**LABORATORY SAFETY HANDBOOK**

**JR Laboratories**

**V1. 2014**

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| --- | --- |
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Laboratory Management Intranet Websites

<http://www.expmedndm.ox.ac.uk/lab-management>

http://www.imd.ox.ac.uk/lab-management

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**1 Health & Safety Induction**

In order to comply with the University of Oxford Safety Policies, all new employees, students and visitors must be fully aware of the safety regulations pertaining to their post. In general, individuals have a responsibility to comply with safety regulations set by the Department and the University and Supervisors are responsible for maintenance of safety matters within their areas of influence and to ensure adequate training of all individuals working for them.

In addition, each laboratory or area has an appointed person who is responsible for the safety of that area and committees have been formed to advise on various aspects of safety as described in the Departmental Statement of Safety.

The complete set of University of Oxford Safety Policies can be found at

<http://www.admin.ox.ac.uk/safety/policy-statements/> or hard copies are held by the Departmental Safety Officer in room 5061.

During the Induction, you will;

* Meet the Laboratory Management team
* Have a tour of the laboratory facilities
* Be provided with the Laboratory Safety Handbook
* Be provided with safety glasses

After the induction, you will;

* + Have an opportunity to raise any concerns or ask any questions
  + Complete a quiz to gain access to the laboratories
  + Complete and return any relevant paperwork required to complete the Induction process (i.e. COSHH Health Surveillance Registration form)
  + Complete the relevant training

**A pass mark of 80 % must be obtained before access is given.**

**A deposit of £5 is also required for a programmed access fob**

**Emergencies**

**First Aid:** First Aid Boxes and Eye Wash Bottles can be found at strategic points around the Department. Familiarise yourself with their location. In the event of an accident to the face with chemicals, wash eyes and face immediately with cold water.

**Qualified First Aiders are Robin Sparkes (Room 5061) and Chris Dodd (Room 7402)**

**Accident:** Report to Laboratory Manager, if seriously injured **c**ontact a First Aid Officer who will accompany you to the A & E Department which is on Level 1 of this Building.

If there is a cardiac arrest or medical emergency – dial 2222

**Fire:** There are two types of alarms which sound;

Intermittent alarm – fire alarm activated in an area adjacent; no need to evacuate but be prepared if the tone changes.

Continuous alarm – fire alarm activated in the area; Evacuate area immediately to a zone without alarm, preferably an area below your current location.

*The Hospital does not conduct fire alarm testing so if the alarm sounds, act accordingly.*

If you discover a fire **BREAK THE FIRE ALARM GLASS** to raise the alarm. The fire alarm bells will then ring continuously, as a signal to move to a zone not alarming. Dial 4444

On hearing the Fire Alarm, close all windows and internal doors. Only collect personal belongings which are readily at hand and leave the area without delay via the fire escapes. DO NOT USE THE LIFT. DO NOT re-enter the building until told to do so.

***If you require the Laboratory Manager out of hours facility or equipment, please contact the switchboard by dialling “0” and they will connect you to the person you ask for by name.***

**2 Training Requirements**

***Details of the required training including training schedules can be found on the Laboratory Management Website.***

**2.1 Biological & GMO Safety**

All laboratory workers are required to attend this mandatory training organized by the **Safety Office**. These training sessions are offered approximately every 4 weeks and you must pre-book your attendance. Please ensure you sign the attendance register upon arrival.

**2.2 Cryogenic Facility/Liquid Nitrogen**

All laboratory workers must complete a Cryogenic/Liquid Nitrogen training session with **Laboratory Management**. These training sessions are scheduled with the individuals once the Induction test has been completed.

1. **Overview of Health & Safety Documentation in Laboratories**

Each Group holds a safety documentation file located in the laboratory which must hold;

* 1. Safety Provisions Declaration -

*This is a document that must be signed by all laboratory personnel. Upon signing, you are agreeing that you have read, understood and will comply with all the information held within the safety file and Departmental and University Safety Policies*.

* 1. Copy of the Laboratory Safety Handbook
  2. Departmental Statement of Safety
  3. Risk/COSHH Assessments
  4. Genetic Modification Assessments

**3.1 Risk /COSHH Assessments**

Risk assessment is a document which lists all the possible hazards and risks associated for an activity.

Hazard can be a substance, piece of equipment, location, procedure.

Risk is the chance and consequence of the hazard being realized.

Control of Substances Hazardous to Health (COSHH) assessments are documents that outlines the hazards or risks associated for asingle substance.

Any laboratory activity or hazardous substance must be covered by a risk assessment or COSHH assessment BEFORE the work is performed. If you will be performing an activity that has not already had a risk assessment completed, please complete the form and submit it for approval to your Group Leader and the Departmental Safety Officer. Forms can be downloaded from the Lab Management website.

**3.1.1 COSHH Health Surveillance**

Under the regulations according to COSHH, use of certain substances, requires Health Surveillance through University Occupational Health Service (OHS) such as;

* Human Blood
* Latex
* Vaccinia Virus
* Heavy Metals
* Work involving animals (Laboratory Animal Allergens)

If your work involves any of the above listed substances, please register for Health Surveillance by following the link to OHS on the Laboratory Management website to download the form. *Failure to register and attend appointments may result in cancellation of laboratory access.*

**3.1.2 Pregnancy**

If you become pregnant, please inform the Departmental Safety Officer as soon as possible as a confidential risk assessment will need to be completed on the work performed.

Women working on any of the below listed items should seek advice from the Departmental Safety Officer or arrange to have the work transferred to another individual.

* Human pathogens
* Volatile solvents
* Carcinogens, teratogens and mutagens
* Radioactivity

1. **Personal Protective Equipment**

**4.1 Eye Protection**

It is mandatory in containment laboratories when undertaking wet work (including work within a Microbiological Safety Cabinet) to wear eye protection. Eye protection may take the form of individual’s prescription glasses or safety glasses which are provided by the Department during the induction. If your safety glasses become damaged, they will be replaced free of charge.

If a risk assessment identifies the need for specific eye protection (i.e. safety glasses meeting EN166) then the correct eye protection must be worn – individual’s prescription glasses are NOT suitable in these instances to give sufficient protection.

The activities listed below are some examples when safety glasses (EN166 compliant) must be worn :

* Preparing large volumes of Virkon
  + Draining disinfected material and flushing used Virkon solution down the sink
  + Aspirating liquids not within a microbiological safety cabinet
  + Preparing chemical mixtures

**4.2 Laboratory Coat**

All staff and visitors working in laboratory areas are required to wear laboratory coats fully fastened. Items such as neckties or scarves should be secured inside the lab coat.

A laboratory coat can be obtained on L0 at Laundry Services upon presentation of your University card. Lab coats should be exchanged for a clean coat on a regular basis.

**4.3 Gloves**

Nitrile disposable gloves are used within the laboratories. Latex gloves are prohibited from use due to the high risk of sensitization to latex and latex powder when frequently used. If you find you cannot use nitrile gloves, an alternate disposable glove will be provided. If no alternative to latex can be used, please contact the Laboratory Manager.

***ONE GLOVE POLICY***

***Do not touch door handles wearing gloves – remove a single glove when opening doors***

**4.4 Other PPE Items Provided by Laboratory Management**

|  |  |
| --- | --- |
| Cryogenic gloves | Heat resistant gloves |
| Cryogenic face shield | UV face shield |
| Cryogenic apron | Chemical aprons |

These are shared items that are available within the laboratories. Please check these items over before use and report any faults immediately to the Laboratory Management Team.

**4.5 Laboratory Safety Compliance Policy**

If a laboratory worker is observed not following laboratory safety rules, the individual will be warned and a follow – up notification email will be sent to the individual and the Group Leader.

If non-compliance is observed again within a 4 week period for that individual, the individual will be asked to leave the laboratory immediately; access will be removed and not re-instated until a meeting has occurred between the individual, Group Leader and Laboratory Manager to discuss non-compliance.

Examples (not exhaustive) of non-compliance are;

* Failure to wear the appropriate PPE for the activities being performed in the laboratory;
* Storing used sharps on benches or re-sheathing sharps;
* Failure to remove gloves before opening doors

**5 Laboratory Facilities**

**5.1 Cryogenic Facility**

Appendix 1 is the Departmental Code of Practice for the Cryogenic Facilities containing a risk assessment for use of liquid nitrogen. Please note that this Code of Practice only applies to the Experimental Medicine and Investigative Medicine – JR facilities. If you work in other University of Oxford facilities or NHS sites, there will be a different code of practice in place

**5.2 Tissue Culture Facility**

The department has two tissue culture suites and are shared between several groups so they must remain fully stocked and tidy. Both suites have class II Microbiological Safety cabinets, CO2 Incubators, centrifuges, microscopes and various plastic consumables. There is a booking system in place for use of the MSCs and the incubators are designated by Group.

**5.2.1 Decontamination Policy**

Appendix 2 outlines the full decontamination policy. Briefly, Virkon is the general disinfectant used within the tissue culture suites. Final concentration for disinfection is 1%.

General surface disinfection (not contaminated with blood) can be performed using 70% Ethanol or 70% Isopropanol.

Equipment cleaning for Incubators, MSCs, pipettes or centrifuges can be done with a 10% Trigene solution.

**5.2.2 Microbiological Safety Cabinets**

Please see appendix 3 for Good Laboratory Practice when working with Microbiological Safety Cabinets

**5.3 Cold Rooms**

There are two cold rooms available; however use of the cold rooms is restricted to the level in which you work. Individuals are provided a single storage crate from Laboratory Management which must be labelled with your name and Group Leader to store all personalized items.

**Cardboard boxes and paper is prohibited within the cold rooms as these materials encourage the growth of moulds.**

**Storage of dry ice is prohibited in the cold room – see section 10.2**

Each cold room is fitted with a panic alarm and is tested annually. Please make yourself aware of the location of these panic alarms in the case of emergency. These rooms are not to be used as work areas so please limit the time you spend in here.

