The University Of Sheffield.

The Medical School

Health & Safety Manual

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INTRODUCTION

To whom does the Safety Manual Apply?

To you! Everyone working within the School is both at risk and a potential source of hazard. Whilst not all sections will apply to every person, it is important that everyone is aware of the need to consider safety and minimise risk. The use of the term 'staff' throughout this manual refers to you whether you are a technical, domestic, clinical, clerical, secretarial or academic member of staff, or a student.

Where does the Safety Manual apply?

The remit of the Health & Safety Committee covers all sites the departments and academic units that make up the Medical School. Although most safety advice can be applied across the board it is acknowledged that some information herein will not apply to every building and information in relation to outlying sites should be sought form the Department Manager or Technical Team Lead.

Responsibility

The employer, who must provide a safe environment and the individual, who must act in a responsible manner, shares responsibility for safety. Any individual with supervisory functions also takes on employer responsibilities for those in their charge. It is School policy that academic supervisors take ultimate responsibility for those working on their projects. The University of Sheffield, Sheffield Teaching Hospitals NHS Trust and the Sheffield Children's NHS Trust are committed to providing conditions that promote the health and safety of their staff: you are advised to read the School Policy Statement. The onus, however, remains on the individual who have a duty under the law to work safely and not to do anything that would make things unsafe for others.

Safety Suggestions

If anyone has a suggestion, that they consider will improve safety within the School, they are actively encouraged to pass it on to their local safety representative or Department Manager.

HEALTH & SAFETY COMMITTEE

The Health & Safety Committee was set up in accordance with University guidelines to maintain appropriate standards of safety throughout the Medical School. The Safety Committee takes direction from, and reports back to the School Management Committee and Health and Safety Services on a regular basis. Minutes from its meetings are circulated to all committee members and are available for inspection by any interested parties. The composition of the committee is as follows:

Chair School Safety Committee	Colin Bingle
School Safety Officer	Kevin Corke
Radiation Safety Officer & Neurosciences	Anne Gregory
Biological Safety & GM Officer	Martin Nicklin
Laser & X ray Safety Officer and Cardiovascular Science	Mark Arrians
Human Metabolism	Susan Smith
Infection & Immunity	Yvonne Stephenson
Oncology	Andrew Platt

The Department Managers will be responsible for the day-to-day management of Health & Safety within the school in conjunction with the Lead technicians.

Terms of Reference

1. Monitor the effectiveness of Health, Safety and Welfare arrangements in the Medical School and make recommendations to the School Management Committee and to other Committees as appropriate.
2. Consider, and take action as appropriate on, reports from departments, University and safety representatives.
3. To review Health & Safety processes and procedures, including appropriate risk management measures, to ensure that they comply with relevant legislation and meet current University requirements
4. Consider and approve amendments to the Schools safety manual.
5. Monitor the adequacy of health and safety training and communication.
6. Consider reports from the Health and Safety Executive and other external authorizing bodies and action as appropriate.
7. Set up and monitor working parties as appropriate to address specific issues.
8. To monitor Health & Safety training across the Medical Schools' departments and Units.

POLICY STATEMENT

The Medical School Management Committee (SMC) are committed to safeguarding the health, safety and welfare at work of all its staff and students. We consider safety an essential component of all activities within the School.

SMC are responsible for ratifying policy on safety matters, acting on advice from the Health & Safety Committee, which is also charged with implementing this policy. We regard legally required levels of practice as being the minimum acceptable. We believe that the measures contained within this manual have already led to a safer working environment for all. The policy will be continually reviewed and developed as we strive for progressively higher standards of health and safety in the School.

Although the SMC are ultimately responsible for safety within the School, it is the legal responsibility of all staff and students to play their own part in the maintenance of our high standards and to act in a responsible manner when working in the School. It is also expected that anyone with a supervisory role takes on some of the responsibilities of employer in relation to safety of those in their charge. All who work within the School are encouraged to have input into safety policy by raising issues with their supervisors, Safety Committee representative or directly with the Department Managers or Lead technicians.

The provision of this comprehensive Safety Manual to all staff and students within the School is one indication of our commitment to communicate material on health and safety issues. Further items will be provided as policy and practice develop to keep everyone fully informed at all times.

Please remember that although research inevitably involves unknown risks, no undertaking is so important that it should be pursued in an unsafe manner.

FIRE & OTHER EMERGENCIES

All staff and students must familiarise themselves with the Fire and Emergency Procedures for the building in which they are working. Please see your Department manager, Lead technician or Unit coordinator for local information.

Fire safety training

All staff must complete general fire safety training at least once per year. Fire Training courses are specific to site. These are held at various times during the year and details are circulated in advance. At this fire training session, the nature of the portable fire extinguishers will be explained to staff. You must attend one of the training sessions held near your place of work or if within a University owned property you can undertake the online fire training course.
Within University owned properties fire drills are also held annually.

Access for fire pump

Unimpeded access to premises for fire appliances and ambulances must be maintained at all times. In the event of fire, it is essential that fire appliances and ambulances can gain access to the Schools buildings. Parking cars outside of marked spaces could seriously impede emergency access. Persistent offenders will have their parking privileges withdrawn!

Smoking Policy

Both the University of Sheffield and the Sheffield Teaching Hospitals NHS Trust have established their premises as No Smoking Zones. Smoking is the single most significant cause of ill health and premature death and research has shown that passive smoking carries the risk of lung cancer to non-smokers sharing the same room as smokers. In addition, smoking is a significant fire hazard, particularly in buildings containing laboratories. Smoking is strictly forbidden on University property.

Corridors, stairwells and lobby areas

Circulation spaces are vital escape routes in the event of fire or other emergency. These areas must be free of furniture, equipment, cardboard boxes or anything else that would impede the escape route and access in an emergency. It is particularly important that flammable materials are not placed in these areas as thick smoke from e.g. foam upholstery on chairs, would soon fill the corridors and render visibility a major problem. Nothing should be stored in any of the building's corridors, stairwells or lobby areas.

Fire Doors

The doors of all laboratories and offices are fire resistant and will contain any destructive fire starting behind it long enough to achieve a total evacuation of the building or safe movement to the nearest safe fire zone. If, however, the door has been wedged open this containment measure will be lost, allowing flames and smoke to spread rapidly. Laboratory and office doors should not be wedged open at any time.

People with Disabilities

A Personal Emergency Evacuation Plan (PEEP) will have been agreed between the facilities team leader and any new member of staff or student with a disability during the induction period. In the event of an emergency, any person with a disability may require additional help.

Other Emergencies

The fire alarm system may also be activated in the event of emergency situations other than fire when it is necessary to evacuate the building. The exception to this is a gas leak when the activation of the fire alarm may itself present an ignition hazard and should therefore be avoided.

GENERAL INFORMATION FOR ALL STAFF

Safety documentation

All staff will have access to a copy of this manual and the University of Sheffield Safety Handbook can be found online. In addition, they will receive as appropriate additional safety documentation relevant to their particular research needs e.g. microbiological or radiation hazards. All safety documentation will be supplied by their Lead technicians or Department Manager

Safety training courses

Name of Course	***Place***	***For Whom***	***How Often***
Out of Hours	University on line course	All personnel	Once every 3 years
Fire Training	University on line course	All personnel	Once each year
Radioisotopes	University Safety Services or on line	Anyone working with sealed or unsealed isotopes	Once every 5 years
Manual Handling Training	University on line course	All staff and post graduate students	Once every 3 years
Display Screen Equipment Assessments	Online/Own work area	Designated users (See guidance)	New Starter/Whenever you move workstations
First Aid Training	University Safety Services	Approved volunteers	Once every 3 years
Equipment Training	Within the Department	Named person responsible for equipment	Once only for each item of equipment
Tissue Culture	Within the Department	Anyone using tissue culture	Once

Security Swipe Cards

A security swipe card is required to gain access to the Medical School. Outside normal working hours this card operates and allows access via the Beech Hill Road entrance door to the School and the doors to the hospital link corridor. This level of access is not, however, automatic and is only granted to staff meeting particular criteria (see following section on Out-of-Hours Working). **NB: in an emergency, once the fire alarm system has been activated; the electromagnetic locks on all external doors are automatically released. It is then possible to use any of the external doors to vacate the building and for the emergency services to use any door to gain access.**

Swipe cards for the STH site are available from your department manager/ lead Technicain.

PERSONAL SAFETY / SECURITY

Although the University of Sheffield and the School make every effort to provide you with a safe and secure work environment it must be accepted that we work on a hospital campus, areas of which are open to the public and therefore individuals with less than honest intentions may gain access. Your best defence against personal attack by such individuals is vigilance. The installation of swipe access to within the School has increased the level of security but for this to be effective staff need to be careful of allowing strangers to enter with them. If in doubt, ask strangers who they are and why they need to gain access to secure areas. Report suspicious occurrences to your department Manager, Lead Technician or to Security immediately. You are not expected to endanger your personal safety in the defence of University property. Remember to close and lock windows and doors when you leave offices or other areas containing valuable or sensitive materials. Familiarise yourself with the out-of-hours policy and stick to it. How far away is your nearest colleague?

INFORMATION FOR NEW STAFF

Induction checklist for new staff and students

All new staff and students must be made aware of the following points. It is the responsibility of supervisors to make sure that all new staff are familiar with guidelines in place throughout the School to promote a safe working environment.

- ☐ Location of fire exits, fire call points and assembly point
- ☐ Emergency phone numbers
- ☐ Safety manual, University Health and Safety Handbook and any specialised codes of practice that are relevant - read and understood
- ☐ University identification card
- ☐ Swipe card and enrolment for out of hours course if needed. Undergraduates and those who have not been on the course cannot work out of hours (weekdays 18.00-07.30, weekends and statutory holidays)
- ☐ Introduction to key members of staff
- ☐ Hours of work
- ☐ Procedure for reporting holiday/sick leave
- ☐ First Aid box location
- ☐ Incident Report Book Location

Laboratory workers must also be made familiar with the following points:

- ☐ H&S Induction
- ☐ Waste training Induction. https://www.waste.shef.ac.uk/
- ☐ General risk assessments (e.g. cryogenic liquids, compressed gases, solvents)
- ☐ COSHH forms - location, read, understood and signed all appropriate forms
- ☐ Laboratory coat - when and where it is to be worn – cleaning/collection
- ☐ Location of all safety equipment : gloves, goggles, masks etc
- ☐ Hepatitis B policy and immunisation for laboratory workers
- ☐ General running of the laboratory (ordering; autoclaving; clean/dirty glassware; disposal/waste routes)
- ☐ Use of relevant laboratory procedures and equipment

Please refer to individual departments Induction procedures for further information

ACCIDENTS, INCIDENTS & INJURIES

In the event of an accident:

1. **Make the situation safe.**
   If it is possible to safely **remove the source of an ongoing hazard** (electric current, broken glass, leaking gas etc.) then do so first.

2. **Render immediate first aid.**
   Make sure casualties are safe, then administer immediate first aid if appropriate, following the guidelines covered in your "out of hours" training. If you have not had out of hours basic first aid training, or separate first aid training you should seek the help of a First Aider or someone who has. First aid boxes can be found in all laboratories and some offices. They contain the names and contact numbers of trained First Aiders. You may also seek the assistance of any clinically trained colleague.

3. **Summon assistance.**
   If emergency assistance is required, ring 2222 (RHH & NGH), 4444 (UoS) or 999 depending on the building you are in to report the details of the incident and ask for the service required e.g. ambulance, fire brigade etc. If the hospital is unable to provide specific assistance (with a chemical spill for instance) it is also worth contacting the University's Emergency Control Room on 4444 (24 hr.).

Incident reporting

All incidents should be reported within 24 hours, to the University's Safety Services using the on line reporting system http://www.shef.ac.uk/hs. Incident reports should be completed and details passed to the Facilities Manager. Accidents involving NHS employees should also be reported to the hospital safety officer by submitting an STH accident report form in addition to the University form.

If a casualty requires hospital attention then University Safety Services must be informed immediately by phone on 26100 (during working hours) or via the Control Room on 24085 (24 hr.).

Near-misses

If you have encountered a 'near-miss' or something that you think constitutes a safety hazard, then please inform your Lead technician or Facilities Manager. You may also contact any member of the safety committee informally or, if you prefer, make anonymous use of the suggestion box adjacent to the School Office on C-floor. Please also use this box for any suggestions you might have regarding safety matters. All safety suggestions are taken seriously.

