant. All swabs together with the

gloves should be placed in the container provided (e.g. a hazardous waste bag, autoclave bag). The contamination of ANY instrument e.g. spectrophotometer, must be reported to a member of the academic staff IMMEDIATELY so that decontamination procedures may be instituted.

6. Before leaving the laboratory hands should be thoroughly washed with soap and water.

### **Obtaining blood samples by finger puncture - training students to carry out the procedure**

These steps include making sure you have all your supplies such as:

- A timer or a watch for timing the tests,
- Gloves because you might come into contact with blood or blood products,
- Disinfectant such as zircon or bleach for cleaning your work area,
- A sharps container for disposing used lancets and other sharps,
- An autoclave bag or bucket to collect waste,
- A pen,
- A waterproof marker so the client identification doesn't get wiped away on the test device,
- Client/consent forms and,
- Other appropriate record forms.

The supplies you need for a finger prick include:

- Gauze pads or cotton balls,
- Sterile cleansing wipes, and
- Lancets,
- Sticking plasters (have hyper-allergenic available)
- Sometimes a micropipette with pipette tips are used for collecting blood. Other situations require capillary tubes or loops.

As with any laboratory test you should always use universal safety precautions to provide safety for yourself, as well as for your client, these precautions should include

- using a new pair of gloves with each client and wearing a clean lab coat
- washing your hands before and after you test a client, and
- in some situations eye protection.

You should also keep your work area clean by wiping it with disinfectant. Be sure to disinfect all spills.

Be cautious when using lancets, capillary tubes or other sharp objects. Dispose of all used items and materials in the appropriate sharps or waste container immediately after use.

Another part of the initial steps is to organize your work area so that you have space to work and your supplies are easy to reach. Make sure a chair is available for the client when you're performing a finger prick.

And finally, educate the client. Explain that the supplies are sterile and have never been used on another person. And also describe the procedure and assure them that the test is safe and their results will be kept confidential.

### **Procedure.**

1. Position the hand palm-side up. Choose the fingertip of the ring, middle, or index finger, whichever is the least calloused. You can also use the thumb if it's the least calloused finger.
2. Once you've chosen which finger to prick, it may be necessary to apply intermittent pressure to the finger to help the blood flow to the fingertip. Clean the fingertip with sterile wipe. Start in the middle and work outward so as not to re-contaminate the area. Allow the finger to air dry.
3. Use a new sterile lancet for each person. Show the lancet to the client so they're reassured that it's new and unused.
4. Place the lancet off-centre on the fingertip. For an auto lancet hold the finger and firmly press the lancet against the finger and puncture the skin.
5. When using a traditional lancet hold the finger firmly and make a quick firm prick.
6. Dispose the lancet in a biohazard sharps container.
7. Wipe away the first drop of blood with a sterile gauze pad or cotton ball.
8. To help the blood flow you may need to hold the finger lower than the elbow.
9. Next collect the blood specimen. You may need to apply intermittent pressure to the base of the finger to help the blood flow. How blood is placed on test devices can vary from test to test, be sure to follow the manufacturer's directions.
10. For some tests you can simply collect the blood directly from the finger onto the test device. But other test kits require an exact volume of blood to be collected. For these situations the instructions provided with the test kits, and your standard operating procedures, will indicate whether to collect blood using a disposable pipette, a loop, or a capillary tube.
11. After you've collected all the blood that's needed for the test, give the client a gauze pad or cotton ball to place on their finger until the bleeding stops. And finally, properly dispose of the gauze before the client leaves the testing area.
12. A sticking plaster may be used if bleeding continues.
13. In review, to perform a finger prick, choose the least calloused fingertip and clean it with sterile wipe. Use a new sterile lancet for each person and show the lancet to the client. Place the lancet off-centre and firmly press the lancet against the finger and puncture the skin. Wipe away the first drop of blood with sterile gauze or a cotton ball. Next collect the blood. After you've collected all that's needed give the client a gauze pad or cotton ball to place on the finger until the bleeding stops. Dispose of the used gauze properly before the client leaves the testing room.

Further Information available from

[HSE Blood-borne viruses in the workplace. Guidance for employers and employees](#)

## **Appendix 9**

### STINGING BY HONEYBEES

Most stinging insects can sting repeatedly, the honeybee however stings only once. The female worker bee has a barbed stinger with a venom sac attached at the posterior end of the abdomen. After stinging the bee tears itself away from the stinger leaving it in the victim's

skin (the bee dies shortly afterwards). If possible remove the stinger from the skin immediately to reduce any reaction.

Most stings result in a temporary injury, sometimes however the effects can be severe even life-threatening, depending on where the person is stung and if they have an allergy. If stung near the eyes, nose or throat seek medical help.

**Usual Reaction** – local pain, swelling, redness and itching around the sting site

**Mild Allergic Reaction** – pain, swelling, redness and itching in a larger area around the sting site. This reaction can last a few days. Hives may develop and scratching may cause the skin to break and lead to infection.

**Severe Allergic Reaction** – some or all of the following symptoms may appear immediately or within the first 30 minutes

- Hives, itching, redness or swelling in areas other than the sting site
- Swollen eyes or eyelids
- Wheezing
- Tightness of chest and difficulty breathing
- Swelling of the tongue
- Hoarseness
- Dizziness
- Shock
- Unconsciousness
- Cardiac arrest

This **anaphylactic reaction** can occur the first time someone is stung or with following stings. If you see any of these signs of reaction, even if you are not sure, get medical help immediately. Death can occur within 30-45 minutes of being stung.

Some people who know they have a serious allergic reaction to stings carry prescribed medication which they should administer immediately.