**5.4 Fume Cabinets**

Fume cabinets are located in laboratories 7602 and 5609 and are serviced annually. Dispensing chemicals or weighing out powders must be performed in the fume cabinet to avoid inhalation of hazardous vapours. Before use, please check the air velocity rate to ensure it is operating between 0.8 -1.0 m/s If the air velocity is out of this range, do not use and report immediately to Laboratory Management. Do not use fume cabinets as chemical storage areas.

**5.5 Flow Cytometry Facility**

This is a small research facility which operates within Experimental Medicine and is open to all departments within the Medical Sciences Division. The Flow Cytometry Facility Manager is responsible for access, training and the equipment within this facility. Any queries regarding this facility should be reported directly to the Flow Facility Manager. For more information, please visit the facility website <http://www.expmedndm.ox.ac.uk/flow-cytometry-facility>

**5.6 Core Laboratory**

Laboratory 7402 is the service laboratory run by Laboratory Management. Access to this laboratory is provided to all laboratory users within Experimental Medicine and Investigative Medicine as there are pieces of equipment available for use such as;

|  |  |
| --- | --- |
| * Ultracentrifuge | * High speed centrifuges |
| * Bacterial Incubators | * Gel Imaging System |
| * Ice Machine | * Fluorescence/Luminescence reader (Lab 5600) |
| * Sonicator |  |

This laboratory also operates as the washroom where glassware is processed and sterile reagents are prepared by the Laboratory Assistant.

Please visit the Laboratory Management Website for more information regarding services available.

**5.7 Biomedical Sciences Unit/Home Office Licences**

Induction, access and training for all work performed within the Biomedical Sciences Unit is arranged independently from Experimental Medicine. If you require more information, please speak with other members of your laboratory who will arrange a meeting and necessary inductions.

All work must be covered by a Home Office Project Licence, Personal Licence and risk assessment. BMSU local rules must be followed. All project licence and personal licence original certificates are held by the Experimental Medicine Laboratory Manager and a copy will be provided to the individual. If amendments or alterations are required, the original licence can be signed out from the office. Upon departure or transfer, it is the individual’s responsibility to notify Laboratory Management and the licence will be revoked.

**6 Equipment**

Use of all equipment is to be in accordance with the manufacturer’s instructions and attention must be paid to warning labels. Ensure that you are shown how to use the equipment by a competent person before using that equipment.

Before using any electrical equipment please carry out a visual inspection looking for frayed cables, cracked plugs, exposed wires, etc… Do not operate electrical equipment in wet, corrosive or dirty conditions.

All electrical faults must be reported immediately to the Laboratory Management team who will remove the item from use. All electrical repairs and wiring of plugs must be carried out or checked before use by a competent electrician.

*Please note: Use of electrophoresis apparatus is subject to a local risk assessment which is the responsibility of the Groups using that equipment*

**6.1 New Equipment Additions**

Please consult the Laboratory Manager before any new equipment is purchased as an assessment must be done for the proposed location and to ensure all infrastructure requirements can be met. Equipment costing £500 or more must be identified by an asset number and recorded into the Departmental Asset Register. Failure to register equipment will void any insurance coverage of that item in the event of damage.

**6.2 Repairs, Transfer or Disposal**

Report any faults on equipment to Laboratory Management immediately.

Before any repairs, transfers or disposal can occur, the items must be free from radiation, biological or chemical hazards and require a decontamination certificate to be completed.

Please ask the Laboratory Manager for a copy of this form.

**7 Laboratory Operations**

A wide variety of work is carried out within the laboratories in Experimental Medicine. To ensure all activities are done safely and in compliance with local and University Health & Safety regulations, all laboratory workers must;

* Ensure all work is covered by a risk assessment, COSHH assessment, GMO assessment or Home Office Project Licence
* Attend a Health & Safety Induction
* Register any visiting scientists, students or work experience placements by completing a registration form as far in advance of the visitor’s arrival as possible. Registration forms can be found on the Laboratory Management website
* Attend the Biological & GMO Safety training offered by the Safety Office
* Comply with local laboratory rules and raise or address any questions or concerns they have with the Laboratory Manager
* Ensure the work is performed according to Good Laboratory Practice
* Take responsibility for their own Health & Safety and do not place others at unnecessary risk
* Report any accidents, incidents and near-misses immediately to Laboratory Management and an accident form must be completed

**7.1 Laboratory Rules according to Good Laboratory Practices**

* Lab coat (fastened ) and eye protection must be worn when working at the bench
* Sensible foot ware must be worn in the labs (No open-toe shoes or sandals permitted)
* Remove one glove when opening doors
* No food, drinks, medication is to enter the lab. Do not apply cosmetics or insert contact lenses. Do not chew gum.
* Disposal of waste must follow local rules
* All spills must be dealt with immediately and in accordance with the local Departmental disinfection policy
* Work surfaces must be kept clear and tidy and disinfected when work has been completed
* Centrifugation of human blood or tissue must be done using sealed buckets
* All cuts and abrasions must be covered with a waterproof dressing before entering the laboratory
* Wash hands when leaving the laboratory
* Stored samples must be within secondary packaging (i.e. box or plastic bag) and clearly labelled with a name, Group Leader and general contents
* All bottles must be clearly labelled with contents, date and owner

**7.2 Lone Working Procedures**

Ensure that you have been given approval from your Group Leader/Supervisor for lone working and/or working out of hours and you are fully aware of emergency procedures in the event of personal injury, fire or serious facility or equipment breakdown.

Do not de-cant liquid nitrogen unless another person is present.

**8 Waste Disposal**

The correct disposal of waste must be followed and failure to comply with local rules may result in access to the laboratories removed.

|  |  |
| --- | --- |
| **Sharps Bins**  *Do not re-sheath sharps before placing in bins*  **Needles**  **Scalpels**  **Glass Sharps**  **dental waste complete packageSyringes** | **Orange Bags**  **Paper towel**  **http://www.cliniserve.co.uk/html/images/bag-orange.jpgGloves**  **Flasks**  **Universals**  **Pipette Wrappers**  **Plastic tubes**  **Gels** |
| **Black Bags**  **Domestic waste**  **B410D4B3(not located in labs)** | **Limb Bins**  **Wet biological waste**  **Pipettes**  **B410D4B3Tips (loose or Dispo-jar)**  **Plates**  **Small sealed sharps bin** |

Small sharps bins when full, may be placed in a limb bin, however large sharps bins must be sealed when full and the laboratory number and date must be written on the top.

Limb bins, when full, must be sealed and the laboratory number and date must be written on the top. These will be collected from the laboratories by the cleaners.

**8.1 Glass Waste**

Small glass bottles (up to 10mg or ml) can be disposed of in sharps-bins. Larger glass bottles (rinsed with water) or broken glass must placed in the glass disposal grey wheelie bin in the Core Lab 7402.

Dustpan and brush sets can be found in all laboratories located under the sink to assist in clearing broken glass or other spilled material.

**8.2 Chemical/Solvent waste**

Chemical and solvent waste is considered hazardous waste and disposal must be arranged by Laboratory Management and the Safety Office. The waste must be placed in glass bottles and clearly labelled with the contents and rough percentages of the chemical components. Do not dispose via the drains. If chemical waste is not clearly labelled, it must be sent for analysis, identified and the cost will be charged to the Group.

**8.3 Batteries**

There are battery collection containers located in the Lab Management Office as well as in the Core Lab. Please ensure you tape up the battery before placing it in the designated bin.

**9 Biological Hazards**

Biological Hazards are based on pathogenicity to humans, whether or not it poses a hazard to employees, the rate/route of transmission and the availability of treatment or prophylaxis.

|  |  |
| --- | --- |
| Hazard Group 1 | * An agent unlikely to cause human disease |
| Hazard Group 2 | * An agent that can cause human disease and may be a hazard to employees * Unlikely to spread to community * Effective treatment available |
| Hazard Group 3 | * An agent which can cause severe human disease and presents a serious hazard to employees * May present a risk of spreading to community * Effective treatment available |
| Hazard Group 4 | * An agent which causes severe human disease and is a serious hazard to employees * Likely to spread to the community * No effective treatment |

The Advisory Committee on Dangerous Pathogens (ACDP) has published an Approved List of Biological Agents which outlines the hazard classification for most bacteria, viruses and fungi. To view this list, a hard copy is available from Laboratory Management or can be downloaded from http://www.hse.gov.uk/pubns/misc208.pdf.

**9.1 Routes of Infection**

* Airborne: Inhalation
* Percutaneous: Directly into blood (sharps, cuts, bites)
* Permeation: Indirectly through membrane (contamination of eye)
* Ingestion: Into gastrointestinal tract

**9.2 Physical Containment**

There are four containment levels according to the hazard grouping of a biological agent.

All laboratories within Experimental Medicine have been built to Containment Level 2 but work carried out could be containment level 1 or 2.

*Containment level 2 laboratories are used where there is uncertainty existing over the presence of biological agents or where the presence of hazard group 2 pathogenic biological agents are known or suspected.*

Generally, containment level 2 laboratories have restricted access, sealed floor covering, washable work surfaces that are impervious and chemically resistant, separate facilities for hand washing.

The Departmental Biological Safety Officer and Head of the Department must be made aware of any acquisitions of new biological agents entering the premises. Also, all biological agents and toxins must be declared on the annual Biological Safety Returns form.

**9.3 Working with Human Blood**

Individuals working with human blood or tissue must understand the risks involved and must carry out a risk assessment on the proposed activity. *Use of sharps when handling human blood must be kept to an absolute minimum.*

Health Surveillance is required when handling human blood or tissues due to the potential risk of blood borne viruses (HIV or HBV) that may be present from unscreened donors.

Whenever possible, please use blood or blood products obtained from the National Blood Service as these will have been screened and negative for blood borne viruses.