First aid training

The University holds regular first aid training courses. "First Aid at Work" takes either one full week or a half-day per week throughout one term. A shorter "Appointed Persons" course is available and basic level is included in the "Out-of-Hours" training. It is suggested that all staff familiarise themselves with at least a basic level of first aid training to gain the confidence to act sensibly in the event of an accident.
Details of courses will be circulated or can be found at:

https://hs.shef.ac.uk/

GENERAL LABORATORY CONDUCT

Everyone has a legal responsibility to work safely and to not do, or fail to do anything that might make things unsafe for others. Part III of the University Code of Practice on Health and Safety is appropriate to all laboratory-based work and individuals must familiarise themselves with this code before working in the laboratory. Everyone working in a laboratory is responsible for his or her own general conduct and for the safety of the area where they are working.
Importantly all members of staff should set a high standard of safety by personal example so that students and staff develop a responsible attitude to safety at work. Everyone should abide by the following general rules:

- All laboratory areas should be kept clean and tidy.
- Lab coats must be worn in all laboratories at all times and kept fastened. Lab coats must not be worn in offices, lecture theatres, refreshment areas or lavatories.
- Personal protective equipment (Gloves, eye protection, masks etc.) are provided when and where required (if not ask!).
- Avoid breathing chemical fumes or dust – USE FUME HOODS CORRECTLY.
- B-Mercaptoethanol usage must be confined to laboratories with externally vented fume hoods as several current members of staff experience a severe allergic response to this chemical. This means a ban on its use on floors D, E and F where there are no appropriate fume hoods.
- Vessels into which chemicals and reagents are transferred and stored must be LABELLED with the name of the chemical and specific hazards relating to it as indicated on the original vessel
- Laboratory gloves should not be worn when opening and closing doors, answering telephones or using keyboards, in corridors, refreshment areas, lavatories or lifts because of possible contamination risk to door handles, lift buttons etc. A single glove may be used to carry items between rooms.
- Spillages must be cleaned immediately. COSHH forms and risk-assessments should be consulted prior to clean-up if necessary
- When experiments are completed chemicals, reagents and containers etc. should be returned to cupboards or refrigerators as appropriate and glass and plastic-ware decontaminated and deposited for cleaning.
- Waste should be disposed of by appropriate routes (see waste disposal).
- Wash your hands before leaving the laboratory.
- Children under the age of 16 are not allowed in laboratories or office areas.
- Food and drink must not be consumed in a laboratory or stored in any refrigerator that is also used for storing laboratory samples, reagents or specimens.
- Personal stereos are not permitted in laboratory areas. Volume of music from other sources should be kept to a minimum. Fire regulations discourage the use of personal earphones as the fire alarm cannot be heard.
- Appropriate shoes should be worn in laboratories; sandals where toes are exposed are unsuitable in terms of protection.

WORKING OUT-OF-HOURS

Normal Hours Working

Generally this will be from no earlier than 0730 until not later than 1800 Monday to Friday.

What is considered out of hours?

Outside these times (including weekends and times when the University is formally closed).

The following requirements must be observed:

Staff should have completed the appropriate 'Out of Hours Training' course and have attended up to date Fire training.

Between the hours of 6pm and 9pm, Staff and students should have the approval of their line manager or academic supervisor

Anyone wishing to work should speak with their lead technician to establish local policies and procedures

A risk assessment must have been completed for any work performed out of hours.

No practical or experimental work should be performed where there is risk of personal accident or injury. Normally, work out-of-hours should be restricted to library work, computing, writing reports and making non-risk observations.

Any experimental work must be approved in advance by their supervisor.

Heads of Department may permit untrained staff to work outside normal hours alongside other trained staff in low risk areas on an infrequent basis, but only when there is adequate trained supervision and first aid cover. This exception is designed to permit some flexibility for Heads of Department, not to circumvent the Policy.

Anyone who regularly works out-of-hours must understand the emergency system and know what to do in the case of Fire, Accident or other foreseeable emergency, including the importance of accident reporting. They must undertake fire training annually and an elementary general safety session (to fulfil first aid requirements), unless exempt, every three years. Anyone who wishes to work out of hours must have sufficient competency in the English language to be able to communicate in an emergency.

Students must not work alone and must, as a minimum, be within shouting distance of a colleague. Except for work in a library or a designated computer multi-terminal room, undergraduates are not allowed to work out-of-hours unless under the direct supervision of a member of staff. If, in exceptional circumstances, a Head of Department sanctions other out-of-hours working for a particular group of

undergraduates, he/she must ensure that a risk assessment of the activities has been made and appropriate supervisory and safety measures are in place.

Apparatus left running overnight must include fail-safe features. Permission must be obtained from the person in charge of the laboratory before equipment is allowed to run through the night or unattended at weekends. An approved card indicating that the equipment is to be left running should be clearly visible on or beside the apparatus concerned. It should bear the names of person(s) to be contacted in an emergency, at least one of whom should be on the telephone. The School will ensure that the Emergency Control Centre has the name(s) of persons to be contacted in the event of mains failure or other malfunction to services.

Heads of Department, or nominated officers, must give permission for accompanied visitors to enter the department outside normal hours. Permission must be sought in advance during the normal working day. Blanket permission may be approved in special cases where there is very low risk and constant supervision.

Visitors must sign their names in the "Out of Hours" register and signify their status as "Visitor".

Staff or students authorised to work outside normal working hours and who take visitors into school facilities, must supervise their visitors closely throughout the period of the visit. Heads of Department may require a declaration to this effect. Failure to comply with these requirements may result in withdrawal of authorisation to work outside normal working hours.

DISPLAY SCREEN EQUIPMENT

DISPLAY SCREEN EQUIPMENT

In order to reduce the risk of injury, the Law states that users of Display Screen Equipment (DSE) are required to have their workstations assessed.

What is Display Screen Equipment?

Although display screen equipment (DSE) is most often considered in relation to computers (new regulations now include laptops used in the workplace), the strict legal definition speaks of 'any alphanumeric or graphic display screen, regardless of the process involved'. It therefore includes microfiche readers and other devices. Specifically excluded from the regulations are most portable display screen equipment (e.g. calculators, cash registers), most scientific and medical equipment (e.g., cardiac monitors, oscilloscopes, small digital displays), and display units in vehicles.

A small proportion of DSE users suffer health problems as a result of their work but this can generally be avoided by good workplace and job design, and by informing users of the risks and how to avoid them.

The main health risks are:

1. Upper limb disorders (often inaccurately called repetitive strain injury or "RSI"): Aches and pains in the hands, wrist, arm, neck or shoulder. In severe cases if no action is taken, these disorders can become persistent or even disabling.

2. Stress: from pace of work and deadlines, or through frustration or anxiety when a computer system does not work well or the user does not feel competent to operate it.

3. Eyestrain: Long spells of DSE work can lead to tired eyes, discomfort or headaches (and can make users more aware of eye defects such as short sight). However there is no evidence that DSE work can cause disease or permanent damage to eyes.

How does the University of Sheffield define a 'User'?

All members of staff and postgraduate students who are required to use display screen equipment for around 2 hours or more per day, or around 10 hours per week, are required by the Health and Safety (Display Screen Equipment) Regulations 1992, to be trained to be able to set up their workstations so that it is optimised for their use. The Regulations also require employers to assess all workstations to ensure that they are set up appropriately for each user and in compliance with the Regulations, and that working practices are such that they minimise the risks to users.

Display Screen Equipment (DSE) Assessments

DSE Online training system

The University has put in place an online Display Screen Equipment training system to meet its responsibilities to you. It only takes around 20-30 minutes to complete and leads you through everything you need to know to:

- Set up your chair and computer properly
- Adopt good posture
- Use your mouse and keyboard so that you minimise your risk of developing painful RSI conditions
- Spot the early warning signs of developing computer-related health problems

The training package registers each person attempting the training as they enter the system by asking for their UCard number, name and other relevant information on the Login pages. Once logged in please enter all the required information accurately in MyProfile. The User should select Medicine and Biomedical Sciences in the Department drop-down menu in order to comply with The Medical School Health and Safety Committee policy.

In many departments, existing staff and postgraduates may already have received relevant training and workstation assessment from DSE Assessors and Trainers within those departments. If so, there is no need for them to do this training and assessment unless they want to or unless there is a need for reassessment of workstations following changes to location or orientation of the workstation or installation of new display screen equipment.

The training package can be accessed by clicking onto the following URL:

https://hs.shef.ac.uk/subject_areas/display-screen-equipment-dse

After undertaking the training, if any specific concerns are identified these should be reported to one of the Display Screen Assessors/Trainers in your area following which a formal assessment will be undertaken:

Following consultation with an assessor, it will be your responsibility to ensure that any recommendations are followed. Recommendations that require expenditure should be brought to the attention of the Department Manager. The named DSE Assessors/Trainers will keep manual records for the areas causing concern and a copy will be made available at the individual workstation.

Procedure for DSE eyesight tests & corrective lenses

The Health and Safety (Display Screen Equipment) Regulations 1992 require employers to provide members of staff (or people who are to become members of staff) and those identified as a DSE user with appropriate eye and eyesight tests as soon as possible after the request. An appropriate eyesight test means a “sight test” as performed by a registered ophthalmic optician or optometrist.

Further information can be found under forms and templates at:

https://hs.shef.ac.uk/subject_areas/display-screen-equipment-dse

Use of Display Screen Equipment (DSE)

In order to reduce the risk of injury, the Law states that users of Display Screen Equipment (DSE) are required to have their workstations assessed.

Definitions of user, DSE and DSE assessments are detailed in the document for download which you should read carefully.

RISK ASSESSMENTS and COSHH

A School wide risk & CoSHH assessment policy is in place.

What is a risk assessment?

Risk assessment is a legal requirement under the Management of Health and Safety at Work Regulations 1999 and subsequent legislation. Risk assessment must be undertaken on all operations or processes exposing employees to significant risk. The purpose of risk assessment is to identify anything associated with working practices that might cause harm (i.e. hazards) and to assess the likelihood of harm actually being done. The worst possible result of performing a hazardous procedure, the probability of an incident actually happening and the number of people potentially at risk should all be identified. Adequate and practical control measures to minimize risk should then be recommended and implemented. Those using such processes must familiarise themselves with the risk assessment before starting work. It is not optional.

CoSHH Assessments

CoSHH assessment is a legal requirement to comply with the Control of Substances Hazardous to Health (CoSHH) regulations. It is the responsibility of research workers supervising research projects to ensure a relevant CoSHH form is completed. It is University policy that all chemicals/ biochemicals currently held in the laboratories must be associated with at least one CoSHH number and this number must be quoted with all new purchase order requests. Before undertaking experimental procedures, all members of staff must read and sign the relevant CoSHH assessments.

Potential hazards must be identified and an assessment made of the risks posed by use of these chemicals/biochemical hazards in the intended protocol/procedure. Many chemicals are potentially extremely hazardous but in practice are used at such low concentrations that their risk of causing harm is very low. Conversely, many chemicals of low hazard may, in practice constitute a high risk, because of the manner in which they are used or because they are used in combination with other substances.

This CoSHH serves several purposes.

a) It ensures that you complete risk assessments in order to obtain relevant substances.
b) It makes you think about your work from a Safety standpoint
c) It allows us to audit individuals' exposure to hazardous chemicals and procedure.

Hazards identified

For many of the substances and equipment used there will be no hazards identified and nothing further need be entered on the form for them once this is indicated. However, many chemicals and some pieces of equipment have hazards associated with them (irrespective of how they will be used in the procedure to be described). Only significant hazards need to be itemised. The following is a list of hazards to be considered:-

a) Are you using chemicals which are themselves potentially hazardous, e.g. by virtue of their toxicity?
b) Are you using radio-isotopes which are potentially hazardous?
c) Are you using substances which may constitute a flammable hazard?
d) Does your procedure involve using extremes of pressure which may be hazardous to you or others?
e) Does your procedure involve using extremes of temperature which may be hazardous to you or others?
f) Biological agents?

WEL (Work Place Exposure Limit)

(April 2005 – COSHH 2004 replaced OEL regime (OS+MEL) by WEL because of the confusion it caused).

If a substance has a WORKER EXPOSURE LIMIT (WEL), please quote it and ensure that the exposures anticipated in your procedure are well below these limits. Information of exposure limits can be obtained from HSE guidance note EH40. A copy of the WEL list can be found on the Safety Services website in "Guidance".

Disposal routes for waste materials

It is worth considering disposal before starting an experiment. What category of waste does everything fit into? If it is all itemised here life will be simpler later and we will ensure that dangerous items do not end up in the wrong place such as needles in clinical waste bags and solvents down the sinks.

Disposal of Reagents:

The disposal of all waste should be undertaken in accordance with the laboratory disposal code of practice. In general, small amounts of non-infectious solutions may be placed down the drains if accompanied by a large volume of running water.

Forms

COSHH and risk assessment forms are available either electronically or as a hard copy, advice can be obtained from a member of the technical staff. Completed forms and signed sheets are held within the School as either electronic or hard copy.

Useful Links:

COSHH	
Material Safety Data Sheets (MSDS) site lists, info and advice.	http://www.ilpi.com/msds/index.html
Searchable site of MSDS.	http://www.msdssearch.com/
HSE site for the production of basic COSHH assessments.	http://www.CoSHH-essentials.org.uk/
MSDS for infectious micro-organisms - LCDC Canada.	http://www.hc-sc.gc.ca/pphb-dgspsp/msds-ftss/index.html
BOC Gases handbook	http://goo.gl/G0uDAn

Risk Assessment	
H&S Executive.	http://www.hse.gov.uk/pubns/raindex.htm
University H&S	http://www.shef.ac.uk/hs/riskass

SAFETY INSPECTIONS

Format of inspections

All areas of the School are inspected by the Department manager, Lead technician and a representative from another department three times a year (laboratory) and offices annually. Advanced warning is not given. A full report of the findings is published within the department. Serious breaches of safety policy or recurrent failure to adhere to good safety practice will result in disciplinary action.

Radiation and GM areas are inspected separately by the relevant Officers

Records of radiation use and disposal will be checked to ensure that they are accurate and up-to-date. The Safety Officer reserves the right to monitor for the use of isotopes anywhere in the School and if necessary, to prevent offenders from using isotopes. The location of radioisotopes in fridges and freezers will be examined and their actual position will be compared to their recorded point of storage. Additionally, all dilutions of radioisotopes must be clearly labelled with the use of radioactive tape on all containers at all times.

For GM work the records will be checked and the work areas and procedures inspected to ensure that they comply with relevant legislation.

Inspection checklist

Any aspect of safety may be covered by the inspection but the following list itemises points that the inspectors will be particularly looking out for:

A: Laboratories

1. Fire Safety

- Do any aspects of the area constitute a fire safety risk?
- Fire doors propped open?
- Equipment/mess preventing escape from a room?
- Untidy heaps of paper?
- Inappropriate use/storage of organic solvents and flammable gases?
- Electrical equipment not tested?
- Trailing electric leads?
- Fridges used for storing solvents to be spark proof.

2. Biological Hazard

- Do any aspects of this room pose a biological hazard? E.g. contamination of floor, benches or clothing.
- Evidence of eating and drinking in the laboratory?
- Storage of outdoor clothes/personal belongings where they are likely to become contaminated?
- Failure to wear laboratory coats in the laboratory?
- Failure to use gloves where appropriate?
- Evidence of food and drink stored in fridges and freezers?
- Evidence of blood spillages?
- Evidence of inappropriate disposal of syringes, needles, scalpel blades?

- Poor hygiene practices?
- Absence of relevant risk assessments?

3. **First aid and safety equipment**
   - Are there sufficient items of protective equipment such as goggles, face shield, face masks, first aid box, sterile eye wash apparatus, accident book, thermal gloves and disposable gloves?
   - Do staff know where they are kept? Are lab coats etc. being used by workers in the lab?
   - Evidence of lab coats, gloves etc being worn outside of the laboratory area?
   - First Aid Kit contents checked and current trained people listed on the box lid.

4. **Labelling of chemicals/solutions etc. in the laboratory.**
   Are all chemicals on shelves, in fridges/freezers and currently in use?
   Appropriately stored and labelled? (Are lids or caps on?)

5. **Equipment Maintenance and Training in Equipment Use**
   All items of equipment which constitute a safety risk will be inspected by the Committee in terms of risk to the operator and all such items should be clearly labelled:
   'DO NOT USE THIS EQUIPMENT UNTIL YOU HAVE BEEN TRAINED IN ITS USE'

   and
   'THE PERSON RESPONSIBLE FOR THIS EQUIPMENT IS .....'

6. **Communal Areas**
   Communal areas of usage are often neglected e.g. balance areas, beta and gamma counter areas, centrifuge areas etc. It is the responsibility of the person charged with looking after these areas to ensure that these areas and equipment in them are kept tidy - not necessarily by cleaning these items of equipment themselves but by ensuring that others who have used them do so.

7. **Emergency Procedures**
   All staff may be expected to state the emergency telephone number and the procedures to be adopted in case of fire or other emergencies. They should be familiar with the nearest emergency exits and assembly points to be used in the event of a fire.

8. **Poisons Cabinet**
   A 'Poisons Cabinet', which can be simply a secure lockable cupboard, is necessary for any substance classified as a Schedule 1 Poison. If in doubt about any particular chemical this information can be obtained from the Merck catalogue. Any other particularly toxic material can be placed in the Poisons Cabinet at the discretion of the users but on no account should a Schedule 1 Poison be left on the laboratory bench or open shelves.

9. Anything Else

This check list is not meant to be a completely comprehensive list of everything that could be a potential safety hazard. Please also look for anything else which, in your opinion, might constitute a safety hazard to anyone working in the area being inspected. E.g. Poor housekeeping, broken furniture, inappropriate storage or clutter.

B: Offices

The basic raw material in most offices is paper. It is flammable and single sheets in particular are easily ignited. It is heavy in bulk, yet stacks of paper can slide apart, knocking over other items as they collapse. Safety consciousness is as important in an office as in a laboratory.

Health and Safety issues that are particularly relevant to office working and how associated risks may be addressed can be viewed at the following link:

http://safety.dept.shef.ac.uk/guidance/office.pdf

Health and Safety Inspection Check List for office based areas

General Environment

- Sufficient space (a minimum of 11m ^{3} per person)
- Room thermometer reasonably available – comfortable temperature
- Adequate ventilation or air-conditioning
- Humidity (does the air feel dry or do you need some more plants?)
- Lighting
- Staff work areas should be kept clear, e.g. no boxes left in walkways, deliveries stored immediately, etc.

Floor Surfaces

- Worn or missing stair-treads
- Worn floor covering causing a tripping hazard
- Slippery floor surface
- Trailing cables should be moved or protected
- Boxes, coats, cases etc on floor
- Wetness (eg from drinks, weather or cleaners (unless signed) – staff should be encouraged to mop or report spillages

Furniture

- Sharp edges or corners
- Filing cabinets without interlocks (not essential but otherwise should be wedged back or screwed to adjacent ones)
- Unstable cupboards or shelves
- Heavy storage above head-height
- Availability of steps/kickstools in good condition (if necessary)

Electrical Equipment

- All inspected within the prescribed date
- Any damaged plugs, cables or worn insulation?
- Any internal coloured wires visible at the plug head?
- No cube adapters – use fused distribution boards
- “Overloaded” sockets

First Aid

- First aid boxes properly stocked (details in Appointed Person/First aider handouts and on Safety Services' web pages)
- List of qualified personnel inside the lid up-to-date
- At least 2 Appointed Persons certificated within the last 3 years (2 fully qualified first aiders for Type 1 departments and those doing practical work)

Kitchens and Tea Rooms

- Furniture in reasonable condition
- Fridge (if provided) for food only
- Reasonable state of hygiene
- Dishcloths and tea-towels (if any) kept clean

C: Circulation Areas

- Should be kept clean and tidy at all times.
- Access should be kept clear.
- No white laboratory coats should be worn in general circulation areas at any time.
- Spillages should be wiped up immediately.
- Any problems with circulation areas should be reported to your Lead technician.

REPORTING SAFETY CONCERNS

Problems with the fabric or general running of the School should be reported direct to your Department Manager of the Facilities Manager.
If you believe that the actions of a co-worker are jeopardising the safety of themselves or others we recommend that you discuss your concerns with your Lead Technician/ Department manager or Unit coordinator in the first instance. They will be able to offer guidance on whether practices being used are safe or not and will ideally be able to resolve most issues by speaking informally to those involved.

ENCOURAGING GOOD SAFETY PRACTICE

1. When a safety problem is identified, the member of staff concerned will be informally approached by one person from the Safety Committee to discuss the problem in the first instance. It is envisaged that the majority of safety issues will be dealt with at this stage.

2. More difficult problems may be referred back to the Safety Committee for discussion or further, possibly outside, advice may be sought. In the event of the safety problem requiring immediate attention, any member of the Safety Committee is authorised to make on the spot decisions to deal with the situation. It is envisaged that other problems will be referred to the next meeting of the Safety Committee (which meets on a monthly basis).

3. Persistent safety issues relating to individual members of staff (i.e. someone who, through their actions (or lack thereof) is causing safety problems) will be dealt with by the Safety Officer, who will notify that individual in writing with a clear statement of the problem and the changes which need to be made. This letter will usually set a time limit for a solution to the problem and correspondence will be copied to the relevant supervisor.

4. If a letter from the Safety Officer does not bring about a resolution, then a second letter will be sent to the individual's Supervisor and Head of Unit requesting that they take measures to bring about an immediate resolution of the problem. At all stages, advice and help on the issues will be available from the Safety Committee

5. If in the Safety Committee's opinion these actions have not resulted in the desired response with respect to staff safety, then the problem at this stage will be brought to the attention of the School Management Committee with a request for pressure to be brought to bear on the individual concerned. It is anticipated that this will be a rare event but if it occurs then it may be dealt with by application of sanctions such as withdrawal of out-of-hours working privileges or the right to order and work with hazardous materials.

6. If all else fails then official written warnings from the University will be issued followed by University disciplinary procedures which can result in suspension for varying periods of time.

EQUIPMENT TRAINING

Much of the equipment in the School should not be used until the relevant instructions have been read and understood. Some items of equipment should not be used unless you have been instructed in the use of these items of equipment by the person responsible. For training in the use of equipment, please see the individual responsible - their name will be given on the equipment in question.

Problems concerning equipment use, cleaning, damage or breakdown should be referred to the person responsible and if there is any doubt about this, refer the matter to the lead technicians.

Equipment for which specific training is required

DO NOT USE THE FOLLOWING EQUIPMENT UNLESS YOU HAVE RECEIVED PROPER TRAINING:

Item of Equipment	**Major Risk in Misuse of Equipment**
Autoclave	Exposure to high pressure steam, risk of exploding glass bottles and exposure to hot surfaces
Ultracentrifuge	Unbalanced rotors at high speed can break through the centrifuge and adjacent walls (and people)
Electrophoresis Equipment	Electrocution
Radioisotope Counters	Contamination of user and equipment
Microtomes/cryostats	Injury to fingers
Laser	Damage to eyes and skin
Transilluminator	UV damage to eyes and skin

Equipment which should not be used until you have read and understood the instructions

THE FOLLOWING ITEMS OF EQUIPMENT HAVE RISKS ASSOCIATED WITH THEM. PLEASE READ THE INSTRUCTIONS ON THEIR USE AND DO NOT USE THE EQUIPMENT UNTIL YOU KNOW WHAT YOU ARE DOING - IF IN DOUBT, ASK AND GET SOMEONE TO SHOW YOU.

Item of Equipment	Risk in Misuse of Equipment
Centrifuges	Contamination, Mechanical Injury, equipment damage
Ultrasound Equipment	Hearing Damage
Liquid Nitrogen	Asphyxiation, Frost Bite
UV Light Ultraviolet	Skin/Eye Damage
Cell Culture Cabinets	Risk of infection if used incorrectly
Electrically-driven homogenisers	Aerosolisation of material, Production of High Velocity Glass Shards
Microwave Ovens	Electric Arcs, explosion if Stoppard bottles are heated, burns
Ultra Low Freezers	Freezer Burns
Gas Cylinders	Asphyxiation, mechanical injury, back injury
Stills	Risks associated with cleaning including electric shock and exposure to corrosive cleaning agents
Fume Cupboards	Exposure to noxious fumes if used incorrectly or if airflow is disturbed. Fume cupboards must be examined and serviced annually and must not be cluttered. Perchloric acid should not be used as it vaporises and condenses in the ducts.
Pressure Cookers	Risk of explosion and burns
Bunsen Burners	Risk of explosion and burns to exposed skin. Loose clothing or long hair may be a fire hazard.
Hybridisation tubes & bottles	Glass fatigue & explosion

IONISING RADIATION

ISOTOPES

PROCEDURES FOR ISOTOPE WORK

All users of radiochemicals should familiarise themselves with the contents of safety services radiochemical web pages;

https://www.sheffield.ac.uk/hs/specialist-information/radiation

Important contacts for work with radioisotopes within the School and University:

University Radiation Protection Adviser. Trevor Moseley (t.j.moseley@sheffield.ac.uk, x26190) – Health & Safety, Level 2, Arts Tower

University Radiation Protection Technician. Christine Bull (c.bull@sheffield.ac.uk x26203) – Health & Safety, Level 2, Arts Tower.