Centrifugation of blood or human tissue must be done using sealed buckets. Proper decontamination procedures must be followed.

**9.3.1 Blood Donation/Collection**

Only trained phlebotomists are permitted to take blood samples from donors.

Please see the University Occupational Health Service Policy OHS 1/03 (<http://www.admin.ox.ac.uk/uohs/policies-guidance/blood/>) for further information.

Blood collection is not permitted within the laboratories and only within designated areas.

Please note that individuals are not permitted to work on their own blood or blood products.

**9.3.2 Blood, Tissue and Cellular Derivatives**

Ensure appropriate labelling of all tubes or vials to be stored or sent are anonymous and cannot be directly traced back to the individual or patient the material was obtained from. Do not store any samples labelled with initials or date of birth.

All use and storage of biological material obtained from individuals or patients must be covered by current ethical approval from a UK Ethics committee or registered with the Oxford Radcliffe Biobank (ORB) in accordance with the Human Tissue Act. Failure to comply is not lawful.

**9.4 Cell Lines/Hybrids**

Use of cell lines must be covered by a risk assessment. Please notify the Departmental Biological Safety Officer of any new cell lines entering the premises and these must be declared (if applicable) on the Annual Biological Returns Form.

**9.5 Genetically Modified Organisms**

Any work involving the use or creation of a Genetically Modified Organism or Animal must be declared and assessed under the Genetic Modification (Contained Use) Regulations. Approval and authorization must be gained by the Head of Department before any work can be carried out.

The department has a specialist committee to review all proposed work involving GMOs. Please see appendix 4 for guidance on reviewing or writing GMO assessments.

**9.6 Indirect biological hazards**

The use of sharps such as needles and glass increases the overall risk of the activity if used when manipulating pathogenic material, genetically modified organisms or animals. In the event of a scratch, needle-stick injury or animal bite, please seek first-aid; notify the Laboratory Manager and Occupational Health as soon as possible. Detailed instructions are found above all hand wash basins in the laboratories. Blunt end needles should be used in laboratory operations as much as possible and are available from Laboratory Management.

**9.10 Movement of Biological Material**

When transport or movement of biological material is required, samples must be packaged appropriately whether movement is across laboratories or when using a courier service. Biological material must be in tertiary packaging which includes;

**Primary packaging**: Biological material in tube/vial with leak-proof lid

**Secondary packaging:** Watertight plastic bag or container containing enough absorbent material to absorb contents if spilt.

**Tertiary packaging:** Outer packaging such as a lidded polystyrene box or container

**10 Chemical Hazards**

Work involving chemicals must be included within an activity based risk assessment or by an individual COSHH assessment. These assessments will outline the need (if applicable) of any specialist PPE above the normal lab coat and eye protection required (for example some chemicals will corrode nitrile gloves therefore alternate gloves for protection may be required).

Use of solvents or powdered chemicals should be decanted within the fume cabinet to prevent inhalation of hazardous vapours or powder.

Chemicals must be stored appropriately according to their chemical properties (for example corrosive agents are stored in specialist metal cabinets and are not mixed with other chemicals)

Storage of chemicals over 500ml are not permitted on lab shelves and any dilution of chemical should be clearly labelled with the chemical name and the percentage composition.

All chemicals must be stored with Material Safety Data Sheets (MSDS). Please refer to the MSDS when completing a risk assessment involving the use of any chemical.

In the event of a chemical spillage, spill kits are available and are located in various areas in the department. Please make yourself aware of these locations.

Please see appendix 5 for the Hazard symbols and the safety precautions required.

**10.1 Liquid Nitrogen**

Please refer to appendix 1 for the Cryogenic facility code of practice and risk assessments for the use of liquid nitrogen and cryotanks. You must receive specific training for this Facility from the Laboratory Management Team.

**10.2 Dry Ice (Solid CO2 pellets)**

Dry ice is stored in specialist chests in laboratory 5600 and laboratory 7402. Dry ice must be handled wearing insulated gloves and placed into an appropriate storage container such as polystyrene boxes.

Dry ice is never to be placed in sealed rooms (cold rooms) or sealed containers due to an explosion risk as well as an accumulation of CO2 in a confined area may lead to asphyxiation.

Please see appendix 6 for the departmental risk assessment for handling dry ice.

**11 Radiation Hazards**

Currently, the Experimental Medicine and Investigative Medicine laboratories within the JR Hospital do not have an active radiation licence; therefore no “open-source” radiation work is permitted.

Closed-source radiation use (i.e. use of a Gamma – Irradiator) can be arranged through the Department by contacting the Independent Radiation Protection Supervisor Joy Bull for use in the BMS or Nuffield Department of Surgery on level 6 of the JR Hospital.

**11.1 Ultra-Violet Radiation**

All wavelengths of ultra-violet radiation are hazardous to some extent, but the region between 254 nm and 300 nm, which include the 254 nm radiation used for bactericidal purposes, is especially dangerous.

The use of UV transilluminators is covered in a general risk assessment for the department which can be found in appendix 7. The UV transilluminators should be used appropriately and the interlock (when the door is open, the UV light is off) should not be overridden as this results in direct exposure to UV radiation. If this must be done, ensure you are wearing the appropriate PPE and place the sign on the door to notify individuals not to enter.

**11.2 Microwave ovens**

The use of microwave ovens within the laboratories is to be used only for heating reagents and must not be used with food.

Please ensure that containers are appropriate for use in a microwave and that the lid is loosened to prevent the contents from exploding.

Take care when removing items from the microwave as they are likely to be very hot and a rubber gripper should be used or heat resistant gloves should be worn.

**12 Laboratory Departures**

When your time within the laboratory is coming to an end, you are responsible for;

* Completing the Leavers Checklist with Human Resources
* Clearing out your desk and laboratory bench
* Ensure any stored samples or reagents have been consolidated, clearly labelled and ownership transferred to a nominated individual (if applicable)
* Discarding any diluted buffers, solutions
* Return any IT related items to your Group Leader or Laboratory Management (if you have departmental software installed, it must be removed)
* Return access fob

Appendix 1

**CODE OF PRACTICE FOR USE OF CRYOGENIC FACILITIES AND LIQUID NITROGEN**

1. **Status of Code of Practice**

This code of practice is mandatory for all staff and is in accordance with the University Health & Safety Policy statement S4/03 (Liquid Nitrogen), Memo M12/01 (Storage of samples in liquid nitrogen) and local risk assessments.

1. **Cryogenic Facilities**

Experimental Medicine currently has two purpose-built cryogenic areas designated to store liquid nitrogen in storage tanks and supply tanks. Rooms 7607 and 5603 are well ventilated rooms that are equipped with oxygen monitoring, automatic extraction, low level ventilation and metal flooring (Room 5603 only) to ensure safe working procedures. The departmental cryogenic facility at the JR Hospital consists of ;

* 1. Room 5603;
     1. LABS 20K Cryostorage tanks supplied by a 240L pressurized liquid nitrogen vessel
     2. K series 10 supplied by a 180L pressurized liquid nitrogen vessel
  2. Room 7607 contains a K series 24K supplied by a 180L pressurized liquid nitrogen vessel (owned by V Cerundolo).

1. **Safety Provisions**

All laboratory workers are briefed about the facility during the initial Health & Safety induction and informed that training must be completed with the Laboratory Management Team before accessing liquid nitrogen and placing or retrieving samples from the cryostorage tank. Laboratory Management has full risk assessments completed for the all activities performed within this facility;

1. Connecting/Disconnecting liquid nitrogen supply tank from cryostorage unit and moving empty/full tank using service lifts (Only performed by Lab Management Team)
2. Placement/Retrieval of samples from liquid nitrogen cryostorage tank
3. Decanting liquid nitrogen into a canister for snap freezing.

All cryostorage units and pressurized liquid nitrogen supply vessels as well as oxygen monitors are checked, tested and serviced annually by an external company and records are kept with Laboratory Management. A further annual check is performed by the University Insurance Office on all pressurized vessels.

**3.1 Cryogenic Personal Protective Equipment**

The department provides personal protective equipment for use in the Cryogenic Facility consisting of a cryogenic apron, several pairs of insulated gloves available in various sizes and a face shield. These items, along with a laboratory coat and sensible footwear must be worn at all times when handling liquid nitrogen and handling any cryogenic samples or materials. These items of PPE are checked before use and thoroughly checked and recorded annually.

**3.2 Properties of Liquid Nitrogen**

Liquid nitrogen is a colourless, odourless liquid with a boiling point of -196°C, has a density of 0.8kg/L and a very low viscosity. As the liquid changes from a gas at ambient temperature and pressure, the expansion ratio (gas factor) is approximately 700. The resulting cold gas is heavier than air, so it accumulates at low level. The hazards of liquid nitrogen are largely related to the volume of gas produced on evaporation and the low temperature of the liquid. The low viscosity results in a liquid that quickly and easily penetrates clothing. The associated hazards of liquid nitrogen are;

1. Asphyxiation due to the large displacement of oxygen from the local atmosphere
2. Cold burns and frost bite from skin contact or inhalation
3. Explosions due to trapped, expanding gas as well as condensation of liquid oxygen
4. Brittle materials

**3.3 First aid for contact with Liquid Nitrogen**

General rule for first aid involving liquid nitrogen is to warm the area fully with tepid water before removing any clothing or gloves. Seek medical attention**.**

**3.4 Ventilation and Oxygen Monitoring**

As stated in section 2, the cryogenic facility is a room purpose built for storing liquid nitrogen which requires appropriate ventilation and monitoring of oxygen levels. The oxygen monitoring systems has a sensor located at a low level on the back wall and a display alarm panel outside the room on the wall. This sensor measures the level of oxygen in the room which normally is 21% but has two alarm stages when oxygen is depleted below this level. Both alarms are self-cancelling so when the level of oxygen returns to normal range, the alarm will stop

1. Low oxygen alarm: Activated when oxygen has been depleted to 19.5%. The alarm will bleep and the low oxygen red LED on the outer display panel will flash.
2. Critically low oxygen alarm: Activated when oxygen level has reached 18%. The alarm will bleep, the low oxygen LED and the critically low oxygen LED will both flash

Once the oxygen alarm has sounded, the ventilation system will turn the extract fans on to vent the liquid nitrogen gas to the external environment, thereby rebalancing the level of oxygen within the room

**Actions Required**

If alarm sounds and you are **OUTSIDE** cryogenic facility;

* Look at the display panel; DO NOT ENTER is oxygen is below 19% and any LEDs are flashing
* If the oxygen level is 19% and no flashing LEDs, the alarm may be caused by an error with the cryostorage tanks, enter the room to mute alarm.
* Report to Laboratory Management Office

If alarm sounds and you are **INSIDE** cryogenic facility;

* First alarm; low oxygen alarm, Stop what you are doing and investigate the possible source of oxygen depletion and listen to ensure the extraction fans have started. If you are decanting liquid nitrogen into a canister, stop the flow of liquid nitrogen and resume when the alarm has ceased.
* Second alarm: critically low oxygen alarm, evacuate immediately.