Medical School Radiation Protection Supervisor-Anne Gregory-(a.gregory@sheffield.ac.uk, x22270)-SITraN, 385a Glossop Road, Sheffield.

Local Radiation Protection Officers:
M floor radiation suite- Mark Ariaans (m.ariaans@sheffield.ac.uk)
Cardiovascular- Mark Ariaans (m.ariaans@sheffield.ac.uk)
G Floor radiation suite and Oncology-Andy Platts (a.platts@sheffield.ac.uk)
Infection and Immunity-Fiona Morrow (f.morrow@sheffield.ac.uk)
Human Metabolism-Sue Justice (s.k.justsice@sheffield.ac.uk)
Jessop's wing Sarah Elliott (s.elliott@sheffield.ac.uk)

Radioisotope suites can be found on M floor (tower block) and G Floor (Medical School)

What to do before you start working with radioisotopes

Registration and training of staff and students

All workers using radioisotopes should be registered for this type of work. This is done by filling in the personal registration form found on the safety services web site:

http:// radwork.group.shef.ac.uk

1. All new users of ionising radiation should receive three lots of training:

- Safety services course for sealed or unsealed sources (renewable every five years). These can be in person and are bookable through Anne Gregory or on line at https://hs.shef.ac.uk/subject_areas/radiation.
- If taking the course on line two modules are mandatory:

1) Radiation - Introduction to Radiation Protection (Module 1)
2) Radiation - Effects, Limits and Legislation (Module 2)
then the third module taken should be either Radiation - Control of Hazards - Unsealed source work or Radiation - Control of Hazards - Sealed source work whichever is applicable. In some cases both these modules will be relevant.

- Specific training on your project from the licence holder.

- Area training from the local radiation officer; Andy Platts /Ian Brock for G floor radiation suite, Sue Justice for Human Metabolism, John Anson for M floor radiation suite, Fiona Morrow for I&I and Sarah Elliott for Jessop's wing

All three training sessions should be reported to the local radiation officer so that the training can be recorded on the on line system.
At the end of these three sets of training the on line courses should be taken and passed to demonstrate that the end user is competent to work with radioisotopes. These courses can be found at https://hs.shef.ac.uk/subject_areas/radiation and are either Radiation - Unsealed Source Workers - Take the Test or Radiation - Sealed Source Workers - Take the Test. In some cases it may be applicable to take both tests depending upon the work you are doing.

Registration of work

All work with radioisotopes should be justified and carried out under a radiochemical work certificate which permits work to be carried out in certain areas of the Medical School. No work with radioisotopes should be carried out without being registered with safety services using the on line application:

http://www.radwork.group.shef.ac.uk

When the on line information has been completed a work certificate will be issued that details the isotopes that may be used, the ordering quantities, the regularity of experiments undertaken, the amount of radioactivity to be handled at any one time and the potential radiation exposure from the work.

Registration of labs

Prior to any laboratory being used for isotope work, it must first be visited by University Radiation Protection Adviser (Trevor Moseley) and be registered for such work. It is School policy that unless absolutely necessary all work involving radioisotopes should be carried out in an isotope suite. Radioisotope work carried out in other laboratories requires the prior permission and inspection of lab by Trevor Moseley.

Once your workers, project and labs have been registered:

How to order your radioisotopes and when they will be delivered

- Isotope orders should be placed with your designated orderer by Wednesday to be processed for delivery the following Tuesday. **Orders not placed by this time may miss the deadline and the delivery could be delayed.** Isotopes in regular use will appear on the University Radiochemical Contract at preferential rate:

  https://finance.shef.ac.uk/sid/agreement_detail.php?agreement=30&commodity=6

  - Isotope deliveries will normally be on Tuesday afternoons. This will be delayed a day when there is a Bank Holiday in the UK, USA, Belgium or Holland on the Monday. Purchasing should alert the school administration of this occurrence to enable workers to have prior warning. Some more unusual isotopes may take longer than a week to be delivered dependent upon production times. Isotopes will be delivered direct to the relevant isotope suite within the School.

What to do when you receive your radioisotope

- It is the responsibility of the individual who placed the original order to ensure that, upon receipt, the isotope is removed from its packaging, the University reference number on the packaging transferred to the isotope container and the isotope placed at it's appropriate storage location and temperature. Having done this, an isotope record sheet must be filled out immediately and the following details recorded:
  - Name of Academic Unit
  - Isotope (P-32, I-125, S-35 etc.)
  - Chemical form (dCTP, NaI, Met-Cys etc.)
  - Date received
  - Activity date
  - Activity on activity date
  - Volume
  - Location of stock isotope (fridge/-20^{0}C or -80^{0}C freezer/-80 /Room No.)
  - University reference number.
- Isotope stocks should always be stored in a lockable fridge or freezer designated for the use. Unless a storage temperature of less than -20^{0}C is required, isotope stocks should be stored in the isotope suite. All storage areas should be labelled with a radiation sign and kept locked.
- The transfer of isotopes from one University Department to another or different Institution must not go ahead without prior consultation with the

School Radiation Protection Supervisor (Anne Gregory) and University Radiation Protection Advisor (Trevor Mosley).

What to do each time you work with a radioisotope and how to dispose of the waste

- Any work involving radioisotopes will normally be carried out in one of the School isotope suites. Any work involving isotopes outside an isotope suite requires the prior permission of Trevor Moseley.
- Before commencing any work in the isotope suite you should fill in the isotope suite log book and choose a work area. You should then monitor the work area and record its activity.
- Each time isotope is dispensed from the stock pot the appropriate isotope record sheet must be filled in, recording the date, the volume or activity of isotope used, and the type of waste generated (solid/liquid/gaseous/scintillant) expressed as a percentage of the total used. **The sheet must be filled out immediately the isotope has been dispensed.**
- The waste generated must be disposed of in the correct way. Solid waste must be placed in one of the appropriately labelled metal bins or in Perspex shielded burn bin. Large amounts of solid waste containing highly penetrating radiation such as I-125 should be disposed of in a lead shielded container. Scintillant waste in scintillation vials should be placed in a plastic tub (5, 10 & 25L). Liquid waste should preferably be flushed down the sluice in the isotope suite; alternatively, low levels (100Bq/ml) may be run to waste in the isotope suite sink. Sinks with a glass dilution container rather than a classic U-bend cannot be used for low level liquid waste disposals.
- If you envisage disposing of large amounts of unused stocks or radioactive waste at the same time, please give advance notice to the local radiation protection officer (see Contacts).
- Any lead-lined isotope delivery pots can be placed in the metal bin near the radioactive store entrance once their isotope container has been disposed of in the solid waste. The lead goes for recycling.
- Once the isotope work is finished the work area and all equipment used should be monitored for contamination using the appropriate monitor. Any contamination found should be reduced to permissible limits (<5 cps) and the isotope log book entry completed to show that the area has been monitored. Any spillage other than the most trivial should be reported to the Local Radiation Protection Officer in charge of the isotope suite (see Contacts) who will be able to give advice or seek guidance if necessary.

How can I monitor my exposure to penetrating radiation?

- Those potentially working with P-32 and other penetrating radiations are issued with OSL (optically stimulated luminescence) badges to monitor personal exposure. The badges are exchanged every three months in the first week of January, April, July & October. New badges will be given to a designated member of the lab and the old ones will be collected a few days later.
- It should be appreciated that failure to return a badge within one month of its expiry date will prevent any meaningful measure of exposure being possible. The Supervisor of any individual who fails to return their badge within one month of its expiry date will be responsible for paying the resulting £40 fine levied by Safety Services. Bearing this in mind, anyone not carrying out any or any more radioactive work within the three month life of the badge should return it to the relevant Local Radiation Protection Officer for safe keeping until return date.
- For those who would like the added reassurance of monitoring at hand level, finger dosimeters are available. These are changed every month and one is worn on each hand.
- Anyone who ceases to carry out isotope work for an extended period of time should contact the relevant Local Radiation Protection Officer to return their finger dosimeters and body badges and the School Radiation Protection Supervisor (Anne Gregory) to be removed from the list of those requiring these items. Provided the individual remains registered for isotope work, obtaining the badges and finger rings at relatively short notice is not a problem.

Why do I have to keep accurate records of the radioisotopes I use?

- The University has a legal obligation to account for the whereabouts of each pot of radioisotope from first receipt to final disposal from University premises.
- At the end of every month the Local Radiation Protection Officer will enter the information in the isotope record sheets onto the University Isoinventory to monitor the use of isotopes and the waste generated. The School has limits on the amount of radioactivity it can store and the amount of liquid and gaseous waste it can generate each month.

Disposal of radioactive waste from the isotope suite at the end of each month

- The Local Radiation Protection Officer will be responsible for producing monthly radiation returns, storing expired isotope record sheets for 4 years (to comply with current legal requirements) and transporting accumulated solid radioactive waste out of the isotope suite.
- Once the monthly radiation returns have been generated and the solid waste figure for the isotope suite is known, it can be transferred to the radiation waste store on UA floor. The correct colour label must be attached to the

waste (Blue for 14C & 3H and Yellow for all other isotopes). On the label write the Academic Unit, your name, the isotope and the activity of the waste (from the solid waste sheet) and put the bags in any of the wheelie bins. Scintillation vials plus any related solid waste must be in the containers obtained from stores and labelled in the same way. The sheet in the folder should then be filled in as required.

- The store is emptied monthly.

Use of Volatile Radioisotopes

Any volatile radio chemicals that present significant risk of personal exposure must only be used in GU05.

Undergraduate Practicals

Any individual responsible for running undergraduate practicals using either sealed or unsealed radiochemical sources needs to register this work at the beginning of each academic year. This is done by completing the undergraduate form found on the Safety Services web site and returning it to Anne Gregory:

https://hs.shef.ac.uk/documents?utf8=%E2%9C%93&search[title_or_description_or_base_tags_name_like]=&search[category_id_eq]=21&search[document_category_id_eq]=2&bookmarked_only=

Safety Inspections

All areas used for work with radioisotopes are inspected twice a year by either the University Radiation Technician (Christine Bull) or the School Radiation Protection Supervisor (Anne Gregory)

X-RAYS

X-ray equipment. The use of x-ray equipment is limited to certified users. To become a certified user requires training by the person responsible for the relevant x-ray equipment.
https://hs.shef.ac.uk/subject_areas/radiation

NON-IONISING RADIATION

LASERS

Radiation safety of laser products is covered by BS EN 60825-1:1994. All lasers and laser systems except low-power Class 1 lasers must be registered with Safety Services. All people intending to work with Class 3R lasers and above or modify lower
Class lasers must register with Safety Services and attend Laser Safety training.
https://hs.shef.ac.uk/subject_areas/radiation

UV

Users of UV equipment should take the on line course and have their name added to the departmental register held by the technical team lead before using and equipment fitted with UV light.

https://hs.shef.ac.uk/subject_areas/radiation

STORAGE AND HANDLING OF VOLATILE LIQUIDS

All volatile liquids should be stored in fireproof solvent storage cupboards, labelled 'Solvents Only'. Corrosive liquids should NEVER be stored in the solvents bin as this constitutes a major fire hazard. The maximum amount of flammable liquids permitted by law in a work-room or laboratory is 50 litres although our aim is to remain well below this. Large stocks of solvents should be stored in the external solvent store in the C- Road flammable store. Solvents that need to be stored below room temperature must be located in fridges or freezers that are certified 'SPARK FREE'. All spark free fridges and freezers in the School are labelled as such. Volatile liquids should be handled according to the appropriate COSHH form for the procedure being performed. As a general rule, all volatile or corrosive liquids should be handled in a fume cupboard and care should always be taken to remove any potential sources of ignition from the vicinity of the experiment.