**3.5 Training**

As previously stated all laboratory workers wishing to use the cryogenic facilities must complete training organized by Laboratory Management. This training consists of;

* Receiving a copy of the Code of Practice for Liquid Nitrogen including departmental risk assessments listed in section 3 (b and c only)
* Signature of attendance and confirmation of further reading of the above literature.
* Brief talk highlighting hazards and systems of work
* Practical demonstration of decanting liquid nitrogen from the pressurized supply tank into a canister
* Test of the oxygen depletion alarms to familiarize with actions to be taken.

# 4. Handling Liquid Nitrogen

NEVER ATTEMPT TO DECANT LIQUID NITROGEN WITHOUT ANOTHER PERSON PRESENT.

* Wear appropriate PPE (lab coat, cryoapron, insulated gloves and face shield)
* Use a cryogenically approved canister – pre-cool to minimize splash-back
* Place canister in plastic tray to contain splashes
* Use the dedicated hose for dispensing – Never disconnect the supply tank from cryostorage tank
* Hold dispensing hose with one hand, hold the liquid nitrogen supply valve with the other hand
* Slowly turn the liquid nitrogen valve open to allow liquid nitrogen to flow; This will take a few moments as the hose needs to cool down for the liquid to run through and will be accompanied by a vapour and a loud whistling noise. Once the hose is sufficiently cool and has a build up of frost, the liquid should start flowing. Ensure to aim into the canister and avoid splashes if possible. Once a sufficient amount of liquid nitrogen has been decanted, slowly close the valve.
* Ensure lid of canister is locked before moving the canister
* No not leave unused liquid nitrogen in canisters to evaporate– decant back into cryostorage tank
* Use long handled forceps for snap freezing

**5.** **Risk assessments for handling cryogenic materials**

|  |  |
| --- | --- |
| **PROCEDURE: PLACEMENT/RETRIEVAL OF SAMPLES FROM LIQUID NITROGEN CRYOSTORAGE TANK** | |
| **GROUP: LAB MANAGEMENT** | **LOCATION: ROOM 5603 & ROOM 7607** |
| **PREPARED BY: KAREN CLIFFORD** | **SUPERVISOR:** |

**BRIEF OUTLINE OF PROCEDURE/ACTIVITY AND LOCATION**

Biological samples in 1.8ml – 2.0ml cryovials will require storage in and retrieval from Cryostorage tanks located on both level 5 and level 7. *Cryogenic storage tanks are vapour phase only.*

**ADVERSE EFFECTS**

|  |  |  |
| --- | --- | --- |
| **HAZARDOUS AGENT/EQUIPMENT/PROCEDURE/LOCATION** | **ASSOCIATED HAZARDS** | **LIKELIHOOD OF HARM OCCURING** |
| Liquid nitrogen | This substance is extremely hazardous and potentially fatal due to asphyxiation. LN expands and displaces oxygen. The extreme low temperature of -186°C which can cause burns. | Medium |
| Cryogenic vials | Potential for explosion if liquid nitrogen is introduced in vial. Extremely cold | Low |
| Manual handling of cryostorage columns | Heavy load when columns are full. | Low |

**ELIMINATION / SUBSTITUTION OF HAZARD**

**Can this hazard be eliminated or substituted with one less hazardous? NO**

Samples are held in vapour phase only so there should be minimal amount of possible contact with LN2 when removing the columns and minimal chance of vial explosion.

If NO, provide reasoning.

**EXISTING CONTROL MEASURES**

Individuals wishing to store samples in the cryostore must request space from Laboratory Management Office who will do a safety training session on safe handling of LN and cryogenic sample handling. Oxygen alarms are placed in room to sound when oxygen is low. PPE must be worn when performing this procedure (apron, lab coat, visor and insulated gloves). Vials must be placed in a lidded box immediately upon removal from the LN2 tank and when thawing vials, eye protection must be worn and performed in a lidded waterbath.

**PERSONS POTENTIALLY AT RISK**

Individuals performing this procedure as well as others in the vicinity.

**ACTION IN THE EVENT OF SPILLAGE, ACCIDENT OR EMERGENCY**

In the case of alarm sounding, vacate the area immediately. In the case of accidental spillage of LN, leave to boil off. In the case of contact with skin, do not remove PPE but warm area with tepid water and seek medical attention.

**DISPOSAL OF HAZARDOUS MATERIAL**

Vials containing biological material must be decontaminated fully in a 1% solution of Virkon for 20 minutes. Solution can be flushed down drains and wet plastics are to be transferred to a limb bin.

**FURTHER ACTIONS REQUIRED/MONITORING EFFECTIVENESS OF CONTROL**

Cryostorage tanks and oxygen alarms are serviced annually. Training given to new individuals wishing to access this facility and PPE will be inspected before use and replaced as necessary.

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |

**RISK ASSESSMENT/COSHH ASSESSMENT FORM**

|  |  |
| --- | --- |
| **PROCEDURE: DECANTING LIQUID NITROGEN INTO A CANISTER FOR SNAP FREEZING** | |
| **GROUP: LAB MANAGEMENT** | **LOCATION: ROOM 5603 & ROOM 7607** |
| **PREPARED BY: KAREN CLIFFORD** | **SUPERVISOR: N/A** |

**BRIEF OUTLINE OF PROCEDURE/ACTIVITY AND LOCATION**

Scientists require small amounts of Liquid Nitrogen to be decanted into a cryogenic flask to perform snap freezing. Scientists undertaking this procedure are required to be trained by the Laboratory Management team.

**ADVERSE EFFECTS**

|  |  |  |
| --- | --- | --- |
| **HAZARDOUS AGENT/EQUIPMENT/PROCEDURE/LOCATION** | **ASSOCIATED HAZARDS** | **LIKELIHOOD OF HARM OCCURING** |
| Liquid Nitrogen | This substance is extremely hazardous and potentially fatal due to asphyxiation. LN expands to 700 times its volume of liquid to gas and will displace oxygen. The extreme low temperature of -186°C which can cause burns. Explosive risk when liquid is trapped in vial. | Medium |

**EXISTING CONTROL MEASURES**

PPE available is a cryoapron, cryogloves and full face shield and must be worn. Long handled forceps should be used to lower the vial into the liquid nitrogen rather than being dropped in.

The liquid nitrogen supply tanks are kept in dedicated rooms with oxygen monitoring which is serviced annually. The oxygen monitoring system is connected to extract fans which will increase in speed when the critically low oxygen level is reached. Authorized users receive training from Lab Management team regarding the hazards and protocol. The training includes verbal instructions, demonstrations and copies of the protocol and risk assessments. Two people must be present when carrying out this procedure.

**PERSONS POTENTIALLY AT RISK**

Scientists decanting the liquid nitrogen and other personnel in the room at the same time.

**ACTION IN THE EVENT OF SPILLAGE, ACCIDENT OR EMERGENCY**

If the oxygen alarm sounds, stop decanting immediately, turn off the flow of liquid nitrogen and leave the room immediately. Re-enter only when the oxygen alarm has stopped sounding. In the case of spillage, remove yourself from the area and wait for the vapour to dissipate.

**DISPOSAL OF HAZARDOUS MATERIAL**

Excess liquid nitrogen is to be carefully decanted back into the cryostorage tank. Pour the liquid down the inside of the tank whilst avoiding pouring over columns and samples.

**FURTHER ACTIONS REQUIRED/MONITORING EFFECTIVENESS OF CONTROL**

Ensure this procedure is undertaken with two people. Oxygen sensors are serviced annually along with the liquid nitrogen storage vessels and supply tanks. PPE is checked for holes or damage by user before every use and replaced as necessary.