WASTE DISPOSAL

Disposal of volatile liquids

Small volumes of volatile liquids or very dilute samples may be flushed down the sink with copious amounts of water. Larger volumes of all concentrated volatile liquids must be stored after use ready for collection and disposal by Safety Services. Temporary storage of small volumes of waste in laboratories is permitted, but such stores should be emptied on at least a **weekly** basis. Laboratory stored waste should be categorized and stored in appropriately labelled Winchester bottles according to the list below. Bottles should be labelled according to category and not according to solvent name (all original labels should be removed and replaced with official category labels).

Waste drums are stored in the Medical School's solvent store on C road and are labelled as described below. Laboratory stored waste is decanted into the appropriate drum. All staff and students handling solvents must be familiar with the associated COSHH and SOP forms.

Category X – Halogenated solvents or mixtures containing halogenated solvents

Halogens – bromine, chlorine fluorine, iodine, astatine

Category Y – non-Halogenated solvent

Category Z – Oils

If your procedure requires mixture of acids and solvents then the resultant waste should be stored separately in a metal cupboard away from other solvent waste in glass Winchesters until waste solvents are collected by safety services.

Questions regarding solvent handling, storage and disposal should be referred to the waste solvent coordinator (see contacts).

OTHER WASTE DISPOSAL

The management and disposal of biological waste is highly regulated and legislative requirements have become increasingly complex. To adhere to this, the University in partnership with the Trust have developed a procedure for the identification, segregation and disposal of waste based on the current guidelines which the school is required to adhere to.

To ensure that staff have received appropriate training Estates have developed an online course (www.waste.shef.ac.uk <http://www.waste.shef.ac.uk>) which is compulsory for all lab workers in the University, a modified version for workers on the Trust premises has been developed (select school of medicine as your department)

Note: A copy of the NHS waste Policy is held in Room C13

Solid waste

Solid waste falls into several categories as described below:

Household waste

This is disposed of in black polythene bags (hospital) or clear bags (University). These are for waste with no associated hazards such as paper towels, paper, empty containers, etc. Do not put aerosol cans in these bags. Uncontaminated plastics can also be treated as household waste and disposed of in black bags

Laboratory waste (contaminated materials)

Plastics and materials contaminated with potentially biohazardous material is disposed of in **Orange** sacks. These then go to be rotoclaved and then land fill.

Laboratory waste – (uncontaminated materials)

This is disposed of in **Orange** bagged boxes (hospital) or yellow sacks/black stripe (University). When the boxes are full they need to be sealed with a red security tag attached.

Clinical waste (Hospital Site)

Clinical waste is disposed of in **Orange** sacks as above.
Cytotoxic preparations and prescription drugs must be placed in sharps bins with **purple lids**, which are then incinerated
Disposal of all waste with any (remaining) hazard, such as human tissue should be placed in **Yellow** bins for incineration. Security tags must be attached to the handle of all clinical waste containers.
Also see section on handling human samples & cell lines

Sharps waste

Small yellow containers with **Orange lids** are used for the disposal of all clinical and laboratory sharps i.e. needles, syringes, yellow pipette tips, scalpel blades, etc. but not aerosol cans. Must be UN approved UN3291

Contamination Incidents:
Mon-Fri: 8.30am –4.30pm Ext. 13360

Arranging Disposal of Equipment
Legislation requires the University to separate (waste electrical and electronic equipment) WEEE from other waste. We are legally obliged to send it to be recycled or recovered where possible. The University Recycling Team will collect all types of electrical equipment from kettles and computers to lab equipment and fridges. Simply book a collection by emailing waste@sheffield.ac.uk

If decontamination is required it must be carried out using a suitable disinfecting or sterilising agent. A completed decontamination certificate should be attached to the item for disposal. Make equipment safe before disposal by removing plugs, securing glass shelving/doors with tape and removing hazard /warning signs.
Please contact the department lead technician for guidance.
For disposal of IT equipment please seek advice from the IT team (med-it@sheffield.ac.uk) to ensure that sensitive information has been removed before disposal.

Bulky items and furniture
Bulky items, for example pallets, and furniture can be collected and disposed of by the University portering services. As the size and quantity of these items varies considerably, please contact the waste manager, Charlotte Winnert in the first instance on 29233 or email her on c.l.winnert@sheffield.ac.uk giving as much detail as possible.
You can contact the Recycling Team by e-mailing waste@sheffield.ac.uk.

Incident reporting
A mercury spillage is a dangerous incident – please complete an incident report form and contact Safety Services.

Batteries
Batteries are classified as hazardous waste as they may contain heavy metals. They should be collected in designated special local containers and when these are full contact the waste team waste@sheffield.ac.uk.

Refrigeration Equipment
Any equipment containing CFCs or HCFCs requires specialist disposal after decontamination. There is a charge for removal and disposal of CFC equipment which is invoiced against the Research Group in which the item is located. Details should be forwarded to the facilities manager to co-ordinate collections

Microbiological waste (including GM)
All microbiological waste must be inactivated by autoclaving or chemical inactivation (i.e. Virkon, bleach etc as specified in the risk assessment) before it leaves the building. Once inactivated waste is disposed of via the non-hazardous waste route. Microbiological waste for autoclaving is first placed in an autoclavable waste bag and placed within a metal autoclaving tin (available from the goods lift area on F floor or

wash up on L floor, wash up room at SITraN). When full, fasten the lid with autoclave tape. Write your name, lab number and nature of biological agent on the lid. The tins should then be taken to the autoclaves on F or L before 11am Monday to Friday, DO NOT leave tins of contaminated material by the autoclaves overnight.

Other GM waste

See section on Genetic Modification for details of inactivation procedures (page 37).

Glassware and aerosol can waste

All glassware (broken or not) and aerosol cans should be placed in thick brown paper sacks. Never mix household waste with glass and aerosol cans. Solvent & reagent bottles should be rinsed out with all original labels removed / scrubbed out prior to disposal.

Radioactive waste

See section on Radiation and procedures for Radioisotope work

GENETIC MODIFICATION

All work that involves genetic modification is controlled by Law. This is because of the inherent risks (both real and perceived) involved in such procedures. Before embarking on any procedure which you think might come into this category, it is important to discover whether the procedure is actually controlled by law, and if it is, to obtain approval for both the procedure and for the laboratory in which it will take place. Please seek guidance from the GM safety Officer (GMSO).

Legislation

Control over any work involving genetic modification is ultimately the responsibility of the National Health and Safety Executive (HSE) who have the power to bring prosecutions if the law is infringed. Much of HSE's work is within the University of Sheffield to the Local GMSC (LGMSC), which vets procedures and can give final approval for level 1 GM work and makes recommendations to HSE for all other levels of work. LGMSC acts as an intermediary between the researcher and HSE for class 2 and 3 applications and advice form HSE on GM matters.

Registration of specific projects with LGMSC is not difficult but it is mandatory. **No GM work can go on without the knowledge and official approval of the LGMSC**. Licencing (for Class 1 activities) can be done rapidly by correspondence if the risk of harm posed by a GM organism is extremely remote, as is usually the case,

What constitutes genetic modification?

The Government guidelines on genetic manipulation define it as:

"... the propagation of heritable material by the insertion of that material, prepared by whatever means outside a cell or organism, into a cell or organism in which it does not occur naturally, either – (a) directly; or (b) into a virus, microbial plasmid or other vector system which can then be incorporated into the cell or organism"

Please be aware that storing and culturing GM organisms (including viruses and cell lines), and not just creating new ones, are both considered to be GM activities. On the other hand, amplifying DNA by PCR is not a GM activity. Transient transfection of eukaryotic cells in culture with plasmids is also not considered to be a GM activity, in itself, and nor is possessing a purified plasmid.

However, producing plasmids in bacteria (to put into the cells) is considered GM (with respect to the bacterium) and must therefore be licenced. The LGMSC does not need to approve every modification specifically, but can approve a type of activity within defined limits. This means that provided you have obtained a licence covering a type of activity (for example, growing plasmids to express a defined group of genes

in various mammalian cells), then you will not need to get a new licence from the LGMSC every time you need to make a new plasmid. Any substantial change should be reported to the LGMSC. Your GMSO is likely to be able to advise you of whether a change is substantial enough to require a new approval from LGMSC.

The GM regulations also cover the production of cell/protoplast fusions, stable cell lines, transgenic and knockout animals but they do not cover somatic hybridomas.

New Staff

Before a member of staff can commence genetic modification work at the University of Sheffield, they must complete a confidential Health Record that can be obtained from GMSO and should be returned to the Staff Occupational Health Unit. The GMSO should not see the completed form as it is confidential. A medical examination might be required (but is very unlikely) at the discretion of the supervising medical officer. You must obtain a health review **before** you start any genetic modification work. GM work can only be done according to approved protocols (see "Registration" below).

If the work to be done is already approved, then the **new staff member should read and familiarise themselves with the permit**. In doing the work, the worker must abide by the procedures outlined in the relevant protocol**, particularly the stated methods of containment, inactivation and disposal of the GM organism.**

Registration of New Projects

By law, all GM procedures need to be registered with and approved by the Local Genetic Modification Safety Committee (LGMSC) of the University of Sheffield. GM work, by law, must be confined to laboratories that are specified on the application to the LGMSC. You may add or change rooms to other approved laboratories on notification of the LGMSC. You should check whether the room in question has an appropriate rating before proposing to work there. Please note that some laboratories in the Medical School are not suitable for work at GM Class 2 although they are all are appropriate for Class 1.

New workers on existing projects should consult the approved application for the work that they are planning to do and ensure that they have completed the health review (above). New proposals should be discussed with the person responsible for GM work (through GMSO) who can give advice on the application to the LGMSC and an appropriate level for the application. The GMSO also tries to keep up to date records of all of the GM work in the school so that he can answer enquiries from the HSE.

Applications for work at Class 1 is reviewed locally and attracts no fee. Procedures above Class 1 need to be approved by LGMSC then by HSE.

Class 2 applications attract a fee exceeding £1000 to HSE .

Classification

GM protocols are classified according to the risk of harm that the GM organism (GMO), when used in the procedure, causes to the worker or the environment. GM procedures are assigned a "Class". An activity of a given class cannot be done in a facility with a lower "Containment Level" than the class of the GMO. If there are significant non-GM risks that need to be taken into account, LGMSC can request that a GM procedure should be handled at a higher containment level than is calculated from the risk of the GMO alone, For example, because of the known risk that human cell lines may contain infectious viruses, the creation of stable transfectants expressing luciferase from human cell lines will be performed at containment level 2 even though creating stable human cell lines expressing luciferase is a class 1 GM activity. Please feel free to consult the GMSO

Note that if the LGMSC recommends that a Class 1 procedure is done at containment level 2, then there is still no need to report this to HSE and there is no fee.

If the intended GMO is to be derived from a microorganism that is in "Group" 2 as listed by the HSE Advisory Committee on Dangerous Pathogens (ACDP), then creating the GMO is at least a Class 2 procedure and must be done under Level 2 Containment, unless the genetic modification can be *proved* to attenuate the organism grossly. Class 3 GM work will always require the use of the special Level 3 facility on F floor and will always require the consent of the Microbiology BSO.

Most GMO work in the school is with laboratory strains of *E coli*, which are pathogen group 1, or with mammalian cell lines (which do not fit any pathogen category, though human cell lines should be handled under level 2 containment). Many, but certainly not all, current attenuated virus vectors can be considered within pathogen group 1. Class 1 viral vectors generally have no self-replication ability, no ability to recombine to create viable virus and do not carry a dangerous gene. Do be aware that viral systems are not all the same!

For classification of most GM work, the important considerations are

(1) The nature of the foreign protein that is being produced,

(2) The risk of the organism transferring its modification to a wild, more dangerous host,

(3) The risk of infecting or modifying a worker's cells as a result of an accident and

(4) The likelihood of a harmful outcome to the worker, the population at large and to the environment in the event of an accident involving the quantity of GMO that will be used.

Clearly, an important consideration in all these matters is how the GMO will be handled and how it will be inactivated.

Applications to LGMSC must carry a **risk assessment** that discusses all of these issues. **If the risk is completely negligible, then you may say so, but you must justify your statement.**

Applications may cover “related activities” within a group of workers. In any case the current GMSO recommends that you write a broad application, whose risk assessment covers the GMO and the procedure that you consider to represent the greatest risk, giving the worst case scenario. Ensure that your application is able to accommodate the entire project that you are considering. This will be particularly important for Class 2 applications, because the LGMSC (by law) can only allow changes that do not extend the remit of the work or significantly increase the risk. Creating a new Class 2 application will incur a new fee to HSE.

Please contact the GMSO to obtain the relevant forms and advice.

Changes to protocols

Protocols may be changed subject to the approval of LGMSC. This may be done by writing to the LGMSC. Please send a copy of changes to the GMSO. Include a risk assessment of the changes. The LGMSC will query changes that appear to raise the risk of the procedure, if the risk assessment does not make it clear that this is intended. Note that the LGMSC cannot approve the conversion of a class 1 to a class 2 procedure (which must be notified to HSE with the relevant fee), nor can it (according to the regulations) approve "a significant increase in risk" to a class 2 procedure.

Responsibility

It is the responsibility of scientific staff to ensure that their co-workers (that is, technicians, students, visiting fellows) know when their work falls within GM regulations and are told which licence they are working under. The licence holder must also ensure that their co-workers have enough training to enable them to work safely. It is the responsibility of the licence holder to ensure that all active co-workers have copies of the approved GM application, which will specify how the organism is to be handled and disposed of. It is also the responsibility of the licence holder to ensure that stated safety procedures **can** be followed (for instance, by ensuring that the specified disinfectant is supplied) and that they **are** adhered to. New staff must be supervised until it is clear that they understand and are familiar with safe handling and disposal of the relevant GMO. You should refer to the section on handling of waste and biological hazards for general GM code of practice.

Disposal

The protocols in your application will contain the rules for disposal of the GMO and materials that are contaminated by the GMO. We are currently trying to standardise disposal methods.

By law, GMOs must be "inactivated" before they leave the premises either as solid waste or via the drains.

Generally 1% peroxide based disinfectant (Virkon (R)) is adequate to destroy viruses and organisms in tissue culture medium.

Plasticware containing tissue culture cells (contaminated or infected with GMOs) should be treated for 30 min with 1% Virkon before draining away the disinfected medium and disposing of the flasks as clinical waste.

Rich bacterial broths are traditionally inactivated by addition of hypochlorite or hypochlorite generating compounds to 1%. Much of the oxidising activity is taken up by the broth itself. 0.25 volume of 4% hypochlorite bleach or 25 g/l Actichlor is sufficient.

Solid GM-contaminated waste, such as agar plates, must be autoclaved before disposal. This material may only be removed from laboratories in the Medical School in autoclave tins before it is transferred to the autoclaves. Please refer to section on disposal for more details (Page 34).

Transgenic (and knockout) mice, fish and other whole animals are GMOs. Only live animals constitute a GM risk. (A dead fish is an inactivated fish).

All accidents should be reported to the Safety officer and the GMSO

HANDLING HUMAN SAMPLES & CELL LINES

Infection risk to staff (of unknown pathogenicity?)

All human tissue and cell lines of human origin, whether known to be abnormal or thought to be normal, should be treated with caution to reduce the risk of bacterial or viral infection to the user. Many pathogens are of relevance, although those of most importance are likely to be the Hepatitis B and Human Immunodeficiency viruses.

The University Occupational Health Service offers a vaccination service against Hepatitis B prior to start of work with potentially infectious material. Vaccination status of new staff that may be at risk is checked prior to employment during the pre-employment procedure. Students must also provide proof of their vaccination status to their supervisor before they handle potentially infected material. Students can be vaccinated by the University Student Health service. Note that it is important to have antibody levels checked after a course of vaccination and to have booster doses when necessary to maintain immunity if there is high risk exposure. In the event of an unvaccinated individual being accidentally exposed to a potential source of Hepatitis B infection, they should receive an accelerated course of vaccine post-exposure.

The most common routes for HIV or Hepatitis in the laboratory is via the skin through an uncovered abrasion or a needle-stick injury. Use of protective gloves, waterproof plasters over wounds and extreme care with sharp objects such as scalpels and hypodermic needles represent the best form of protection. In the event of such an injury immediate notification of Occupational Health and Health and Safety via an Accident form will ensure appropriate action i.e. vaccination is carried out.

Solid tissue

Always wear gloves and eye protection when handling human tissue and, wherever possible, handle only inside a class II tissue culture hood. The air flow in a class II cabinet is designed to keep both the user and the material inside the hood safe by filtering the air passing over both. For all physical procedures where the risk of being contaminated by the tissue *e.g.* during homogenisation of the tissue causing production of an aerosol spray, is present, as far as possible carry out these procedures within a class II cabinet. Where this is not possible, *e.g.* centrifugation of samples, please ensure that samples are contained in sealed vessels at all times and that all waste material coming from the human tissue is labelled clearly as human waste material and disposed of appropriately as laid out below.

Blood samples

Blood withdrawal for experimentation should only be performed by suitably trained personnel and never in a laboratory area where chemical and microbiological contamination could have serious consequences. The ideal environment would be a clinical consulting room but where this is not available

the best alternative would be a clean office area where the donor can be afforded some comfort and privacy. However, no blood should be taken in office areas if food and drink is consumed in the area. Blood spillages should be cleaned immediately and the area swabbed with 70% ethanol,Virusolve+ or 10% Hyperchlorite

As for solid tissues, unsealed blood samples should be handled inside a class II tissue culture hood wherever possible. This protects both the user and the sample from contamination. Where this is not possible exposure should be limited by use of appropriate personal protective equipment and by containing samples within tubes and limiting work to areas designated for human blood/tissue work. Gloves should be worn when handling **all** blood samples in all procedures. Eye protection should be worn at all times when handling all biological materials. When processing blood samples in the laboratory, the user should ensure they do not come into direct contact with the blood. Colleagues working in the area should not be put at risk of exposure to blood or blood products. In situations when a considerable volume of blood is handled routinely, it is recommended that an area be set aside for this purpose and supplied with a fluid-proof tray to contain spills and prevent the risk of contaminating colleagues. In the event of blood splashes on skin, you should wash thoroughly with soap and water immediately.

Urine samples

As far as possible, it is recommended that urine samples be processed while still fresh. Gloves should be worn at all times. Eye protection should be worn at all times when handling all biological materials.

Established Cell lines

Always wear gloves when handling human cell lines and, wherever possible, handle only inside a class II tissue culture hood. The air flow in a class II cabinet is designed to keep both the user and the material inside the hood safe by filtering the air passing over both. Where handling inside a class II cabinet is not possible, *e.g. c*entrifugation of samples, please ensure that these are contained in sealed vessels at all times and that all waste material coming from the human tissue is labelled clearly as human waste material and disposed of appropriately as laid out below. It is accepted that the risk presented by certain established cell lines is considerably lower than that presented by primary human material. Primary culture and established cell line culture should ideally not be performed in the same cabinet.

Disposal of solid tissues

Solid human tissue waste should be disposed of using yellow incineration boxes. Prior to placing in the incineration boxes, please put inside a biohazard bag, tied up securely. Red ID tags should be attached to all orange bag in boxes and yellow incineration bins used for the disposal of Clinical waste. If a considerable volume of tissue is to be disposed of by this route, please exercise common sense and do not add this to incineration bins which may stand around over a bank holiday weekend *etc.* waiting to be taken to the incinerator, in this case tissue can be

stored in freezers over the holiday period, clearly labelled "Human Tissue For Disposal". Please remember to include anything that has been used in handling this tissue, *e.g.* swabs, tissues, *etc.* Large volumes of tissue waste should be disposed of inside the yellow incineration bins. Small amounts in cryovials or eppendorf tubes may be placed into the yellow sharp bins.

Disposal of blood samples

For relatively small volumes of blood, it is recommended that the sample be sealed in an appropriate container (*e.g.* the glass or plastic tube in which the blood sample arrived or is centrifuged) and placed in the sharps bin which is eventually incinerated. For larger volumes of blood, an alternative disposal route is to collect blood samples in a glass container where it can then be autoclaved or bleached. Following autoclaving or bleaching the blood can then be disposed of down the sluice and the jar washed out and reused.

Disposal of urine

Human urine should be disposed of down the sluice in the glass washing room or via the lavatories. In the latter case containers should **NOT** be rinsed out in the lavatory hand basins.

Disposal of human cell lines

Human cell lines should be disposed of by adding a presept tablet or 1% Virkon to the culture flask inside a hood, leave overnight, the flask should then be placed in the orange bag in box.

Transmission of infection to patients

As well as protecting themselves, individuals should be conscious of the risk of transmitting viral or bacterial infections to patients or volunteers either directly through contact or indirectly by handling materials which will subsequently be used in patient care. In particular, staff having any such patient contact need to have vaccinations against the Hepatitis B antigen and need to consider all ways of minimising the risks of transmitting infections.

Carriage of Dangerous Goods Act

If it is necessary to send any samples through the post you should be aware of the relevant postal regulations found at:
http://www.parcelforce.com/help-information/sending-advice/prohibitions-and-restrictions
Briefly these state that the sample should be within multiple layers of containment and should be labelled as 'Pathological Specimen - Handle with Care'. Different carriers have their own regulations that you should always check in advance.

FIELD LABORATORY USERS

The major risk associated with using the field laboratory is development of occupational allergies which can develop in sensitive individuals exposed to (for example) animal fur, waste or bedding material and may lead to occupational asthma. There is a small perceived risk from contaminated bedding i.e. excretion of infectious or mutagenic agents via animal urine. All users should take steps to limit risk as follows:

1. The unit is separated into high (animal holding) and low (procedure rooms) allergen areas. Users should spend as little time as possible in the high allergen area.
2. Users should limit the amount of time they spend in the unit *per se*. Only work in the field laboratory if you have to. Don't perform work that could be done elsewhere.
3. Staff should be trained and instructed by their supervisor regarding the risks associated with laboratory animal allergens.
4. Any user who experiences symptoms suggestive of an allergy while working in the unit should report these symptoms immediately to the safety officer.
5. If you suspect you have an allergy, ask a colleague to enter the unit on your behalf – so as to minimise your time in the unit

Symptoms include

a. blocked, itchy or runny nose
b. itchy or watery eyes
c. skin rash
d. tightening of chest

Serious reactions could lead to acute bronchial congestion and anaphylaxis

6. All staff working in the field laboratories must undergo occupational health surveillance upon induction (this should be organised by the School) and then at least annually or more often if required by occupational health. Records of this monitoring will be kept centrally by the Occupational Health Service.

7. Zoonoses – awareness of diseases communicable from animal to man. This is very unlikely but a bite or scratch could transmit infection and must be reported.
8. In the event of pregnancy it is recommended to avoid all procedure work
9. Outer clothing (coats, lab coats) should be removed upon entry and hung separately from the coats to be worn while in the unit.
10. Coloured lab coats/gowns and overshoes provided in the unit should be worn and fully buttoned at all times. Air flow helmet is available for known allergist.
11. Before starting your experiment and at the same time as placing your first animal order, Risk Assessment and COSHH forms (on hazardous substances to be used) should be completed for all procedures to be performed in the unit.

MANUAL HANDLING

The problem with manual handling

We all lift, carry and move objects as part of our daily routine and often do so without serious consideration of the potential for personal injury. Injuries related to manual handling account for more than a third of all 'over-three-day' injuries reported each year to HSE and local authorities and thus represent a significant hazard in the workplace. Most of the reported accidents cause back injury, although hands, arms and feet are also vulnerable.
Any lifting involving a weight in excess of 5Kg and/or lifting an object of large size or difficult shape should be the subject of a suitable risk assessment.

Responsibilities

The employer (in many cases the supervisor of the project for which the task is required) has the following responsibilities:

1. Avoid the need for hazardous manual handling, as far as reasonably practicable
2. Assess the risk of injury from any hazardous manual handling that can't be avoided
3. Reduce the risk of injury from hazardous manual handling, as far as reasonably practicable.

The employee should:

1. Follow appropriate systems of work laid down for their safety
2. Make proper use of equipment provided for their safety
3. Co-operate with their employer on health and safety matters
4. Inform the employer if they identify hazardous handling activities
5. Take care to ensure that their activities do not put others at risk

Points to consider

All manual handling tasks exposing those involved to significant risks or harm should be assessed by a suitably competent person before the task commences. Any reasonably practicable measures, which can be taken to reduce the risk, should be implemented. Mechanical aids must be used wherever practicable.

Do not attempt to lift or move anything if you have doubts regarding your ability to do so. Anyone engaged in manual handling as part of their job should undergo training at an appropriate level. Our porters handle loads regularly. It is often worth consulting them and, if necessary recruiting their assistance.