Appendix 2

**Decontamination Policy**

**Any Biological Material**

1% Virkon solution (final concentration) for 20 minutes

**General surfaces**

70% Ethanol or 70% Isopropanol

**Equipment**

10% Trigene Solution

**\*\* In the event of spillage of Biological Material on surfaces or equipment\*\***

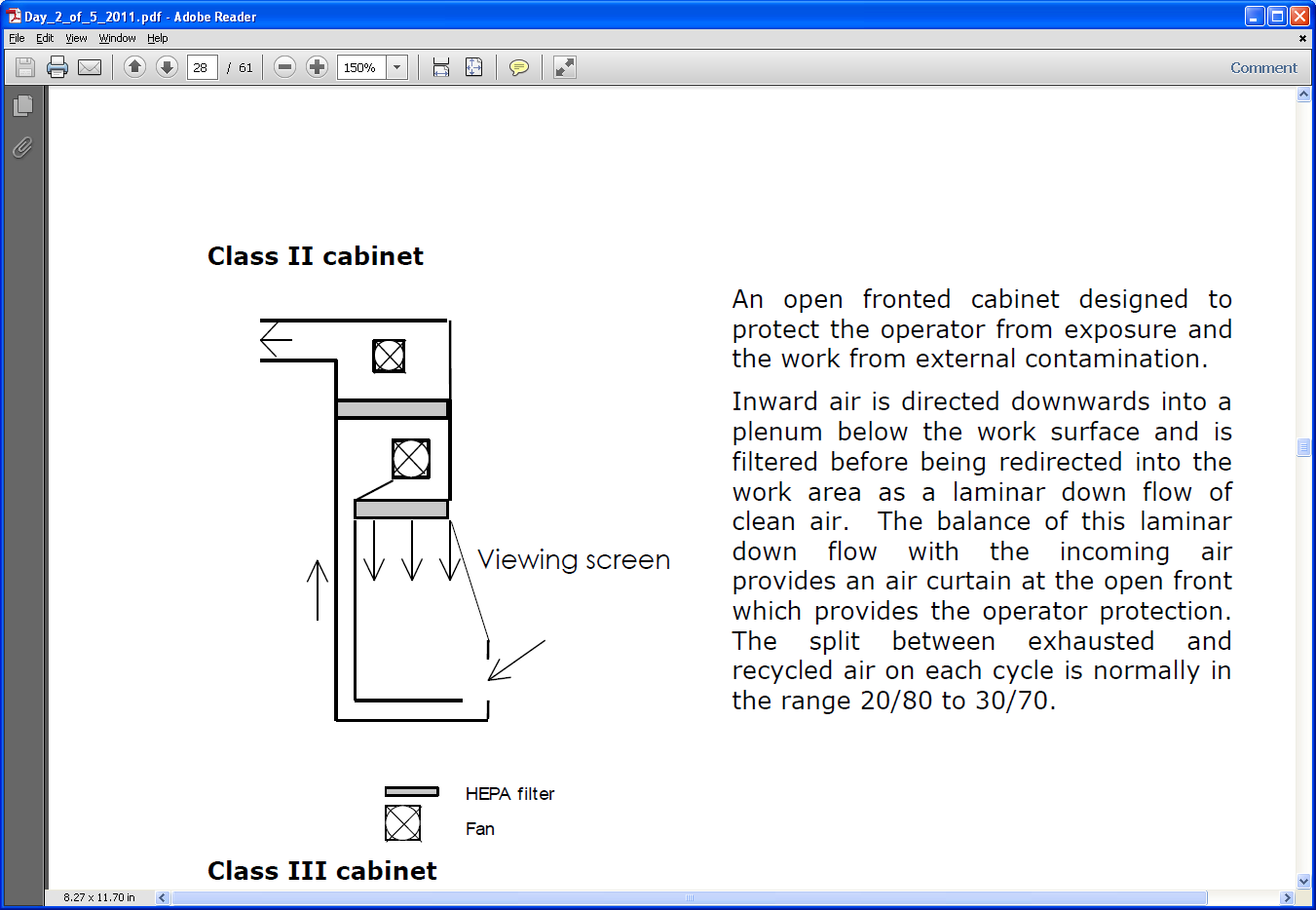
***Large spills Virkon granules for 20 minutes***

***Minor spills 1% Virkon solution***

* Fill waste container with appropriate volume of Virkon (2% stock solution)
* Label container with name, date and time
* Place all solid and liquid waste into Virkon solution when working
* Let waste disinfect for 20 minutes
* Drain and discard solid waste into Limb bins, and carefully place glass or sharps in Sharps bins

Appendix 3

**Good Laboratory Practice: Working with Class II Microbiological Safety Cabinets**



* Before the MSC is used, the night door must be removed; air flow turned on and allowed to stabilize, then sprayed with 70% ethanol to disinfect the working area.
* All items required for working in the MSC should be sprayed into the MSC with 70% ethanol and wiped down before work begins. Please ensure you have a fresh waste container of Virkon available. This container should be labelled with your name, date and time to ensure the correct disinfection time.
* Work within the MSC should be performed in the centre of the cabinet, avoiding blockage of the grills located at the front or back of the MSC. Disruption of airflow will compromise the sterile environment within the MSC.
* Once work has been completed, remove all items from the MSC. Ensure the waste disinfects for the appropriate time. Any sterile consumables that have been opened within the MSC but not used entirely should be taped up and labelled with the word “STERILE” across the tape so it can be used again. Spray the inside of the MSC with 70% ethanol to disinfect.
* If you are the last individual to work in the MSC for the evening, turn off the airflow and place the night door over the opening. The night door is held on a shelf underneath the bottom of the MSC.
* Two types of class II MSCs within the department
  + Vented; Filtered air from the top of the MSC is exhausted to the external environment
  + Recirculated; Filtered air re-enters the room (80% of MSCs in department are this type)
* Servicing of MSCs is done annually and must be fully decontaminated before servicing when hazard group 2 or above material has been used.

Appendix 4

**Guidance for Reviewing Genetically Modified Organism Assessments**

**Definition**

Genetically Modified Organisms pertaining to the Contained Use 2000 Regulations, are created by “*the altering of the genetic material in that organisms in a way that does not occur naturally…using recombinant nucleic acid techniques involving the formation of new combinations of genetic material… and their incorporation into a host organism in which they do not naturally occur but in which they are capable of continued propagation.”*

**Application**

The Contained Use Regulations apply to recombinant techniques using viral, bacterial plasmids or other vectors that resulted in the introduction of the recombinant into a host organism.

* + Recombination does not need to be integrated into the host genome.
  + Expression is not necessary
  + The ability to propagate is a requirement
  + Introduction of genetic material via micro-injections, macro-injection and micro-encapsulation
  + Formation of a transgenic animal to include homozygous gene deletions by experimental means (a gene knock-out or knock-in experiment).

**Approval Process**

See appendix A.

**Building an Assessment**

A GMO assessment is essentially a detailed activity based risk assessment of all component parts during the creation of the GMO.

1. The components of a GMO are:
   * Donor (Organism)
   * Insert (Sequence, gene of interest)
   * Vector (Plasmid, viral vector)
   * Recipient (Organism)
   * GMO (Organism)
2. Components of a risk assessment are:
   * Identify the hazard
   * Identify the Who, What, Where, When (Frequency)
   * Identify the degree of risk
   * Identify how to control the risk (Eliminate, Minimize, Substitute)
   * Identify how work/people will be monitored.
3. The assessment should include

* Overview of the project
* Risk assessment for human health and safety ( include information for all components for the GMO as listed above)
* Nature of the work (general laboratory procedures; should cover all GMO components)
* Risk assessment for environmental harm (assign control measures; cover all GMO components)
* Classification and assignment of final control measures (includes completion of tables and waste management considerations)

**Assessing the Assessment**

The GM Safety Committee will be composed of individuals who have the expertise in these areas but also individuals with limited genetic modification knowledge. All individuals on the committee have a responsibility to review the assessments to the best of their ability. Key words to look out for include: virus, needles, sharps, injection, oncogene, toxic. Here is a list of some main points to look for when reviewing a GMO assessment.

* Check the hazard grouping is appropriate for donor and recipient microorganisms. This can be found on the HSE website (http://www.hse.gov.uk/pubns/misc208.pdf)
* Regarding the inserted material, is this gene encoding for an allergen, toxin, oncogene, hormone, cytokine (more hazardous than a structural gene insert)?
* Is it possible that the recipient organism or the GMO could survive, establish or disseminate or displace other organisms? Is there a selective advantage?
* Can the GMO express a phenotype capable of producing toxic products or interfering with cellular activity?
* How are the recipients and GMOs handled?
* What volumes are used?
* Are viral titres high or low in the procedures? Concentrations?
* Are some elements of the work required to be completed within a Microbiological Safety Cabinet? (Is the cabinet for sterility or safety/protection of the worker?) Is some work done on the bench? Is the containment level appropriate?
* Are any sharps used in the procedures? Needles for inoculations?
* Any organisms during the procedures being aerosolized? An explanation of techniques used that may cause aerosols may benefit those who may not be familiar.
* Disinfection procedures listed? Correspond to the correct hazard grouping?
* Are the recipient organisms/GMOs disabled? Attenuated?
* Does the insertion material alter any existing pathogenic traits?
* What generation is the viral vector being used? Third generation is the safest.
* Has a vector map been included?
* Is there the presence of WPRE sequence within the vector (mainly associated with retrovirus such as lentivirus)?
* Are there SOP’s attached relating to non-standard procedures such as stereotaxic surgery/injection.
* Are there codes of practice attached for the use of needles if they are to be used. This should include training procedures for staff.

Appendix A

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**SUMMARY OF GENETIC MODIFICATION RISK ASSESSMENT PROCESS**

An appropriate risk assessment, approved by the departmental Genetic Modification Safety

Committee, is required before *any work with or storage of* genetically modified organisms (GMOs)

can commence. This includes both novel modifications of micro-organisms, cell lines, or transgenic

animals of any kind within the laboratory or the holding of and work with such GMOs generated

elsewhere and imported into the department, laboratory, or biomedical services unit.

NB possession of vectors such as phages, plasmids, YACs, BACs etc., will not require an

assessment but one must be completed and approved prior to any subsequent transformation or

transfection of cells. However, many viral vector systems are themselves considered to be GMOs

and must be covered by an assessment before they are obtained or used.

To expedite the process please contact the Departmental Biological Safety Officer (BSO) or Area

Safety Officer (ASO) for advice before starting any assessment and to ensure the correct and most

up to date pro forma is used. Also note that any significant changes to work covered by an existing

assessment must be discussed in advance with the BSO or ASO as approval may be necessary.

1. **For work using non-hazardous inserts and host micro-organisms generally handled at**

**Containment Level 1**

(a) Researcher to undertake basic genetic modification risk assessment (use Class 1

pro forma) for the work and forward an electronic copy to the BSO or ASO.

(b) The BSO/ASO to recommend any changes.

(c) Finalize assessment for approval by Genetic Modification Safety Committee and

return to the BSO/ASO.

(d) The BSO to circulate risk assessment (can be done via email) to Genetic

Modification Safety Committee for review, amendment, and approval of

classification. The committee must comment even if it to say they have no comments.

(e) Once committee has approved risk assessment it should be sent to the safety office for final approval. After this process (and head of department has given permission for work to proceed indicated by signing the original risk assessment) the work can commence.

(f) Copies of the risk assessment must be held in the laboratory(ies) where the work

is to take place and a departmental copy of the risk assessment should be held

and must continue to be held for ten years after the work has finished. A copy

should also be sent to the Safety Office for archiving.

(g) The BSO includes details of project in annual returns to the Safety Office.

2. **For work using host micro-organisms handled at, or involving modifications requiring**

**subsequent handling at Containment Levels 2 or 3**

(a) Researcher to undertake genetic modification risk assessment (use Class 2/3 pro

forma) for the work and forward an electronic copy to the BSO or the ASO.

(b) Researcher to discuss with the BSO/ASO about what they want to undertake and

to indicate any collaborations within the University or elsewhere involving this

work.

(c) The BSO/ASO will consult with University Biological Safety Officer (UBSO) who

will advise what the notification requirements are and how to proceed.

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(d) Finalize assessment for approval by Genetic Modification Safety Committee and

return to the BSO/ASO.

(e) The BSO to circulate risk assessment to Genetic Modification Safety

Committee for review, amendment, and approval.

(f) Once committee has approved risk assessment all paperwork to be sent to the UBSO.

(g) The UBSO to notify HSE of work. When HSE has given permission for work to go

ahead the UBSO to write to the BSO to confirm and the BSO have the head of department sign off that they give permission for the work to begin This can be as soon as within

ten days of notification for Class 2 work and is typically six to eight weeks for

Class 3 work.

(h) Copies of the risk assessment must be held in the laboratory(ies) where the work

is to take place and a departmental copy of the risk assessment should be held

and must continue to be held for 10 years after the work has finished. A copy

should also be sent to the Safety Office for archiving.

(i) The BSO includes details of project in annual returns to the Safety Office.

3. **In vivo work (with Genetically Modified Micro-organisms)**

(a) As above depending on Class of GMMO involved plus biological services unit

must be informed of details.

4. **Work with transgenic where GM animal is as safe in containment facility as parental**

**organism**

(a) Researcher to undertake transgenic risk assessment for the work and forward an

electronic copy to the BSO or ASO.

(b) The BSO/ASO to recommend any changes.

(c) Finalize assessment for approval by Genetic Modification Safety Committee and

return to the BSO/ASO.

(d) The BSO to circulate risk assessment to Genetic Modification Safety

Committee for review, amendment, and approval.

(e) Once committee has approved risk assessment a copy is sent to the safety office for final approval (along with the head of department to give permission for work to proceed) before the work can commence.

(f) Copies of the risk assessment must be held in the laboratory(ies) where the work is to take place and a departmental copy of the risk assessment should be held and must continue to be held for ten years after the work has finished. A copy should also be sent to the Safety Office for archiving.

(g) The BSO includes details of project in annual returns to the Safety Office.

Appendix 5

**Chemical Hazard Symbols**

|  |  |  |
| --- | --- | --- |
| **Hazard** | **OLD SYMBOL** | **NEW SYMBOL** |
| Toxic | toxic | 150px-GHS-pictogram-skull_svg |
| Corrosive | corrosive | 150px-GHS-pictogram-acid_svg |
| Highly flammable | flammable | 150px-GHS-pictogram-flamme_svg |
| Oxidising | oxidising | 150px-GHS-pictogram-rondflam_svg |
| Irritant | irritant | 150px-GHS-pictogram-exclam_svg |
| Explosive | explosive | 150px-GHS-pictogram-explos_svg |

|  |  |  |
| --- | --- | --- |
| **Hazard** | **OLD SYMBOL** | **NEW SYMBOL** |
| Dangerous to the environment | environmental_hazard | 150px-GHS-pictogram-pollu_svg |
| Biohazard | biohazard |  |
| Ionising radiation and / or radioactive material | radioactive |  |
| Harmful | harmful |  |
| Gases under pressure |  | 150px-GHS-pictogram-bottle_svg |
| Respiratory sensitisation  Germcell mutagenicity |  | 150px-GHS-pictogram-silhouete_svg |

Appendix 6

**Risk Assessment for Handling Dry Ice**

**BRIEF OUTLINE OF PROCEDURE/ACTIVITY AND LOCATION**

Dry ice (CO2) is delivered twice a week and is left in the North Lift lobby to be picked up by the Lab Management team or scientists and emptied into the CO2 chest in laboratory 5600 and laboratory 7402. Dry ice is also collected from this area to be used during laboratory procedures and for shipping samples.

**ADVERSE EFFECTS**

|  |  |  |
| --- | --- | --- |
| **HAZARDOUS AGENT/EQUIPMENT/PROCEDURE/LOCATION** | **ASSOCIATED HAZARDS** | **LIKELIHOOD OF HARM OCCURING** |
| Dry ice (solid CO2 pellets) | This substance is intensely cold and can cause burns when in contact with bare skin. Sublimation point is -78.5°C to produce CO2 vapours so it should be stored and used in a well ventilated area to prevent asphyxiation. Expansion of the gas from solid increases by 900 times so this substance should not be used in sealed containers or sealed rooms. | Medium |

**ELIMINATION / SUBSTITUTION OF HAZARD**

**Can this hazard be eliminated or substituted with one less hazardous? NO**

Must be used as a refrigerant to achieve certain temperatures. Amounts entering the department are controlled by Laboratory Management and are stored in designated areas.

**EXISTING CONTROL MEASURES**

Dry ice is handled with care whilst wearing a lab coat, safety glasses and insulated gloves. The substance is stored in well ventilated areas in specialist storage chests. Users are made aware of risks and are advised of the proper packing procedure when this substance is used as a refrigerant for sample shipping.

**PERSONS POTENTIALLY AT RISK**

Scientists and personnel handling the substance as well as personnel in the vicinity of the storage chests.

**ACTION IN THE EVENT OF SPILLAGE, ACCIDENT OR EMERGENCY**

In the case of contact with the skin, warm the skin gently by immersion in tepid water and cover with a clean dressing – seek medical attention.

In the case of inhalation, remove from exposure – if recovery is not rapid then seek medical attention immediately.

**DISPOSAL OF HAZARDOUS MATERIAL**

Leave in storage container in well ventilated area to evaporate.

**FURTHER ACTIONS REQUIRED/MONITORING EFFECTIVENESS OF CONTROL**

Check insulated gloves and record. Train users and advise of risks.

Appendix 7

**Risk Assessment for Using UV Transilluminators**

**BRIEF OUTLINE OF PROCEDURE/ACTIVITY AND LOCATION**

The use of transilluminators within the department are enclosed and operate with an interlock in place so if the door is open, the UV source is not on. However, due to particular laboratory activities, it is occasionally required to override the interlock or use a transilluminator which is not enclosed for cutting bands out of electrophoresis gels for downstream molecular biology procedures.

**ADVERSE EFFECTS**

|  |  |  |
| --- | --- | --- |
| **HAZARDOUS AGENT/EQUIPMENT/PROCEDURE/LOCATION** | **ASSOCIATED HAZARDS** | **LIKELIHOOD OF HARM OCCURING** |
| UV light source | Ultra-violet light sources can cause photokeratitis and photochemical cataracts in the eye and erythema (sun-burn), accelerated aging, increased pigmentation, skin darkening and photosensitive reactions | low |

**ELIMINATION / SUBSTITUTION OF HAZARD**

**Can this hazard be eliminated or substituted with one less hazardous? NO**

Frequent use of transilluminators are done with the UV source made safe by the enclosure, but at times, the physical barrier of the enclosure prevents removal of the appropriate section of gel and cannot be avoided.

**EXISTING CONTROL MEASURES**

Users performing this activity must place a sign on the door notifying others of the open UV source. Lab coat must completely cover all of forearms and wrists and fully fastened. Gloves must be worn and pulled over the cuff of the lab coat. A face shield must be worn to cover the face and neck. Perspex cover should be positioned between the light source and the individual.

**PERSONS POTENTIALLY AT RISK**

Individuals performing this task

**ACTION IN THE EVENT OF SPILLAGE, ACCIDENT OR EMERGENCY**

Responses to UV skin damage occur 12-24 hours later. If evidence of skin damage has occurred, notify Laboratory Management as soon as possible.

**DISPOSAL OF HAZARDOUS MATERIAL**

UV light sources are disposed of through the Safety Office

**FURTHER ACTIONS REQUIRED/MONITORING EFFECTIVENESS OF CONTROL**

Face-shield and Perspex cover integrity checked and ensure appropriate training for users.

**STATEMENT OF HEALTH AND SAFETY ORGANISATION**

As Head of the **Experimental Medicine**, I am responsible for ensuring compliance with University Health and Safety Policy. My responsibilities are set out in the Annexe and I have delegated some of these responsibilities to others, as set out in Section 1.

**1. EXECUTIVE RESPONSIBILITY FOR SAFETY**

Every employee with a supervisory role is responsible for ensuring the health and safety of staff, students, and other persons within their area of responsibility; and of anyone else (e.g. contractors and other visitors) who might be affected by their work activities. In particular, the responsibilities listed in the Annexe are delegated to supervisors for areas under their control.

As it is my duty to ensure adherence to the University’s Health and Safety Policy, I instruct every employee with a supervisory role and the Departmental Safety Officer and the Area Safety Officerto report to me any breach of the Policy.