Being big and strong doesn't render you immune to back injury. If you are the big strong person in the group that everyone gets to help with lifting then you are a good candidate for manual handling training.

Do not attempt to lift a load that is unduly heavy or bulky. In such circumstances, help should always be sought. Consider the following:

1. Can the task be redesigned to avoid manual handling?
2. Get help
3. Use mechanical aids (e.g. a trolley), but only if you have appropriate training.

In team lifting, it should be made clear from the outset who is acting as leader and the lift should be planned carefully before any action is taken.

Consider what you are lifting. Is it inherently hazardous (sharp, hot, cold, infectious, corrosive etc?) Check all packaging (hazard labels) and articles for sharp edges and projections before lifting.

Ensure that there are no obstructions in your path before moving any article.
Ensure that you can see around a load when lifting it.
Ensure that there is adequate room to put down a load when you have moved it.
Repetitive low intensity operations can be more damaging than occasional heavy lifts.

Training & Information

Safety services offer on line training for all staff and post-graduate students which is renewable every three years:
https://hs.shef.ac.uk/subject_areas/general-health-safety-training

PORTABLE APPLIANCE TESTING (PAT)

This testing is a legislative requirement undertaken by the employer. PAT testing is carried out annually on all laboratory electrical equipment. But only every two years on computers and accessories. The test involves visual inspection of the plug, cable, an insulation resistance test and earth test. If passed a colour coded sticker is attached to the item with the next year of testing written on it. Should the item be condemned then the plug is removed, a condemned sticker attached and the person responsible for the laboratory notified. All testing records are kept on a School database.

CRYOGENIC MATERIALS

Liquid nitrogen and dry ice (frozen CO2) are used as cryogenic materials.

Hazards

Volumes of cryogenics greater than 25L have a high potential for creating an asphyxiating atmosphere.
All cryogenic liquids and solids are capable of producing severe frost-bite if brought into contact skin.
Eyes are at risk from exploding vials removed from liquid nitrogen cell stores.
If suddenly heated, cryogenic materials will produce dangerously high pressures in containers and pipe work;
Moisture or air condensing in the narrow aperture of older types of dewars and cryostats can readily cause blockages which may lead to an explosion of the vessel.

Control Measures

1. Protective Equipment
2. Eye protection and cryoprotective gloves MUST be worn whenever pouring or transferring cryogenic material, suitable protection for feet should also be worn. Two people must always be present in case of accident.
3. Minimise volumes used and stored internally.
4. Use only in a well ventilated area.
5. Oxygen depletion monitors are fitted in all laboratories where liquid nitrogen vessels and/or gas cylinders are in use or stored. You must immediately vacate the laboratory on hearing the alarm. Never enter the laboratory if the alarm is activated but as matters of urgency contact lead technician on the alarm label. Please attach a Do Not Enter notice on the laboratory door and report to the Safety officer. Note that in very rough terms, one volume of the common cryogenic liquids will produce about 800 volumes of gas.

Containers for Cryogenic Materials

Only approved containers designed for the appropriate cryogenic materials should be used and all containers must be dry and clean before use. If dewars are used with removable transfer tubes, the person responsible for removing the transfer tube should be aware of the special precautions covering this operation.

Policy and procedure for movement of liquid nitrogen through The Royal Hallamshire Hospital

Policy

All movements of liquid Nitrogen should be made in such a way as to eliminate the potential for harm to those carrying out the activity and anyone else that might be affected by this activity.

In order to comply with this Policy: -

- Only trained personnel will be involved in the transportation of vessels, although untrained personnel, who are aware of the dangers and action to take in an emergency, can be situated outside the lifts.
- Personnel must not travel in lifts with vessels.
- A key controlled lift must be used for transporting vessels, as arranged with NHS Estates Services.
- BOC delivers liquid Nitrogen each Thursday afternoon to a secure compound on "C" Road.
- Liquid Nitrogen movement must take place between 10.00- 10.30 a.m., and 3.00 - 3.30 p.m. to avoid movement at peak times.

Emergency Procedures for liquid Nitrogen movement

In event of spillage emergency on "C" Road: -

Evacuate immediate area - stand upwind of spillage or at least 50 meters downwind but out of direct path of any gas cloud.
Activate personal alarms to warn other occupants on "C" Road of the spillage – drop near to spillage to indicate site of hazard.
Inform Hospital Control and Safety & Security Services immediately and ask them to secure both ends of "C" Road until safe.

In event of spillage emergency inside Store Room on "C" Floor: -

Leave lift doors open & evacuate immediate area.
Activate personal alarms to warn other occupants on "C" Road, "C" Floor and UA Floor of the spillage and to initiate evacuation of the area.
Inform Hospital Safety & Security Services immediately and ask them to secure both ends of "C" Road until safe.

In event of spillage emergency on U/A Floor: -

Evacuate area immediately.
If oxygen deficiency alarm has not activated break fire call point.
Leave lift doors open if possible – to prevent use
Close all doors behind you.
Inform Hospital Control and Safety & Security Services immediately from outside affected area.

This document has been drawn up in consultation with the Head of Safety Services for the University, Safety Services for the Royal Hallamshire Hospital and representation from the Estates Department of the Royal Hallamshire Hospital.
The procedures and rules relating the movement of liquid nitrogen at the Jessop's wing, Western Park Hospital and the Northern General Hospital can be obtained from your lead technician.

References:

BCGA code of practice CP30, The safe use of liquid Nitrogen dewars (2000)
BOC Gases Guidance notes: Movement of cryogenic vessels within lifts

General Notes:

Nitrogen is a colourless, odourless and tasteless gas, which can expand to 683 times its liquid volume and so can produce a local oxygen deficient atmosphere, which will cause asphyxia if breathed.

The Nitrogen dewars for this reason should never be used:

- in enclosed or confined areas
- by untrained personnel

Nitrogen dewars should be adequately labelled and include the following information:

- Product designation, i.e. NITROGEN, REFRIGERATED LIQUID
- Product UN number, i.e. UN1977
- Product danger sign, i.e. Green diamond with a cylinder symbol and the number 2 at the bottom
- Basic safety information

Handling

- When carrying out any task involving liquid Nitrogen the appropriate protective clothing should be worn. This should consist of a minimum of eye and hand protection

Procedure for filling Dewars from bulk containers

- Only trained personnel shall be involved in the filling of dewars.
- When filling sample stores and dewars from a bulk storage vessel, the room should have adequate ventilation and ideally a second person should be present or at least within shouting distance.
- Check that the dewar is clean and free from damage.
- Purge the hose to clear any excess atmospheric moisture or dust, closing the valve as soon as frosting appears.
- Insert the fill-hose into the dewar and ensure it is secure.
- Initiate the fill slowly by opening the fill valve. If the dewar has warmed the nitrogen will boil and turn to gas immediately on contact.
- When the dewar has cooled, the fill valve can be opened fully to establish a steady flow of liquid. If the liquid is spitting back out of the dewar then the flow should be reduced.
- For dewars with neck tubes, stop filling when the liquid reaches the bottom of the neck. The sound of the fill will change, indicating that this has happened.
- For dewars that do not have neck tubes, stop the fill when the liquid reaches the required level, which should be a level below that of the insulating bung. **NEVER OVERFILL A DEWAR**
- When the dewar is full, replace the insulating bung.

Transportation

- Movement of vessels requires at least two people to be present.
- Do not ‘walk’, roll or drag dewars. When carrying dewars a Manual Handling Risk Assessment should have been performed.

- Movement of larger vessels should always be carried out using the trolleys provided.
- Care should be taken to avoid severe jolting and impact.
- Do not transport dewars that are more than 90% full

Movement within lifts

- Vessels to be moved in lifts should be vented until such time as the pressure falls below 60% of the relief valve set pressure. The vessel shall then have all valves closed and allowed to stabilise prior to entry into lift. Open dewars shall be checked for excessive boil off and the correct neck plug fitted.
- A key controlled lift will be available for the movement of vessels within the hospital
- Personnel shall not travel in the lifts with the dewars
- Only trained personnel shall be involved in the transportation of vessel.
- Additional personnel, who are aware of the hazards and action to take in an emergency, shall be situated outside the lifts.
- Do not transport dewars that are venting gas: this especially apples to dewars that have just been filled.

SAFE USE OF COMPRESSED GASES

Hazards

Pressurised gas, used in the laboratory presents several hazards:

1. Uncontrolled release of a large volume of gas can replace air in confined spaces (small rooms) and cause asphyxiation
2. The gas itself may be inherently toxic or flammable
3. Uncontrolled release of gas at high pressure can be associated with considerable force resulting in the cylinder spinning on falling on its side.
4. Pressurised gas cylinders can be very heavy - up to 80 kilos- and act as an unstable object and as such can present considerable danger to those handling them. Never wear opened toed sandals when moving cylinders. Never attempt to catch a falling cylinder. Never use PTFE tape on equipment if a leak is suspect, report it to the appointed personnel and take it out of use.

Control Measures

Training and Instruction

• Risk assessment to determine the risk of an asphyxiating atmosphere developing or other risk to users.
• Cylinders of compressed gases must only be used by those who have been properly instructed in their use and made aware of the hazardous properties (e.g. flammability, toxicity, chemical activity) of the gases used.
• Cylinders must always be stored or kept in a vertical position and must be securely clamped either to the wall or bench or in a specially designated stand.
• At least two people should be available to attempt to move a cylinder. Never move cylinders wearing open-toe sandals. Safety shoes (i.e. steel toes) should be worn to transport gas cylinders. Cylinder trolleys used for transporting cylinders should be three or more preferably four wheel types.
• Safety specs should be worn at all times when using compressed gas.
All users of compressed gases should attend training from their departmental designated compressed gas trainer before attempting to use this equipment.

Recognition

Always check the cylinder label for the correct details before connecting to the regulator. Do not rely on the colour of the label as the colour is only a guide and mainly for the manufacturers benefit.

Air quality monitoring

Oxygen depletion monitors are fitted in all laboratories where compressed gases are in use or stored (with the exception of compressed Air, Medical Oxygen and Helium). You must immediately vacate the laboratory on hearing the alarm. Never enter the laboratory if the alarm is activated but as a matter of urgency contact the named lead technician on the alarm label.

On entering a laboratory be aware of any hissing sound from a faulty cylinder. Leave the room immediately, attach a DO NOT ENTER notice to the door and report your finding immediately to the Safety officer.

Valve Regulators

A Regulator is an intricate instrument that enables the high pressure from the cylinder to be reduced to a safe working level. Only staff who have attended the appropriate training course should change/fit regulators.

All regulators have to be replaced after 5 years whether in active use or not. A record of regulator replacement dates is kept centrally. All regulators must also be checked yearly and a central record kept. Valve outlets to cylinders are screwed left hand for combustible gases and right hand for non-combustible gases to avoid the dangers that could arise by their interchange. It is essential to ensure that an appropriate regulator, suitable for the cylinder in question, is fitted. A cylinder must never be discharged without the use of a pressure control valve. Uncontrolled emission of compressed gas to apparatus could result in a serious explosion.

The protection cap should be in position until the cylinder has been secured at the point of use. Only valve keys or combination spanners should be used when changing cylinders. Check the maximum pressure of the regulator exceeds the pressure of the cylinder. Leak tests must be carried out monthly and after every cylinder change.

Leak testing

It is advisable to leak test once a week.

Always test with a genuine leak detection spray e.g. TEEPOL HB7

DO NOT USE soapy water as this contains traces of oil.

Spray

- Where Regulator screws into the body
- Where Regulator gauges screws into the main body
- Where Regulator outlet goes to hose
- Where Regulator safety valves are screwed to main body

Storage

A bulk store for compressed gas is located on C-road. To order a new cylinder or exchange an empty one contact pharmacy (hospital) or BOC (University)n with all the details giving the type, size, room number to be delivered too and your own extension). A porter will deliver the cylinder but will not disconnect the old one or fit the new one

Transportation and Use

Cylinders should be transported by means of a suitable hand trolley (not lifted by the cap or dragged along the ground.)