All those with executive responsibility should notify me and the Departmental Safety Officer ***Karen Clifford*** (and the Area Safety Officers ***Dr. Graham Ross*** *and* ***Dr. Julie Hamilton***) of any planned, new, or newly identified significant hazards in their areas and also of the control measures needed to avert any risks identified.

Where supervisors or others in charge of areas or with specific duties are to be absent for significant periods, adequate substitution must be made in writing to me and such employees and other persons as are affected. Deputising arrangements must be in accordance with University Policy.

The following employees have executive responsibility throughout the Department for ensuring compliance with the relevant part of University Safety Policy:

The Administrator ***Jo Hovard*** is responsible for making arrangements for visitors, including contractors, and for ensuring the necessary risk assessments have been made.

The person responsible for the bulk storage of highly flammable and flammable liquids is ***Karen Clifford***

In the following parts of the department, the persons named below have executive authority for safety:

|  |  |  |  |
| --- | --- | --- | --- |
| **Room** | **Responsible Person** | **Office** | **Extension** |
| 5800, 5801, 5802A and B, 5803, 7302, 7400, 7400A and B, 7401, 7401A and B | J Hovard | 5801 | x21320 |
| 5804, 5600, 5601, 5603, 5609 | Dr. C Arancibia | 5802 | x22910 |
| 5061, 5603, 5607, 5609, 7402, 7402C, 7603, 7607, 7609 | K Clifford | 5061 | x22907 |
| 5605 | Dr. H Ferry | 5605 |  |
| 7601, 7705, 7709, 7714, 7718, 7720, 7722, 7724, 7724A, 7730, 7732, 8100 and 8112 | Professor D Crook | 7709 | x21226 |
| Gastroenterology Clinical Trials (L2 Endoscopy) | Dr. S Travis |  | x28771 |

**2. ADVISORY RESPONSIBILITY FOR SAFETY**

I have appointed those listed below to advise me on matters of health and safety within the Department. If any member of the Department does not take their advice, they should inform me. If they discover danger that requires immediate action, they are authorised to take the necessary action and inform me subsequently.

**Departmental safety officer (DSO)**

***Karen Clifford***  is responsible for;

* Advising me on the measures needed to carry out the work of the Department without risks to health and safety
* Coordinating any safety advice given in the Department by specialist advisors and the University Safety Office
* Monitoring health and safety within the Department and reporting any breaches of the Health and Safety Policy to me
* Informing me and the Director of the University Safety Office if any significant new hazards are to be introduced to the Department.

The DSO’s duties are described in University Policy Statement S1/01

To assist in this work, the Department has the following specialist advisors:

**Area safety officers (ASO)**

***Dr Graham Ross*** and ***Dr. Julie Hamilton*** have been appointed to support the DSO in his/her administrative, monitoring and advisory role.

**Departmental Fire Officer**

***Robin Sparkes*** is responsible for advising the DSO on all matters relating to fire precautions and fire prevention in compliance with University Health and Safety Policy.

**Departmental Biological Safety Officer (BSO)**

***Karen Clifford***  is responsible for advice on all matters relating to biological safety, and in particular on the implementation of University Policy Statement S5/09. The BSO’s duties are described in University Policy Statement S5/09.

**Departmental Safety Advisory Committee**

In addition to the above arrangements I have set up a joint Departmental Safety Advisory Committee, whose functions are set out in University Policy Statement S2/01and whose membership comprises of members of both Experimental Medicine and Investigative Medicine working in the JR Laboratories which includes;

|  |  |
| --- | --- |
| Head of Department | Professor Fiona Powrie |
| Departmental Safety Officer | Karen Clifford |
| Fire Officer | Robin Sparkes |
| Business Manager | Jo Hovard |
| Prof Buchan Group Representative | Dr. B Sutherland |
| Prof Crook Group Representative | Ali Vaughan |
| Flow Facility Representative | Dr. H Ferry |
| Prof Cerundolo Representative | Dr. U Gileadi |
| TGU Representatives | Dr. C Arancibia |
| BRC Group Representative | Ishita Marweh |
| Microbiology Lab Manager | David Griffiths |
| Dr. Simon Group Representative | Dr. S Sanderson |
| University Biological Safety Officer | Dr. A Thompson |
| Clinical School Area Safety Officers | Dr. G Ross and Dr. J Hamilton |

The Committee’s terms of reference are:

* **To secure the health, safety and welfare of all employees at places of work under the control of Experimental Medicine**
* **To protect students and other persons who are lawfully on the premises of Experimental Medicine against the risk to their health or safety which might arise out of activities in those places**
* **To maintain safe plant, machinery and equipment and a safe and healthy place to work*.***

It will meet **quarterly, or as appropriate** andfollowing each meeting minutes shall be deposited with the Business Manager and published on the departmental website.

**Biological Safety & Genetic Modification Safety Committee**

I have also set up a Biological Safety & Genetic Modification Safety Committee, whose functions are set out in University Policy Statement S5/09, and whose membership comprises

|  |  |
| --- | --- |
| Head of Department | Professor Fiona Powrie |
| Biological Safety Officer | Karen Clifford |
| Business Manager | Jo Hovard |
| Prof Buchan Group Representative | Dr. B Sutherland |
| Prof Crook Group Representative | Dr. K Dingle |
| TGU Representatives | Dr. C Arancibia |
| Level 7 Group Representative | Dr. U Gileadi |
| University Biological Safety Officer | Dr. A Thompson or T Mustoe |
| Clinical School Area Safety Officers | Dr. G Ross or Dr. J Hamilton |

The Committee’s terms of reference are:

* **Protect staff, students, contractors and visitors from the hazardous effects of biological agents and toxins that are stored or handled within its laboratory and storage facilities;**
* **Reduce to an acceptable level the risk of release of biological and toxicological agents, including via the infection of staff, students, contractors or visitors;**
* **Conduct risk assessments and implement the required control measures;**
* **Comply with all legislation, other legal requirements, or recommended standards applicable to the biological and toxicological agents that will be handled, and with the requirements of any current or future biorisk standards;**
* **Ensure that the need for effective biorisk management shall supersede all other non-health and safety operational requirements;**
* **Communicate individual obligations with regard to biorisk to all staff, students and relevant third parties;**
* **Continually improve biorisk management performance through monitoring of activities and auditing of performance.**

It will meet during the DSAC and reviewing assessments will be done via email**.**

**3. OTHER SAFETY FUNCTIONS**

**First aid**

The following persons are responsible for first aid:

Robin Sparkes – trained first aider

Chris Dodd – trained first aider

First aid facilities are located as follows:

**In the labs, room 5800 and A&E on level 1 of the John Radcliffe Hospital**

**Accident and incident reporting**

***Karen Clifford*** is responsible for keeping the accident/incident report forms and for ensuring accidents are reported promptly to the University Safety Office. Accident report forms are kept in the following places **Room 5061.**

**Display screen assessors**

I have appointed the following people as Display Screen Assessors, and the number is sufficient to ensure no one has to assess more than 50 persons.

***Karen Clifford***

**Manual handling assessors**

I have appointed the following people as Manual Handling Assessors

***Karen Clifford***

**Departmental laser supervisor (DLS)**

***Dr. Helen Ferry***is responsible for advising the DSO on the use of laser systems and in particular for the implementation of University Policy Statement S2/09, which also outlines the other duties of a Departmental Laser Supervisor.

**4. TRADES UNIONS AND APPOINTED SAFETY REPRESENTATIVES**

University Policy Statement S2/04 sets out the arrangements for dealing with trade unions and their appointed safety representatives. Employees who wish to consult their safety representatives should contact the senior safety representative of the appropriate trade union.

UNISON: [unisonoxford@netscape.net](mailto:unisonoxford@netscape.net,)

Unite/Amicus: [unite@herald.ox.ac.uk](mailto:unite@herald.ox.ac.uk)

UCU: [ucu@ox.ac.uk](mailto:ucu@ox.ac.uk)

**5. INDIVIDUAL RESPONSIBILITY**

All Departmental employees, all students and all other persons entering onto the Department's premises or who are involved in Departmental activities have a duty to exercise care in relation to themselves and others who may be affected by their actions. Those in immediate charge of visitors and contractors should ensure that those persons adhere to the requirements of University Health and Safety Policy.

**Individuals must**

a) Make sure that their work is carried out in accordance with University Safety Policy.

b) Protect themselves and others by properly using any safety equipment or devices (e.g. machinery guards) provided.

c) Protect themselves by properly wearing any personal protective equipment that is required.

d) Obey all instructions emanating from the Head of Department in respect of health and safety.

e) Warn me and the DSO/ASO ***[Karen Clifford / Graham Ross]***of any significant new hazards to be introduced to the department, or of newly identified significant risks found on the premises or in existing procedures.

f) Ensure that their visitors, including contractors, have a named contact within the department with whom to liaise.

g) Attend training where managers identify it as necessary for health and safety

g) Register and attend for health surveillance with the Occupational Health Service when required by University Safety Policy.

h) Report all fires, incidents, and accidents immediately to **Karen Clifford**.

i) Familiarise themselves with the location of fire fighting equipment, alarm points and escape routes, and with the associated fire alarm and evacuation procedures.

**Individuals should**

a) Report any conditions, or defects in equipment or procedures, that they believe might present a risk to their health and safety (or that of others) so that suitable remedial action can be taken.

b) Offer any advice and suggestions that they think may improve health and safety.

c) Note that University Policy Statements are available on the web at http://www.admin.ox.ac.uk/safety/notes.shtml and in hard copy in room 5061*.*

**6. SPECIFIC SIGNIFICANT RISKS**

The following areas/activities have been identified as significant risks in this Department:

**Cryogenic Facilities/Liquid Nitrogen**

Local rules are covered within the Laboratory Safety Manual provided at induction and training must be completed with Laboratory Manager, **Karen Clifford** or Assistant Lab Manager, **Robin Sparkes** to access these facilities.

**Risk Assessment Forms**

Copies for risk assessment forms are available in the health and safety folders in all laboratories. Additional forms are available from the DSO, or may be obtained from the University Safety Office Website.

Head of Department ***Professor Fiona Powrie***

Date

**STATEMENT OF HEALTH AND SAFETY ORGANISATION**

As Head of **Investigative Medicine**, I am responsible for ensuring compliance with University Health and Safety Policy. My responsibilities are set out in the Annexe and I have delegated some of these responsibilities to others, as set out in Section 1.

**1. EXECUTIVE RESPONSIBILITY FOR SAFETY**

Every employee with a supervisory role is responsible for ensuring the health and safety of staff, students, and other persons within their area of responsibility; and of anyone else (e.g. contractors and other visitors) who might be affected by their work activities. In particular, the responsibilities listed in the Annexe are delegated to supervisors for areas under their control.

As it is my duty to ensure adherence to the University’s Health and Safety Policy, I instruct every employee with a supervisory role and the Departmental Safety Officer and the Area Safety Officerto report to me any breach of the Policy.

All those with executive responsibility should notify me and the Departmental Safety Officer ***Karen Clifford*** (and the Area Safety Officers ***Dr. Graham Ross*** *and* ***Dr. Julie Hamilton***) of any planned, new, or newly identified significant hazards in their areas and also of the control measures needed to avert any risks identified.

Where supervisors or others in charge of areas or with specific duties are to be absent for significant periods, adequate substitution must be made in writing to me and such employees and other persons as are affected. Deputising arrangements must be in accordance with University Policy.

The following employees have executive responsibility throughout the Department for ensuring compliance with the relevant part of University Safety Policy:

The Administrator ***Jo Hovard*** is responsible for making arrangements for visitors, including contractors, and for ensuring the necessary risk assessments have been made.

The person responsible for the bulk storage of highly flammable and flammable liquids is ***Karen Clifford***

In the following parts of the department, the persons named below have executive authority for safety:

|  |  |  |  |
| --- | --- | --- | --- |
| **Room** | **Responsible Person** | **Office** | **Extension** |
| 5800, 5801, 5802A and B, 5803, 7302, 7400, 7400A and B, 7401, 7401A and B | J Hovard | 5801 | x21320 |
| 5061, 5603, 5607, 5609, 7402, 7402C, 7603, 7607, 7609 | K Clifford | 5061 | x22907 |
| 5605 | Dr. H Ferry | 5605 |  |
| 7500, 7501, 7502, 7503, 7504, 7505, 7506 | Professor A Buchan | 7506 | x20346 |
| 7600, 7602, 7605 | Professor V Cerundolo |  |  |
| 4401, 4401A-D, 4402, 4403, 4403A, 4405, 4501, 4501A and B, 4502 | Professor G Wilcock |  | x34614 |

**2. ADVISORY RESPONSIBILITY FOR SAFETY**

I have appointed those listed below to advise me on matters of health and safety within the Department. If any member of the Department does not take their advice, they should inform me. If they discover danger that requires immediate action, they are authorised to take the necessary action and inform me subsequently.

**Departmental safety officer (DSO)**

***Karen Clifford***  is responsible for;

* Advising me on the measures needed to carry out the work of the Department without risks to health and safety
* Coordinating any safety advice given in the Department by specialist advisors and the University Safety Office
* Monitoring health and safety within the Department and reporting any breaches of the Health and Safety Policy to me
* Informing me and the Director of the University Safety Office if any significant new hazards are to be introduced to the Department.

The DSO’s duties are described in University Policy Statement S1/01

To assist in this work, the Department has the following specialist advisors:

**Area safety officers (ASO)**

***Dr Graham Ross*** and ***Dr. Julie Hamilton*** have been appointed to support the DSO in his/her administrative, monitoring and advisory role.

**Departmental Fire Officer**

***Robin Sparkes*** is responsible for advising the DSO on all matters relating to fire precautions and fire prevention in compliance with University Health and Safety Policy.

**Departmental Biological Safety Officer (BSO)**

***Karen Clifford***  is responsible for advice on all matters relating to biological safety, and in particular on the implementation of University Policy Statement S5/09. The BSO’s duties are described in University Policy Statement S5/09.

**Departmental Safety Advisory Committee**

In addition to the above arrangements I have set up a Departmental Safety Advisory Committee, whose functions are set out in University Policy Statement S2/01and whose membership comprises

|  |  |
| --- | --- |
| Head of Department/Representative | Professor V Cerundolo |
| Departmental Safety Officer | Karen Clifford |
| Fire Officer | Robin Sparkes |
| Business Manager | Jo Hovard |
| Prof Buchan Group Representative | Dr. B Sutherland |
| Prof Crook Group Representative | Ali Vaughan |
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Head of Department ***Professor V Cerundolo***

Date

**Annexe 1**

It is my responsibility, as Head of ***Investigative Medicine****,* directly or through written delegation

1. To ensure adherence to the University’s Health and Safety Policy and to ensure that sufficient resources are made available for this.

2. To plan, organise, control, monitor, and review the arrangements for health and safety, including the arrangements for students, contractors, and other visitors, and to strive for continuous improvements in performance.

3. To carry out general and specific risk assessments as required by health and safety legislation and University Safety Policy.

4. To ensure that all work procedures under my control are, as far as is reasonably practicable, safe and without risks to health.

5. To ensure that training and instruction have been given in all relevant policies and procedures, including emergency procedures.

6. To keep a record of all cases of ill health, accidents, hazardous incidents and fires, to report them to the University Safety Office, and to ensure any serious or potentially serious accidents, incidents, or fires are reported without delay.

7. To inform the University Safety Office before any significant hazards are introduced or when significant hazards are newly identified.

# University Statement of Health and Safety Policy

1. The general provisions of the Health and Safety at Work etc Act 1974 impose a duty on all employers to ensure, as far as is reasonably practicable, the safety of their employees at work by maintaining safe plant, safe systems of work, and safe premises, and also by ensuring adequate instruction, training and supervision. The University is also bound by the Act to ensure the safety of all other persons, who (though not employees) may be affected by the University's work activities.

2. The University has established the Health and Safety Management Sub-Committee, which reports to the General Purposes Committee, with the responsibility to determine the health and safety management strategy and policies necessary for the University to discharge its legal obligations regarding health and safety. There is also a Consultative Committee for Health and Safety, which includes representatives of the recognised trades unions together with others representing a wide spectrum of interest in the University.  The Consultative Committee will advise the Health and Safety Management Sub-Committee on all new health and safety policies and is expected to determine the appropriate health and safety culture for the University.

The Chairman of the Health and Safety Management Sub-Committee, who also chairs the Consultative Committee, is appointed by the Vice-Chancellor

3. The Health and Safety Management Sub-Committee has appointed four specialist advisory groups to advise on ionising and non-ionising radiation safety, biological safety and occupational health.  The Act requires every employer to prepare a written statement of general policy with respect to the health and safety at work of his employees and the organisation and arrangements in force for carrying out that policy, and to bring the statement to the notice of all his employees. Council therefore circulates the following Statement of Safety Policy:

It is the policy of the University, and the responsibility of Council, to adopt all reasonably practicable measures:

(a)           to secure the health, safety and welfare of all employees at places of work under the University's control and elsewhere when performing their duties;

(b)           to protect students and other persons who are lawfully on University premises against risk to their health or safety which might arise out of activities in those places;

(c)           to maintain safe plant, machinery and equipment and a safe and healthy place of work;

(d)          to commit to continuous improvement in the management of health and safety.

4. It is also the policy of the University to ensure that all members of the University and its staff are aware of their individual responsibility to exercise care in relation to themselves and those who work with them. To this end individuals are enjoined to:

(a)           familiarise themselves with University Safety Policy and any departmental or unit safety requirements;

(b)           take reasonable care that all procedures used are safely carried out, and seek expert advice in any case of doubt;

(c)           warn of any special or newly identified hazards in existing  procedures or risks in new procedures about to be introduced;

(d)          report accidents or incidents promptly;

(e)           familiarise themselves with fire and emergency drills (including the location of emergency telephones) and escape routes; and

(f)            where required by University policy register with the Occupational Health Service for health surveillance purposes.

Where self-employed persons or contractors and their employees carry out work on University premises, they must comply with standards of safe working contained in any regulations or codes of practice applicable to their operations, and in the University's safety rules.

5. Divisional heads are responsible for the oversight of departmental arrangements for health and safety within their division in order to ensure that they are functioning in accordance with the University's policies.

6. Heads of departments and institutions, and faculty board chairs in the Humanities Division, are responsible for the health, safety, and welfare of all persons who are lawfully in the buildings under their charge and are required to bring to the notice of all employees a written statement describing the organisation and arrangements for safety within their departments, institutions or units.

7. Responsibility for implementing University Safety Policy rests with heads of departments and institutions or with faculty board chairs. In order to provide expert advice on matters of health and safety, the Council has appointed the following officers:

Director of the University Safety Office;

University Occupational Physician and Director of the University Occupational Health Service.

The policies of the University on specific legislative requirements and other matters are issued as University Policy Statements. Advice on specific hazards and technical items is issued as memoranda by the University Safety Office and by the University Occupational Health Service.

Heads of departments must appoint suitable members of their staff as departmental safety officers to advise them and to liaise with University officers. Area/Divisional safety officers are appointed in high-risk departments and divisions, in order to enhance the departmental safety officer system. Any department using ionising radiation must have a system of radiation protection management based on departmental radiation protection supervisors, whose task is to ensure compliance with statutory regulations and local rules. Departments carrying out genetic modification work must appoint a departmental biological safety officer.

8. This Policy supersedes all previous versions of University Safety Policy. It will be reviewed annually by the Health and Safety Management Sub-Committee.

9. The names of the chairmen of the committees and advisory groups and of the University officers are given in the Appendix.

  (Signed) A Hamilton

 Vice-Chancellor Michaelmas Term 2013