BIOLOGICAL SAFETY

Working with Biological Agents - the basics

The following is a discussion of some of the considerations and requirements for researchers intending to work with pathogens and other biological agents. Much of it can be found in "COSHH Regulations 2002". It does not discuss genetic modification of biological agents, although it is still relevant to researchers wishing to carry out GM work with biological agents. Researchers interested in carrying out GM work should visit the Safety Services web site and read "A Guide to the Genetically Modified Organisms (Contained Use) Regulations 2000" and the "ACGM Compendium of Guidance" (the latter is available at http://www.shef.ac.uk/hs/specialist-information/biosafety) in conjunction with the relevant parts of COSHH Regulations 2002.

What is a biological agent?

The Advisory Committee on Dangerous Pathogens (ACDP) and "CoSHH Regulations 2002" defines a Biological Agent (BA) as:

"Any micro-organism, cell culture or human endoparasite (GM or non-GM) which may cause an infection, allergy, toxicity or otherwise create a hazard to human health."

This includes agents responsible for transmissible spongiform encephalopathies and the microscopic infectious forms of larger parasites (i.e. helminths).

Points to note:

(i) Micro-organisms which cannot infect or exert an adverse effect on humans are not BAs.

(ii) A micro-organism which has adverse effects does not have to be infectious to be classified as a BA. The allergenicity and toxicity of the organism are also factors.

(iii) Nucleic acid is not a BA but it can be a substance hazardous to health (e.g. oncogenic DNA) and under such circumstances is therefore subject to COSHH regulations.

(iv) Cell lines derived from multicellular organisms are defined under CoSHH as biological agents, as they may be infected (deliberately or adventitiously) with biological agents (usually viruses or mycoplasmas). Also, it is possible that the cell line may be producing a toxic or allergenic substance.

How are Biological Agents classified?

As outlined in COSHH Regulations 2002, BAs are classified into four **Hazard Groups** (HG) based on:

(i) ability to cause infection
(ii) severity of the disease
(iii) risk that infection will spread to the community
(iv) availability of vaccines and effective treatment

Thus:

HG1 - unlikely to cause human disease.

HG2 - can cause human disease (may be hazardous to employees). Unlikely to spread to the community. Effective prophylaxis available.

HG3 - can cause severe human disease (may be a serious hazard to employees). Can be spread to the community. Usually effective prophylaxis or treatment available.

HG4 - causes severe human disease (serious hazard to employees). Is likely to spread to the community. Usually no effective prophylaxis or treatment available.

Note that the classification of a BA is based on infectivity. Thus, a non-infectious BA which may be very toxic would be classified as a HG1 organism, yet would require substantial control measures under COSHH.

A list of BAs with assignment of hazard group can be found in the ACDP publication "The Approved List of Biological Agents 2004" and may be viewed at http://www.hse.gov.uk/pubns/misc208.pdf.

Who should you notify of intention to use Biological Agents?
COSHH Regulations 2002 stipulates that:

(i) HSE must be notified in advance of first use of any HG2, HG3 and HG4 BA at particular premises. "Particular premises" does not mean the University of Sheffield, but rather it refers to an individual research group or unit (see "COSHH Regulations 2002", Appendix 2, paragraph 27).

(ii) HSE must be notified of intention to use each subsequent HG3 or HG4 BA, and the following HG2 BAs:

Bordetella pertussis
Corynebacterium diphtheriae
Neisseria meningitidis

Exemptions occur where the BA has previously been notified to HSE under the GMO (Contained Use) Regulations (see, Schedule 3, paragraph 5, sub-paragraph 7 in "COSHH Regulations 2002").

The BSO also needs to be informed since they must check, sign off and keep a copy of the Risk Assessment for each BA. If the work involves genetic modification

of HG2 or HG3 BAs (i.e. Class 2 and Class 3 activities), although it is handled by the Local Genetic Modification Safety Committee (LGMSC), the BSO should be made aware of the nature of the work and be provided with a risk assessment. A recent HSE visit has stressed the need for the BSO to keep copies of the RAs.

What control measures should I take?

For each Hazard Group there is a specified set of working conditions known as the "Containment Level". For an HG1 BA, the minimum containment level (CL) which should be employed is CL1, for an HG2 BA the minimum containment is CL2, and so on.

The requirements of each CL are set out in several publications ("COSHH Regulations 2002", "ACGM Compendium of Guidance 2000" and the "A Guide To the Genetically Modified Organisms (Contained Use) Regulations 2000") and can also be found on the Safety Services web-site:
http://www.shef.ac.uk/hs/specialist-information/biosafety.

However, it is important to note that the control measures may need to be modified in the light of other information:

(i) the nature of the BA
(ii) the risk assessment (see below).

For example, you would need to consider whether you are working with the infectious form of the BA and its route of transmission. If a HG2 organism infects the respiratory tract via an aerosol, then one would need to take steps to minimise the production of aerosols, work in an appropriate microbiological safety cabinet (MSC) when there is a risk of aerosol generation, use sealed buckets for centrifugation and so on.

Factors relating to the worker need also to be taken into consideration. For example, are workers at increased risk if they are on medication, afflicted with a pre-existing disease or illness or immunocompromised? What if they are pregnant? If you were working with an organism that can cause wound infections or can cause systemic disease following entry via a lesion or abrasion, and you had a cut finger, you would need to carefully consider the risk of infection even though you will have taken steps to protect the wound. In some cases, the worker should be advised not to work with a particular BA during treatment or while they have a particular condition or injury, or they may be advised not to work with the organism at all.

For genetically modified BAs, the associated risk to the worker or the environment may be greater or less, and the containment level may need to be revised accordingly. The reclassification of CL requires the agreement of the HSE.

Thus, the end result would be a set of "Local Rules" or "Codes of Practice" tailor-made for each BA. These should be detailed in the Risk Assessment (see below) and, ideally, set out in more detail in a set of local rules which each worker should have.

In addition, you must also be familiar with the principles of "Good Microbiological Practice" (Schedule 7 in "A Guide to the Genetically Modified Organisms (Contained Use) Regulations 2000" and http://www.hse.gov.uk/pubns/books/l29.htm).

Note:

(i) the assignment of Containment Level to BAs of different Hazard Groups includes situations where the BA is known to be or is likely to be present in human material.

(ii) this system of containment is distinct from the "Bio safety Level" system operating in the USA. Some biological agents which are handled at BSL2 in the USA should be handled under CL3 conditions in the UK.

What is a risk assessment and do I need one?

This is a statutory requirement. Under COSHH regulations, a risk assessment must be carried out prior to working with a BA. It is not something that is required only for GM work.

Examples of completed forms can be viewed as PDF at http://shef.ac.uk/medicine/staff-info/healthandsafety/coshhonline/coshh

A risk assessment for a BA is required not only when there is a deliberate intention to work with the BA, but also where the worker may be exposed to it through handling infected samples. It is also important for other workers in the lab, not directly involved in the work, to be aware of the risks associated with the BA.

The risk assessment must be carried out by a competent person, either the research supervisor or an individual with the appropriate experience or knowledge of the BA.

The risk assessment must take into account

- the hazard group of the BA
- what form the BA is in
- route and efficiency of transmission of the BA
- the likelihood of exposure to the BA and consequent disease
- the fact that there is no exposure limits for BAs, i.e. that they can replicate to high titres from barely detectable levels
- effect on the environment

From reading a risk assessment, the worker should know to what hazard group the BA belongs, the associated hazards, how it is transmitted, who is at increased risk, how to minimise exposure, whether prophylactics/treatment are available and whether they should have health surveillance.

The risk assessment must be checked and signed off by the BSO, who retains a copy. Risk assessments endorsed by the BSO must be handed out to workers by their supervisors, who must then read and sign them. It is not sufficient to inform the worker that a risk assessment is available on the web. The worker must keep their signed copy of the risk assessment available in the lab and give a copy to their supervisor or to a person responsible for maintaining these records in the academic unit.

What training do I require?

Regulation 12 of "COSHH Regulations 2002" states that the employer must ensure that any person who carries out work which is liable to expose them to a substance hazardous to health is provided with suitable and sufficient information, instruction and training. This responsibility lies with the academic responsible for supervising work involving biological agents. Furthermore, the academic must monitor the work to ensure that the codes of safe working practice are being adhered to. Work must be carried out so as to minimise the risk to the worker, their colleagues, and to the environment. For work with HG3 BAs, it is a legal requirement that a written record of training in maintained. For CL2 work it is considered good practice to do this.

It is not possible to provide enough information on the risk assessment to deal with all experimental scenarios involving the BA. Therefore, as well as training the worker, a separate set of "Local Rules" or "Codes of Practice" for working with that particular BA should be drawn up based on the risk assessment. These should detail how to carry out certain procedures so as to minimise risk. This would be in addition to the more general rules or COP for CL2 or CL3 labs.

Staff should have received training in good microbiological practice and in local safety procedures. There should be guidance on routine cleaning of benches, decontamination, dealing with spillages and other emergencies.

Do not overlook the fact that some procedures which do not involve direct handling of the BA, such as fumigation and use of a pressure cooker or microwave, are also hazardous or potentially hazardous and responsible training should be applied in these situations as well.

No one should start work with a BA until they have received a risk assessment and have received appropriate instruction on how to work safely with the BA.

Do I require health surveillance?

Health surveillance is required under COSHH where:

(i) there is an identifiable disease which may be related to workplace exposure
(ii) there is reasonable likelihood that disease may occur,
(iii) there are valid techniques for detecting indications of the disease

Health surveillance is a statutory requirement for workers exposed to HG3 and HG4 BAs.

In addition to the health surveillance of workers exposed to HG3 and HG4 BAs, a list of all such workers should be maintained for 40 years from the date of last entry made in the list.

Workers should be informed of the availability of vaccines. If vaccines are available they should be offered free of charge.

How do I inactivate and dispose of the BAs I am working with?

All BAs must be inactivated prior to disposal. Disinfectants are usually used to inactivate small volumes of liquid waste and to decontaminate items of equipment. Disinfectants should be validated to ensure 100% kill of the organism you are working with under the same conditions under which you handle the organism, and should be monitored regularly. Procedures should have been determined by your supervisor before you start work. Disinfectant solutions should be freshly made, labelled and dated.

Autoclaving is more efficient and must be used for plate cultures. More details regarding the procedure for autoclaving is given in the section on disposal (page 34)

The method of inactivation should be summarised in the risk assessment. However, it is good practice to have a written set of detailed procedures for waste inactivation and disposal, either as a separate document or as part of the local rules for working with a particular BA.

What are the procedures I need to follow in the event of an accident?

Procedures must be drawn up by the supervisor to deal with accidents (i.e. spillages) involving a BA. This is a statutory requirement for HG3 and HG4 BAs, and is considered good practice for handling major incidents (i.e. high volume spills) involving HG2 BAs. Emergency procedures must be kept in writing or recorded electronically in such a way that they are readily accessible. This information must be provided to every worker. There should be a chain of command within each research group in the event of an accident or spillage, i.e. a responsible individual should be identified who can advise or ensure that the correct procedures are followed. The BSO must be informed of any incident which may result in the release of a BA which could cause severe human disease.

The final word on Health and Safety issues is the responsibility School Council in conjunction with advice from the School safety committee and University Safety Services.

PATIENTS, VOLUNTEERS, VISITORS, CONTRACTORS & ANCILLARY WORKERS

Clearly, visitors will be less familiar with the hazards associated with our work environment than we are. By the same token, ancillary workers are not expected to have detailed knowledge of hazards contained within specific laboratories. For this reason it is strongly recommended that you do not leave visitors unattended in laboratory areas unless unavoidable. Where visitors do have access to laboratories it is your responsibility to bring all hazards associated with those areas to their attention and inform them of any relevant emergency procedures. If visitors engage in laboratory work then they must read, understand and sign appropriate COSHH forms which must be undersigned by the academic supervisor.

The need for a tidy work area, appropriate labelling, handling and storage of hazardous material, appropriate labelling of hazardous machinery and appropriate handling/disposal of waste are all extremely important in areas where visitors or ancillary workers may have access.

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LITERATURE AND SOURCES OF INFORMATION

University of Sheffield Safety Services	http://www.shef.ac.uk/safety
The Health and Safety Executive	http://www.hse.gov.uk
National Radiological Protection Board	http://www.nrpb.org.uk
US Chemical safety & Hazard Investigation	http://www.csb.gov/
British Safety Council	www.britishsafetycouncil.co.uk
BOC Gas Data & safety	http://goo.gl/gvQDJR
Material Safety Data Sheet search	www.msdssearch.com
Health Protection Agency	http://www.hpa.org.uk/
Display Screen Equipment (DSE) Assessment and Training	http://goo.gl/d9lQwB